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Evaluation of Dietary Patterns, Eating Behaviors and Gastrointestinal Symptoms among Autistic Children

A Dissertation by

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To

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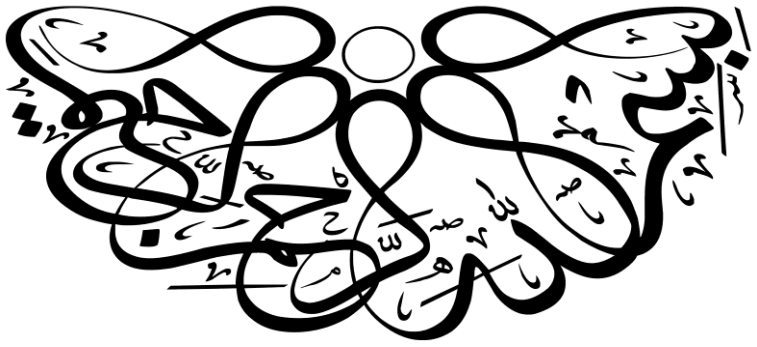

وَاصْبِرْ لِحُكْمِ رَبِّكَ فَإِنَّكَ بِأَعْيُنِنَا وَسَبِّحْ بِحَمْدِ رَبِّكَ حِينَ تَقُومُ ۝

صدق الله العظيم

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Dedications

With great respect I dedicate this effort to

The memory of my father and brother bless of Allah on them (I will never forget them).

My mother for her great help and support.

My brothers and sisters

The wellspring of an inspiration, power, and love, my husband, Mohammed

My brothers, which my mother did not give birth to them (Ghazwan Jassim, Ali Abdul Hassan&Abbas Naji)

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Abstract

ABSTRACT

Background: Autism Spectrum Disorder is a clinically heterogeneous neurodevelopmental disorder that manifests as a persistent impairment in social interaction and social communication, with repetitive or stereotyped behavior is that range from mild to severe. Children with Autism Spectrum Disorder presents with unique nutritional challenges and nutritional deficiencies that often lead to poor dietary pattern, which lacked the recommended nutrients important for proper growth and development. Along with the poor dietary pattern, they also have problem in eating behavior and gastrointestinal symptoms.

Objectives: The study aims to evaluate of dietary patterns, eating behaviors and gastrointestinal symptoms among autistic children, and Find -out the relationship between dietary patterns, eating behaviors and their effect on gastrointestinal symptoms.

Methodology: A descriptive correlational study design was carried out in Al-Najaf Al-Ashraf City, which was selected to confirm its objectives through the period October 20th 2021 to May 18th 2023. Modified questionnaire is used and consisted of four parts that include demographic characteristics of the study sample, dietary patterns, eating behaviors, and gastrointestinal symptoms. Content validity of the questionnaire is determined through panel of (18) expert and its reliability were verified through a pilot study, which were excluded from the original sample. Data are collected using self-report technique. Data are analyzed through descriptive and inferential statistical data analysis approaches.

Results: The findings of the study indicate that autistic children have moderate level of dietary patterns and eating behaviors. Their dietary patterns and eating

behaviors have high effect on gastrointestinal symptoms among autistic children.

Conclusion: The study concludes that more than two thirds of children have moderate dietary patterns, more than three quarters of children have moderate eating behaviors and Dietary patterns and eating behaviors have high effect on gastrointestinal symptoms of autistic children. Child age, gender, age at diagnosis, type of treatment, birth order, severity of autism have not been influencing dietary patterns and eating behaviors. While, body mass index have been influenced them.

Recommendations: The study recommends that improvement of the nutritional status and well-being of autistic children, trained dietitians should be assigned as members of health care team in autistic institutions, and continuous health education and counseling programs are necessary to improve mothers' knowledge about nutrition of their autistic children.

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List of Abbreviations

Abbreviation	Meaning
ASC	Autistic Spectrum Condition
AAP	American Academy of Pediatric
ABA	Applied Behavior Analysis
ADHD	Attention-Deficit/Hyperactivity Disorder
ADOS-2	Autism Diagnostic Observation Schedule , Second Edition
ASD	Autistic Spectrum Disorder
BMI	Body Mass Index
BAMBI	Brief Assessment of Mealtime Behavior Inventory
C	Column
CDCP	Center Disease Control and Prevention
CDD	Childhood Disintegrative Disorder
CEBI	Children's Eating Behavior Inventory
CEPC	cup-equivalents per 1,000 calories
CF	Conceptual Framework
d.f	degree of freedom
DD	developmental disabilities
DP	Dietary pattern
DSM-5	Diagnostic and Statistical Manual 5
DSM-IV	Diagnostic and Statistical Manual 4
EAR **CAM**	Estimated Average Requirement Complementary and Alternative Medicine
ED	Eating disorders
et al;	And other
F	Frequency
FC	Faecal Calprotection
FDA	Food and Drug Administration
FFQ	food frequency questionnaire
FS	Food Selectivity
GID	Gastrointestinal Dysfunction
GIS	Gastrointestinal Symptoms
GIT	Gastrointestinal Tract
GFCF	Gluten Free Casine Free
H.S	Highly significant
HFSFI	high frequency single food intake
IPT	Intestinal Permeability Test
KSA	Kingdom of Saudi Arabia

LFR	Limited Food Repertoire
M.S	Mean Score
M-CHAT	Modified Checklist for Autism in Toddlers
MIA	Immune Maternal Activation
MOH	Ministry of Health
n	Number of Sample
NDP	Without neuro developmental psychiatric
NCPP	National Coaching Certification Programme
N.S	Not significant
NDP	Neurodevelopmental Psychiatric
NHANES	National Health and Nutrition Examination Survey
NOS	Not otherwise specified
AD	Autistic Disorder
PDD	pervasive Developmental Disorders
P-value	Probability value
r	Spearman correlation coefficient
R	Row
SERO	Special Education and Rehabilitation Organization
SD	Standard Deviation
Sig.	Significance
SPSS	Statistical Package of Social Sciences
SSRIs	Selective Serotonin Reuptake Inhibitors
SNRIs	Selective Norepinephrine Reuptake Inhibitors
TD	Typically Development
UL	Upper intake level
USA	United State
WHO	World Health Organization
Σ	Summation

Chapter One
Introduction

Chapter One

1.1. Introduction:

Autistic Spectrum Disorder (ASD) is a condition being enigmatic, without knowledge regarding its origins, the statement that only might be utilized to define ASD was there is no idea and at this time there is no particular explanition for ASD but that there were numerous ASD forms, and fortunately specialists have recently started to offer answers (Yasir and Khudhair , 2021).

Also, ASD is wide range neurodevelopmental disorder impairments in social interaction, skills of language, verbal and nonverbal communication and very repetitive, restricted, continuous, and rigid or stereotyped patterns of activities, interests, and behavior with varying degree of severity (Narayanan, 2021).

While, Tsai *et al*., (2022) state that Autism spectrum disorder is a complex condition being neuro-logical falling under the wide class, pervasive developmental disorders (PDD) also identified as Autism spectrum disorder. This term encompasses a diverse spectrum including autistic disorder, Rett's disorder, Asperger's disorder, childhood disintegrative disorder, and PDD not otherwise specified (PDD-NOS). For an anyone diagnosis of these, a child should reveal a "triad of impairments their communication and interaction socially and imaginative understanding.

In USA, 2022 mentioned that Autism spectrum disorder is a broad term for a disease that affects around 1 in every (36) children of school-aged (CDC, 2022)

It distresses boys (4) more extra recurrently than girls (Giambattista *et al*., 2021)

The Autism spectrum disorder etiology remains unknown; but the genetic, environmental and epigenetic factors are regarded to play the main role (Tordjman *et al*., 2014).

Moreover to, there are many factors that have been recognized to be associated with increased Autism spectrum disorder risk like: maternal and paternal smoking, lower and greater maternal education, threatened abortion

through first twenty weeks, bleeding during pregnancy, hypertension throughout pregnancy; The mean number of autoimmune disorders was greater in Autism spectrum disorder families, advanced paternal and maternal ages are related independently with risk of Autism spectrum disorder (Tawfeeq *et. al*., 2016).

Children are able to be diagnosed reliably with an Autism spectrum disorder between 2 and 3 years by a qualified clinician. The criterion for diagnosis of Autism spectrum disorder is according to The Diagnostic and Statistical Manual 5 (DSM-5) for Mental Health disorders (Ousley and Cermak, 2014).

While, some autistic children may have co-occurring diagnoses, such as disabilities of learning, heightened generalized anxiety, gastrointestinal (GI) issues, problematic eating behaviors and disorder being obsessive compulsive (US DHHS, 2017).

Komijiekchoe and Abojiebahie (2015) consider that the gold standard diagnostic tool utilized to assess ASD to be of Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) test.

Tsai *et al*., (2022) state that the core Autism spectrum disorder symptoms comprise communication and social impairments, as well as restricted repertoires of behaviors and interests, all Autism spectrum disorder symptoms were associated to different kinds of behavioral and emotional difficulties. These impairments manifested in early childhood and can severely affect social integration and learning.

Further, Margari *et al.*, (2020) add that Autism spectrum disorder clinical characters likewise including aberrant behaviors of eating. Although of some kinds of eating disturbances, such as refusal of food, are also frequent in the general pediatric population, their prevalence seems to be significantly higher in autistic children, with percentages ranging from (51%) to (89%).

Characteristics of Autism spectrum disorder are difficulties in social interactions, social communication and by restricted, repetitive patterns of

behavior and interests , symptoms existing across a spectrum, requiring different support levels and tailored individual therapies (Palmer,2022).

Lázaro *et al*., (2018) point that the autistic children may be have other behavioral features such as aggressiveness, hyperactivity, attention deficit, and sleep disorders are likewise recurrently stated. Moreover, caregivers and parents of autistic children report peculiar behaviors of eating. The intrinsic foods factors might interfere in such children's eating behavior, such as the color, texture, form, temperature, and flavor of foods, besides the packages color and format, the way the food is offered and utensils utilized.

The eating abnormalities origin in autistic children is believed multi-factorial, including cognitive, behavioral, and environmental reasons. One of think about eating behaviors such as food that are new to them, repetitiveness and rituals, inflexibility about meal time, need for sameness (Margari *et al*., 2020).

Furthermore, autistic children and atypical oral sensitivity display increased food avoidance behaviors, placing them at a higher risk of potential nutrient deficiencies. Additionally, these children tend to have increasingly problematic feeding and mealtime behaviors that cause greater risk for general gastrointestinal (GI) disturbance that include constipation, diarrhea, and abdominal pain has also been observed for children with and without Autism spectrum disorder (Maclin, 2017).

Researchers exploring eating difficulties among autistic children specifically report that a portion of this population likewise shows oral motor difficulties related to swallowing and chewing, GI difficulties, and sensorial dysfunction. Hyper and hypo-reactive difficulties related to sensorial modulation directly interfere with smell, taste, sight, touch, the vestibular system, and proprioception. Hence, muscular, sensorial and GI alterations might indirectly or directly affect diet (Nygren *et. al*., 2021).

Autistic children experiences significantly extra feeding difficulties in comparison to her/his peers. Refusal of food and new foods introduction are

quoted as the most difficult in Autism spectrum disorder. Autistic children's are significantly additional likely to refuse foods according to consistency/texture, brand, smell/taste, mixtures, and shape (Kral et al., 2015).

Children with a more limited food repertoire have an inadequate intake of a greater number of nutrients. It is generally accepted that autistic youngsters possess unusual eating habits, which may be resulted from oral sensory sensitivity. In addition, their dietary patterns, food preferences and food stigma aggravate their poor nutritional condition, both in terms of under- and over-nutrition (Islam *et. al.*, 2020).

While, Plaza-Diaz *et al*., 2021 report that children with Autism spectrum disorder frequently have significant eating difficulties with a highly restricted range of food choices, and there is consensus that children with autism spectrum disorder have selective dietary patterns (DPs), food neophobia and sensory issues. Indeed, the (DSM-5) now includes sensory symptoms in the diagnostic criteria for autism spectrum disorder, such as food selectivity. Eating behavior problems are autism spectrum disorder features.

Also, Brzóska *et al*., (2021) mention that dietary complications are most prevalent among autistic children than among the population throughout the life 1st year from the time of introducing the complementary foods. The solid foods rejection is very frequent, and the foods introduction with consistencies, new textures, and flavors inclines to be difficult, so they consume preferentially the similar foods in a repetitive routine.

Some behaviours do not seem to influence their growth long- term. Still, they generate a great deal of family anxiety, becoming one of the main concerns of caregivers and family members. Although these behaviors usually improve with time, the possible nutritional restrictions and the important social limitations are relevant and sensory goals should be included in treatment objectives for children with autism spectrum disorder (Margari *et. al.*, 2020).

Many studies have reviewed the autism spectrum disorder children consumption in comparison to such with typical development and determined some nutritional preferences of autistic children. Generally, they detected stronger preferences for energy-dense foods like sweets, snacks, juice and sugary beverages in autistic children. In contrary, autism spectrum disorder children incline to eat less from food groups like fruit, vegetables, and dairy products compared to children with typical development (Vissoker *et. al.*, 2015 ; Karlsson *et. al.*, 2013).

Moreover, Zulkifli *et al*., (2022) declare that one of the common autistic children symptoms is food selectivity such as aggression and refusal of food might interfere with family meal-time. So, feeding problems do not only have negative consequences for the children themselves, nonetheless also for their parents. In origin, such behaviors are multi-factorial, stemming from behavioral, sensory, and social impairments, and typically addressed through occupational or behavior based therapeutic approaches.

Children need certain vital nutrients to function properly that include proteins, fats etc. These key nutrients provide well balanced diet to maintain health. Food additives like artificial colors, preservatives, sweeteners can be a particular problem for autistic children. These foods may have adverse behavioral effects. There for, some autistic children have poor nutritional status, poor digestion, intestinal inflammatory conditions that limits nutrient absorption (Doreswamy *et. al*., 2020).

Moreover, along with deficiencies of nutrition, numerous autistic children face two most common symptoms such as difficulty in eating behavior and gastrointestinal problem which have a significant health, developmental, social and educational impacts (Kral *et. al*., 2013).

Additionally, numerous autistic children may be having an underdeveloped gastrointestinal tract resulting in feeding behaviors such as regurgitation, constipation, rumination and selective eating. The underdeveloped GIT has

mucosa of thin lining, allowing food molecules to be absorbed in the blood stream prematurely; it also causes inflammation and irritation. Behaviors may be a result of irritability due to inflammation and digesting food difficulty. Moreover, the underdeveloped GIT is responsible for a number of essential nutrients deficiencies of which symptoms may mimic neurodevelopmental disorders. Studies of food intake, feeding behaviors and nutrient-drug interactions may increase the understanding of the needs of this population (El-Haliem *et. al.*, 2013).

1.2. Importance of the Study:

Autism spectrum disorder is becoming the fastest growing (10%-17% annual growth) development disability which effects (1 to 1.5) million Americans (Min, 2017). Several studies appeared to indicated that the incidence of ASD has been rising in the world in recent years (Sabbagh *et al*., 2021).

Study conducted by Abdullah, (2015) that there were reported that over the past 50 years, the prevalence of autism spectrum disorders appears to be increasing at the global level, this visible increase, in prevalence, can be explained in several ways, in particular by enhancing awareness, diagnostic standards expansion, improving diagnostic tools and reporting improvement. While, the recent statistics from the Center for Disease Control and Prevention (CDC, 2014) show that (1 in 150) births is diagnosed with autism.

Also, CDC reports in the US, the prevalence of Autism spectrum disorder among (8) year old children is (1 in 59) in 2014 and (1 in 54) in 2016. The prevalence of ASD in children and adolescents in the US is reported at (2.5%) in 2014–2016. In another study in Italy, the prevalence of Autism spectrum disorder among (7–9) year old children is (1.15%) (Narzisi, *et al*., 2020).

In Asia, the prevalence of Autism spectrum disorder has been reported to be (3.9%), with a prevalence of (0.14%) to (2.9%) in the Arab countries around the Arabian Gulf, and Autism spectrum disorder prevalence estimates have increased to one in every 44 in 2018. It is expected that in 2030, the ratio will be

1:1, and this poses a great jeopardy in societies, so we should know how to reduce the spread of this disease and find ways to treat it (Maenner *et. al.*, 2021; Imam Hussain Autism Institute, 2020 CDC, 2018).

While, autism spectrum disorder affects (1.4 per 10,000) in Oman, and (29 per 10,000) for PDD (pervasive developmental disorders) in the UAE. (4.3 Per 10.000) in Bahrain and (18 cases per 10.000) children in KSA, and although no official statistics are available, some medical studies suggest that there are over 800,000 children with autism in Egypt (Hegazy *et. al*., 2021; Almandil *et. al.*, 2019).

According to a study that is conducted by specialists at the centers, there are (7,000) known children dealing with autism in Iraq. Yet, this number does not capture the magnitude of the situation, because the study has been able to access the number of children registered in the (16) centers for autism which are distributed throughout the Iraqi provinces, including the Kurdistan Region (Sakr, 2014).

Corresponding to a study by Hadi and Kassim (2020), ASDs have become an emerging public health concern in Iraq and there is no local epidemiological study, as well as no official statistics on the number of people with autism in Iraq, but estimates show that at least (6,000) child across Iraq.

Autistic children are facing many challenges that often lead to poor dietary pattern. These include problems with sensory processing, eating behavior and feeding disorders. It is estimated that (46% to 89%) of children with ASD experience some kind of problem in eating behavior. These children refuse to eat unless they sit in the same place, eat on the same dishes and eat the same foods (Huxham *et. al*., 2021).

Different studies have shown that at least (70%–90%) of parents of the autistic children reported eating and feeding issues, These behaviors can take the form of picky eating; selective food refusal, insistence on specific and nonfunctional mealtime routines e.g., food is not allowed to touch, only specific

utensils can be used occur in approximately (10%–45%) of children of the general population with a higher severity in children aged less than (3) years (Viviers *et al*., 2020 ; Bandini *et al*., 2017 ; Curtin *et al*., 2015 ; Lane *et al*., 2014).

In Iraq , in the provinces of Hilla and Karballa study conducted by Wtwt and Farhood, 2015 that were Nearly (25%) of all children experience eating problems during the early years of life, but this number may rise to be as high as (80%) in children with developmental difficulties.

Autistic children experience numerous co-occurring health issues. The most frequent somatic disorders in autistic children include the gastrointestinal issues observed in (46%–91%) of children. Similar problems occur significantly less frequently (6%–50%) among kids without the autistic turmoil (Brzóska et. al., 2021).

Zuvekas *et al*., (2021) add that the cost of caring for a child with autism is as a great as ($2.4) million, the autism society estimates the United States of America is facing all most ($90) billion annually in costs for autism.

These patients require considerable care, demanding significant financial resources. The direct and indirect costs of caring for children and adults with ASD in the United States of America in 2015 are estimated at ($268.3) billion, which is more than the cost of stroke and hypertension. Overall, the cost of education, health care, and other lifelong services for an autistic child varies from ($1.4) million to ($2.4) million per year) Salari et al.,(2022).

While, in Iraq, the monthly cost is ranging from (50,000 to 250,000) Iraqi dinars which is equivalent to ($35 to $170), depending on the family's income, but treatment is free for orphans (Mahmoud, 2022).

1.3. Statement of the Problem

Despite recent advances in autism spectrum disorder researches, the behaviors of eating, and gastrointestinal symptom remains a serious health Issue. Autistic children and their parents are facing unique challenges in the children's

daily eating routines and food intake patterns. Parents of autistic children recurrently report that feeding issues are of great concern on an ongoing basis (Kazek *et al*., 2021).

Autism spectrum disorder experience significantly more feeding problems and eat a significantly narrower range of foods than children who do not have autism. Addressing these feeding problems and the core issues behind them is of critical importance to ensure that children with autism are able to thrive. Before parents embark on an aggressive approach to improve their child's dietary intake, any underlying medical conditions must first be either identified and treated (Kral *et. al*., 2013).

Mealtimes pose unique challenges to families of children with ASD. Certain rigid behavior and routines that manifest in children with ASD extend to meal times and can limit when, where and what type of foods are consumed. A small number of studies reveal that eating difficulties in autistic children are of concern because they not only increase parents stress, but they also put autistic children at a greater jeopardy for nutritional deficiencies, which may adversely affect the growth and development (Margari *et al*., 2020).

Studies that examine the dietary pattern, eating behavior and GIS of autistic children are limited in Iraq especially in Al-Najaf Al-Ashraf City. More information is needed to clarify the knowledge about eating behaviors that exists and to bridge the gap between research findings and nursing practice in order to improve the care of Autistic child.

Furthermore, dietary pattern, eating difficulties like food preferences, meal time behavior etc. and GI symptoms of children poses a great challenge for the child with autism spectrum disorder and their parents. Hence, it is realized to be interesting to evaluate the dietary patterns, eating behaviors and GI symptoms among autistic children in Al-Najaf Al-Ashraf City.

1.4. Objectives of the Study to

1.Evaluate the dietary patterns, eating behaviors and gastrointestinal symptoms among autistic children's

2. Effect of dietary patterns and eating behaviors on gastrointestinal symptoms among autistic children's

3. Determine the difference between dietary patterns, eating behaviors with autistic children's socio demographic &clinical characteristics such as child age, gender, severity of autism, BMI etc…).

4. Determine the association between gastrointestinal symptoms with autistic children's socio demographic &clinical characteristics such as child age, sex, severity of autism, BMI etc…).

1.5. Research Hypothesis:

H_o: There was no significant relationship between the dietary Patterns, eating behaviors and gastrointestinal dysfunction of children with ASD at $p \leq 0.05$.

H_1: There was significant relationship between the dietary patterns, eating behaviors and gastrointestinal dysfunction of children with ASD at $p \leq 0.05$.

1.6. Definition of Terms:

1.6.1. Dietary Patterns

1.6.1a. Theoretical Definition

The quantities, proportions, variety, or combination of different drinks, foods, and nutrients in diets, and the frequency with which they are habitually consumed (Marriott *et al*., 2020).

1.6.1b. Operational Definition

It refers to the food selection and its quantity by children with ASD which is assessed by utilizing assessment tool and 24- hours diet recall.

1.6.2. Eating Behaviors

1.6 .2 a. Theoretical Definition

It is distinct as psychosocial and attitudes factors that are related to the decision and selection of that foods to eat (Freitas *et. al*., 2018).

1.6.2b. Operational Definition

It refers to the way that autistic children are react and respond during mealtime which is assessed through the use of such behaviors assessment tool.

1.6.3. Gastrointestinal Symptoms

1.6.3a. Theoretical Definition

Gastrointestinal Symptoms are many issues of stomach pain, diarrhea, constipation, nausea, and vomiting (Hunt *et al.*, 2013).

1.6.3b. Operational Definition

They are clinical manifestations appear for the children with ASD like nausea, vomiting, abdominal pain, indigestion, constipation, diarrhea etc. They are assessed through the Gastrointestinal Problems Assessment tools.

Chapter Two

Review of Literatures

Chapter Two

2.1. Developmental Overview of Autism Spectrum Disorder

Autism spectrum disorder is a terminology that is utilized to describe a group of neurodevelopment conditions that are defined by impairment in 3 areas; social interaction, communication or use of verbal and non-verbal language and a stereotyped, restricted or repetitive pattern of behavior, interest and activities (Asada and Itakura, 2012).

Autism is described by Leo Kanner; an American child psychologist at John Hopkins University, in 1943.The disorder is further developed by Austrian pediatrician, Hans Asperger, in 1944. Previously, Autism Spectrum Disorder is classified under Pervasive Developmental turmoil that encompassed five diagnostic subtypes namely: Autism, Rett's turmoil, Pervasive developmental turmoil, Asperger's turmoil and Child disintegrative turmoil. However, in the Diagnostic and statistical Manual of Mental disorders 5th Edition (DSM-V), all the five subtypes have been merged under a single umbrella known as Autism Spectrum Disorder (Beames, 2019).

Autism, which is also called as Autistic Disorder, this comes under the common classification of developmental disabilities. In 1911, Eugen Bleuler (1857–1939) coined the word autism through his research with schizophrenic individuals who displayed some of the characteristics now associated with autism. He has coined autism from the Greek term autos (it is mean 'self') to characterize people with schizophrenia's aggressive regression into their own dream world in an attempt to deal with overwhelming outside perceptions or capabilities (Cook and Willmerdinger, 2015).

Chukwueloka (2016) has mentioned that the word autism takes on its current definition in 1938, when Hans Asperger of the University Hospital

of Vienna has introduced Bleuler's concept of “autistic psychopaths” in a German lecture on child psychology. An ongoing effort is being to research ASD. For the last 60 years scholars have been studying ASD. Moreover, the classification and interpretation of autism have evolved over time.

Kenner (1943) who has identified such individuals as having impaired social development, first coined the concept / diagnosis of autism. Some of Kanner's nuclear symptoms, like “autistic aloofness and insistence on sameness” are also portion of the criterion for diagnosing ASD in present categorizations (Volkmar and McPartland, 2014).

Since (1944) when Asperger has subsequently published his second PhD thesis and identified a children’s group with restrictive, repetitive behavioral patterns and likewise with deficits social and communication abilities. Though clinical research on autism in Africa commences after Asperger and Kanner who have published their research in about three decades (Murphy, 2001).

Till the mid-1970s, autistic children are usually treated in segregated, specialty outpatient, or school programs. Children with very severe behaviors are sending to residential programs. Subsequently, most residential programs have been closed; and wherever possible, autistic children were "mainstreamed" into local school programs. Short-term inpatient treatment was used when behaviors, such as head banging or tantrums were out of control. The child and family are assisted by community organizations when the crisis is over (Sheila, 2017).

2.2. Autism Spectrum Disorders: General Overview

According to (DSM-5), ASD are neurodevelopmental disorders described by deficits in social communication and social interaction and the presence of restricted, repetitive behaviors (Lord *et al*., 2018).

Autism spectrum disorder represents a complex lifelong developmental incapability that usually appears during the initial years of life, even though

the diagnosis is not habitually made until later in a child's life, especially when it is mild and perhaps moderate in severity (Youssef *et al*., 2021).

Children with Autism spectrum disorder cannot live independently. Parents of Autism spectrum disorder children said that their kids could not live independently without support. Less than 10% can do the most basic tasks: shopping, cooking, washing clothes, paying bills, and managing money without having help. Also, Autism spectrum disorder cases have trouble making companions. ASD also influences numerous parts of family life, not just prompting physical and psychological impairment of parents, additionally creating significant unemployment and monetary problems (Eapen and Guan, 2016).

Early detection of Autism spectrum disorder is critical as early intervention leads to significant improvement in intellectual capability and behavioral performance of an increasing proportion of children with Autism spectrum disorder. When children are diagnosed in school-age or teens where the brain is more developed, the intervention becomes more challenging along with much less usefulness (Webb and Jones, 2009).

Risk factors of Autism spectrum disorder are not clearly identified till now. Genetic risk factors are the most significant, and it seems that it is not a single gene. Instead, various genes are included. Some prenatal and perinatal problems are considered as possible risk factors for Autism spectrum disorder (Chaste and Leboyer, 2022).

2.3. Clinical Manifestations

The core features of autistic disorder (AD) include impairments in three symptom domains: social interaction; communication; and developmentally appropriate behavior, interests, or activities. Stereotypical body movements, a marked need for sameness, and a very narrow range of interests are also common. Aberrant development of social skills and

impaired ability to engage in reciprocal social interactions are hallmark symptoms of AD (Marcdante and Kliegman, 2014).

Early social skill deficits can include abnormal eye contact, failure to orient to name, failure to use gestures to point or show, lack of interactive play, failure to smile, lack of sharing, and lack of interest in other children. Some children with AD make no eye contact and seem totally aloof, whereas others show intermittent engagement with their environment and can make inconsistent eye contact, smile, or hug (Joseph *et al*.,2018).

While, Gorman and Anwar (2018) have stated that children with autism spectrum disorder commonly exhibit the following symptoms: no response to their name by (12) months of age, not pointing at objects to show interest (e.g., not pointing at an airplane flying over) by (14) months, not playing pretend games (e.g., pretending to feed a doll) by 18 months, 4. Avoiding eye contact, physical contact, having trouble understanding other people's feelings or talking about their own feelings, delayed speech and language skills, repeating words or phrases over and over (echolalia), giving unrelated answers to questions, getting upset by minor changes, obsessive interests, flapping their hands, rocking their body, or spinning in circles, unusual reactions to the way things sound, smell, taste, look, or feel and appearing to be in their own world.

As well, autism spectrum disorder is characterized by variable diminished expression of nonverbal social interaction and ability to interpret it in others, failure to develop interpersonal relationships with others at an age-appropriate level, lack of social or emotional reciprocity, delays or absence of spoken language, repetitive use of language, preoccupation with a limited scope of interests, inflexible adherence to daily routines or patterns, and stereotypical movements (Ward, 2013).

2.4 Etiology of Autism

The etiology of autism spectrum disorder is unknown. Genes are clearly involved, although a complex array of genes appears to be responsible. Immune responses, environmental exposures, certain drugs during pregnancy, and neuroanatomical are being investigated as influences that interact with genetics to cause ASDs (Sauer *et al*., 2021).

Neurotransmitters such as dopamine, serotonin, and opioids are abnormal in some children. Fetal alcohol syndrome, fragile X syndrome, phenylketonuria, Down syndrome, and tuberous sclerosis are all associated with a higher than normal incidence of autism. Despite concern expressed in earlier medical and lay press, no demonstrated relationship has been demonstrated between the measles-mumps-rubella vaccine or thimerosal (mercury based preservative in some vaccines) and the incidence of ASDs Jane and Ruth, 2017).

It is believed that a disorder that affects the normal way the brain functions caused autism. This therefore affects the development of social interaction and communication. There were two main autism surveys conducted in France and USA in 2009 and 2010 respectively. In those two surveys, a greater number of respondents believed that biological mechanisms such as heritability which represents 33-44% were the jeopardy factors of autism. Another cause of autism is believed to be that of interactions between parents and their children and stressful events which happened in life also represented between (22%) and (23%). The exact cause of autism is not yet known, and researchers around the world continue to handle the subject with pleasure, although autism nowadays is considered a genetic turmoil (Twi-Yeboah, 2019).

Twin and family studies support a strong genetic contribution to ASD, with estimates placing the heritability of ASD between (50%) and (95%). Correspondingly, one of the strongest jeopardy factors for the development

of autism spectrum disorder is having a sibling with autism spectrum disorder; studies suggest that the risk of autism varies from (3%) to (18%) in this population. The genetic variants for autism spectrum disorder include both common variants with small effect sizes, and rare variants, including inherited and de novo mutations and copy number variations, that carry a larger autism spectrum disorder jeopardy (Alonso-Gonzalez *et al*., 2018; Thapar and Rutter, 2021).

However, environmental factors also contribute to the risk of autism spectrum disorder, including advanced parental age, less than (<12 months) as well as more than (>60-84 month) inter pregnancy intervals, medication use, and pregnancy and birth complications, such as lower gestational age/preterm birth, C-section, and metabolic conditions in the mother. Environmental chemicals, such as air pollution and endocrine-disrupting chemicals have also been implicated in autism spectrum disorder risk (Lyall *et al*., 2014; Emberti Gialloreti *et al*., 2019).

The psychologist Tao Ran, considers the symptoms that come from excessive digital media use particularly internet use similar to the symptom of addictive disorder because this extra media consumption have effect on the brain like heroin consumption do and can lead to decrease the capacity of the brain this may be significant impact on the child developing autism (Ziebro, 2016).

Maternal Immune Activation (MIA) has emerged as an important risk factor for autism spectrum disorder. Bacterial, viral, genitourinary infections, as well as fever during conception have all been associated with increased risk for autism spectrum disorder in the child. The exact trimester in which the various MIA exposures influence autism spectrum disorder risk is not fully elucidated. Further the understanding of how MIA exposures in pregnant women affect autism spectrum disorder risk in the

child is an area of current investigation (Zerbo *et al*., 2015; Holingue *et al*., 2020).

2.5. Diagnosis of Autism Spectrum Disorders

The American Academy of Pediatric (AAP) recommends screening all children for symptoms of autism spectrum disorder through a combination of developmental surveillance at all visits and standardized autism-specific screening tests at (18) and (24) months of age in their primary care visits because autistic children can be identified as toddlers and early intervention can and does influence outcomes. This autism-specific screening complements the recommended general developmental screening at 9, 18, and 30 months of age. Efficient screening of all children would be aided by inclusion of valid screening tools in the electronic health record with appropriate compensation for the staff and professional time necessary to complete the administration, scoring, and counseling related to screening (Zhang *et al*., 2022).

Autism spectrum disorder diagnosis can be complicated, since there is no medical test, like a blood test, to diagnose the disorders. Diagnosis depends on the child's behavior and development. ASD can sometimes be detected at 18 months or younger. By age 2, a diagnosis by an experienced professional can be considered very reliable. However, many children do not receive a final diagnosis until much older. This delay means that autistic children might not get the help they need. Diagnosing an autism spectrum disorder takes two steps, developmental screening and comprehensive diagnostic evaluation (CDC, 2022).

There is no specific biomarker or diagnostic test for autism. Diagnosis is made purely on basis of the presence of characteristic behavior. The diagnostic Statistical manual for mental disorders (V) lists specific criteria for diagnosing Autism, which are Persistent deficits in social communication and social interaction, delay or absence of spoken language

with no compensation from other methods of communication, Stereotyped and repetitive use of language, restricted, repetitive patterns of behavior, stereotyped motor movements use of object insistence on sameness, inflexible adherence to routines e.g. extreme distress at small change (Hayes *et al*., 2022).

The onset of autism spectrum disorder can occur as early as first year of life where abnormalities in behavior are noted .There are two patterns of onset of autism spectrum disorder that have been described; the first pattern is the 'early' onset where the symptoms show in the first year of life. Most common symptom is delay in achieving developmental milestones. The second described pattern is the 'regressive' pattern where the child appears to lose the skills that they had previously learned. This pattern commonly appears from the second year of life onwards. However, because it is difficult to differentiate between autism spectrum disorder symptoms and delay in developmental milestones in the first year of life, screening for autism spectrum disorder should be done at (18) and (24) months as recommended by the American Academy for Pediatrics (Shumway *et al.*, 2011).

The first step in identifying children at risk of autism spectrum disorder is surveillance at each healthcare visit. Since diagnosis and treatment have often been delayed, the American Academy of Pediatrics has now identified a multistage process for surveillance and screening , Perform surveillance at early healthcare visits to identify if a sibling has parents or other caregivers are concerned about the developmental progression of the child, or the healthcare provider notes abnormalities in child behavior , the healthcare provider determines if the child appears to be at risk for ASD, the healthcare provider evaluates the risks. If jeopardy exists, the provider administers an age-appropriate and autism spectrum disorder-specific screening tool (e.g., Ages and Stages Questionnaire and Modified Checklist

for Autism in Toddlers [M-CHAT]), If no jeopardy exists, an ASD-specific tool is administered at the visits of 18- and 24-month, select appropriate screening tool for age and risk profile of the child, If screening is negative for a child with some jeopardy, provide information to parents and evaluate again in 1 month. If screening is positive, refer for comprehensive ASD evaluation, including audiology, and begin early intervention programs. (Jane and Ruth, 2017; Siller *et al.*, 2013).

2.6. Classification Psychopathology of Autistic Disorders

The DSM system of classification has adapted to ongoing research and better understanding of the psychopathology of autistic disorders. DSM-IV identifies five disorders under the broader category of autism spectrum disorder. That includes autistic disorder, Asperger's disorder, childhood disintegrative disorder, Rett's disorder, and pervasive developmental disorder NOS (not otherwise specified). DSM-V publication in 2013 the following changes in the categories of Jane and Ruth, 2017in the DSM-IV are (Lai *et al*., 2013)

A. Autistic Disorder.

In order to qualify for diagnosis of AD, DSM-IV-TR requires taking as a main consideration. Such impairment on social interactions (lack of social reciprocity), impairment in eye contact failure to develop peer relationships, impairment in communication (delay in language acquisition, impairment in ability to initiate or sustain conversation, repetitive use of language), and stereotypic pattern of behavior (restricted pattern of interest, inflexible routines, and repetitive motor mannerisms), all with onset prior to 3 years of age (Faras et. al., 2010).

B. Asperger's Disorder

Asperger's disorder is a part of Jane and Ruth, 2017in which impairment in social interactions and stereotypic patterns of behavior are present with normal intelligence and relatively normal language development.

Individuals with Asperger's turmoil do not have any clinically significant delays in language or cognitive development (Woodbury-Smith, 2021).

C. Childhood Disintegrative Disorder (CDD)

Childhood Disintegrative Disorder also called Heller's syndrome, is a relatively rare disorder that presents with features of normal development until 2 years of age and then loss of social, intellectual, and language skills by 3–4 years of age (by 10 years of age as per DSM-IV-TR) (Charan, 2012).

D. Rett's Syndrome

Rett's disorder presents with normal development until at least (6) months of age followed by deceleration in head growth, loss of social skills, mental retardation and characteristic hand-wringing movements. DSM-V is proposing to exclude this disorder from DSM system, as autistic symptoms are present for only a minimal period through the total course of this disorder (Neal, 2012).

E. Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS)

Diagnostic and Statistical Manual of Mental Disorder, Four Edition ,Text Revision(DSMTV TR) reserves this category for individuals who present with impairment in social interactions, communication skills, or stereotypic behaviors but do not meet the full diagnostic criteria of autistic disorder, Asperger's disorder, childhood is integrative disorder, and Rett's disorder (Hodges *et al*., 2020).

2.7. Conceptual Framework of Study Related

Conceptual framework is a brief explanation of a theory or those portions of theory to be tested in a study (Groove, 2003). Polit and Hungler (1989) have described conceptual framework as a group of mental images or concepts that are related but the relationship is not explicit. It is an abstract and logical structure that enables the researcher to link the findings to the nursing body of knowledge. The conceptual framework gives the

idea of the investigator's main view and common themes of the research in the form of the visual diagram by which the investigator explains the specific areas of interest.

The conceptual framework that is adopted for this study is based on Pender's Health Promotion Model (Pender, 2023). The model focuses on individual characteristics and experience, behavior – specific cognition and affect and behavioral outcome.

The health promotion model notes that each person has unique personal characteristics and experiences that affect subsequent actions. It describes the multidimensional nature of person as they interact with the environment to pursue health (NA, 2023).

The set of variables for behavioral specific knowledge and affect have important motivational significance. The variables can be modified through nursing actions. Health promotion behavior is the desired behavioral outcome and is the end point in the Health promotion model (Petprin, 2023).

1. Individual characteristics and experience

a. Prior related factors

It refers to the same or similar health behavior in the past. It influences subsequent behavior through perceived self-efficacy, benefits, barriers and affects related to that activity. In this study it refers to the past behavior of children on dietary pattern and eating, caregivers past experiences on eating behavior and gastrointestinal symptoms of children with Autism Spectrum Disorder, family eating practices etc. (NA, 2023).

b. Personal factors

Personal factors are categorized as biological, psychological and socio-cultural. These factors are predictive of a given behavior and shaped by the nature of the target behavior being considered. In this study, it refers to the demographic variables of caregivers such as age, gender, education,

relation with the child, occupation, monthly family income, type of family, number of children in the family. It also refers to the demographic variables of autistic children such as age, gender, order of the child, food habit, and meal time frequency (Petiprin, 2023).

2. Behavior/specific factors

These are considered to be very significant in behavior motivation. They are the core for intervention because they may be modified through nursing actions (Ricketts, 2023).

a. Perceived benefits of action

It refers to the perception of the positive or reinforcing consequences of undertaking a healthy behavior. In this study it refers to benefits of good dietary pattern such as good eating behavior and no or mild gastrointestinal symptoms of children with Autism Spectrum Disorder (NA, 2023).

b. Perceived barriers to action

It refers to perception of the blocks, unavailability, difficulties and personal costs of undertaking a healthy behavior. In this study it refers to the perceived problems related to dietary pattern and eating behavior which includes no barriers or barriers related to dietary pattern and eating behavior. The barriers for dietary pattern are intake of processed, hot foods, more carbohydrate intake, intake of same food at each meal etc. and barriers for eating behavior are satiety responsiveness, food refusal, limited intake of food, Emotional underrating . These barriers for dietary pattern and eating behavior also lead to gastrointestinal symptoms. As dietary pattern and eating behavior improves the gastrointestinal symptoms decreases (Petiprin, 2023).

c. Perceived self-efficacy

It refers to one's belief that one is capable of carrying out a healthy behavior. In this study, it refers to perception of caregivers on dietary pattern, eating behavior and gastrointestinal symptoms. The self-efficacy of

caregivers and children's ability to follow appropriate dietary patterns, eating behaviors and no mild gastrointestinal symptoms is clarified (Ricketts, 2023).

d. Activity related affect

It refers to the subjective feeling or emotions that occur prior to, during and following a specific health behavior and also whether an individual will repeat or maintain the behavior. In this study, it refers to positive and negative feeling of caregivers and autistic children towards dietary pattern, eating behavior and gastrointestinal symptoms (NA, 2023).

e. Interpersonal influences

It refers to the feelings, thoughts regarding the beliefs or attitude of others in regard to specific health behavior. In this study, the interpersonal influences form autistic children are the influences exerted by family members, siblings, peers, special teachers and other members (non-related caregivers) (Pender, 2023).

f. Situational influences

It refers to the perceived options available, demand characteristics, and the aesthetic features of the environment where specific behavior takes place. In this study, the situational influences for autistic children are place of eating, time, environment, type of foods provided/ served etc. (NA, 2023).

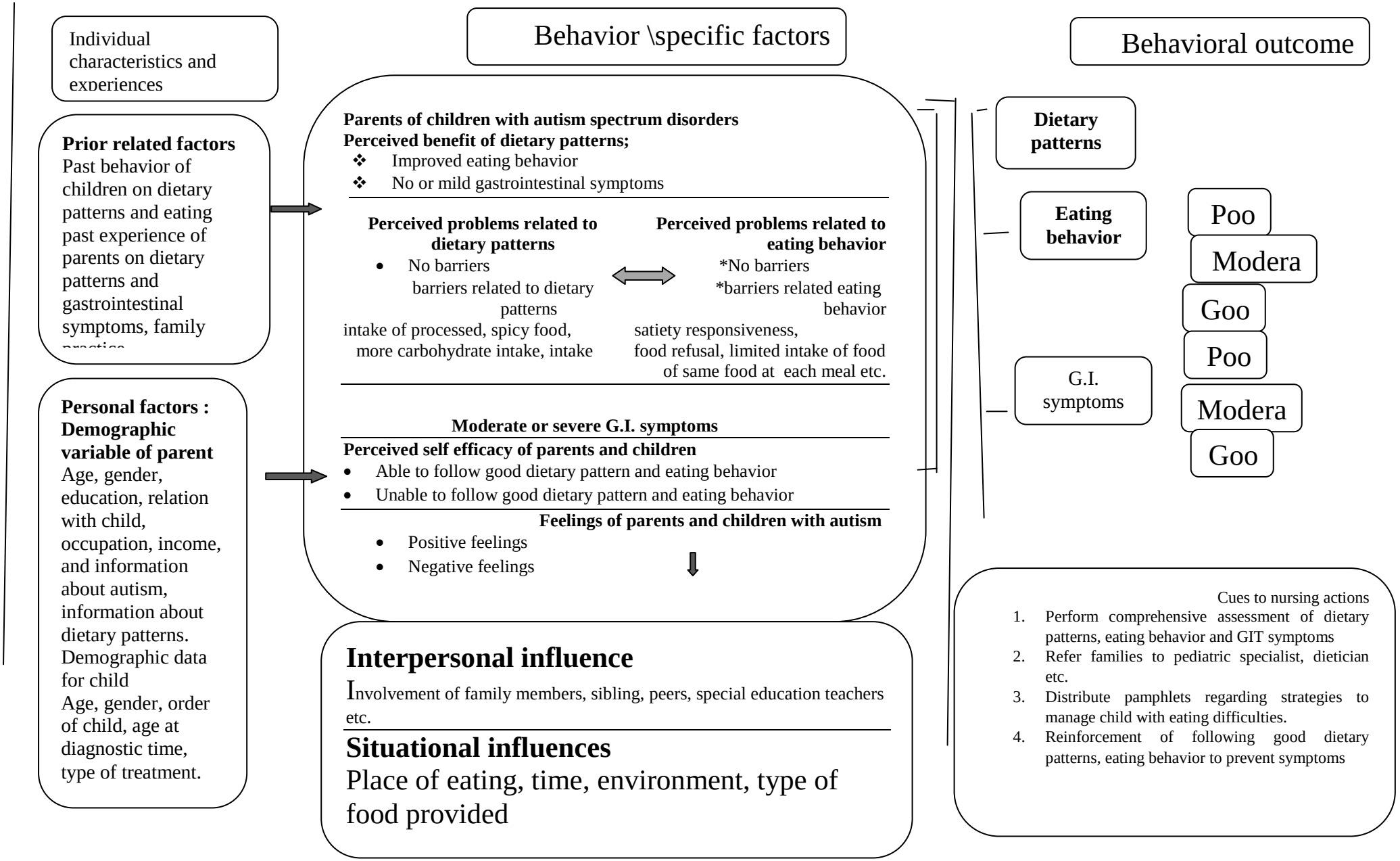
3. Behavioral Outcome:

It refers to the desired behavioral outcome of health decision-making and preparation for action. In this study, it refers to the outcome of the assessment on dietary pattern, eating behavior and gastrointestinal symptoms of children with Autism Spectrum Disorder. In which the outcome of the dietary pattern and eating behavior is categorized as good, moderate and poor. The outcome of assessment of the gastrointestinal symptoms of children with Autism Spectrum Disorder is categorized as no/mild, moderate and severe symptoms (Ricketts, 2023).

Cues to Nursing Action

Health promotion behavior should result in improved health, enhanced functional ability and better quality of life at all stages of behavior. Here response of caregivers of children with ASD provide cues for nursing action like comprehensive assessment of dietary pattern, appropriate referral, training program, community level awareness through health education program on good dietary pattern and strategies to improve eating behavior, distribution of need based teaching materials and reinforcement of good dietary pattern and eating behavior (Petiprin, 2023).

Figure (2-1): Conceptual Framework Based on Pander's Health Promotion Model



2.8. Dietary Patterns:

Eating is an important aspect in childhood because it is related to growth and development process. Besides, eating also reflects parents' attentions in rearing their children. Refuse food is described as avoiding food and won't eat" that can effect picky eater behavior while eat limited food behavior is expressed by eating small number of food and unwilling to try new food or neo-phobia (Johnston et al., 2014).

Many studies have reported that children's eating behavior is characterized by food preference and small numbers of food children eat. Studies in normal population's children in US, European and Asian countries have showed that young children were common to have a picky eater or food neo-phobia (Scaglioni *et al*., 2018).

Recently, a relation between autism and eating behavior has been discussed in many studies. Several researches have noted that children with autism have showed aberrant patterns of food acceptance, are commonly selective in food type (only eating the food they like or picky eater) and eat a narrow range of food than children without autism. It is also reported that children with autism are more likely to exhibit disruptive behavior when they refuse presented food (Handayani *et al*., 2012).

Early childhood is a period when children experience new foods, tastes, and textures. Parents of toddlers and young children often describe their children as "picky eaters" who refuse to try or eat a variety of foods. Although picky eating is not uncommon among young children who are typically developing, pickiness in children with ASDS may be even more restrictive and may extend beyond the early childhood period (1-3) (Cermak *et al*., 2010).

Due to the feeding problems, such as food selectivity, children with ASD may be at risk of nutritional deficiencies. The nutritional status of a child is gauged using anthropometric measurements. Length/height and weight are core in anthropometry. Body mass index which is expressed in kgs/m2 is used to

classify individuals who are (24) months and above as; underweight, healthy, overweight, and obese. Other main variables used to assess the nutritional status are weight for age, height for age, and weight for height (Mbaabu, 2021).

In a review of articles between (1990-2014) on nutritional status of children with ASD, Cerebral palsy and Down syndrome by Nor et al., (2015) have showed that children with ASD are more likely to be overweight or obese compared to healthy children. The review revealed that this would have been as a result of the feeding problems that are common in ASD.

The nutritional status of (67) children with ASD is assessed across various centers in Khartoum and it is found that among the pre-schools, all the females (100%) are overweight while only (14.29%) of the males are underweight (Aziz *et al*., 2015).

The nutritional status in the school age children (6-13) years, 46.15% of the females had normal weight and only (7.69%) are overweight. (44.44%) of the males are underweight and (6.67%) are obese. In a study done in the United States of America by Egan et.al to assess the nutritional status of children with ASD, showed that 32.96% of the (273) participants with ASD were overweight or obese. That is, (15.38%) are overweight and (17.58%) are obese (Mbaabu, 2021).

In a different study which is carried out in the US to compare the nutritional status of adolescents aged (12-17) year, with developmental The restrictive eating patterns and difficulties in other aspects of a healthy lifestyle such as impaired social interaction and communication, can lead to the development of malnutrition and research has reported higher rates of underweight,, such as ASD and those without; has showed that (31.8%) of the adolescents with ASD were obese. This is more than double the prevalence observed in children without developmental turmoil's (Salih et. al., 2017).

Besides food selectivity other prevalent behavioral problems at mealtimes in children with ASD include eating fast, difficulty processing table foods,

gagging/coughing on textures, not feeding self, taking long time to eat meals, not communicating when hungry, stressful and prolonged meal times and eating inadequate amounts . Likewise, children with ASD are more likely to present with food allergies and parental report of allergies include milk/dairy, nuts and fruits (Molina et *al*., 2021).

Several studies have found that children with ASD eat fewer foods overall and a strong preference for starches, snack and processed foods, while rejecting fruits, vegetables and or protein is common in ASD. Comparing fruits and vegetables intake of children with ASD to healthy controls have showed that daily servings of fruits and vegetables were significantly lower in children with ASD (Sharp *et al*., 2016).

One study has reported that overall children with a later diagnosis of ASD have more consultations for feeding problems in early life compared to children who did not get diagnosed. Common early feeding problems observed have late acceptance of solid foods and slow feeding in early years of life. Additionally, at (15) months of age diet of children later diagnosed with ASD are less varied than diets of typically developing children and the variety became progressively less with age. Feeding problems early in life are especially of concern as feeding problems in childhood have been associated with poor growth, developmental outcomes (Lucas and Cutler, 2015).

The daily serving from different food groups by age is tabulated by professionals working with the special need children. The age spanned here is from (2 to 18) plus years. The preferable amount of servings in each food group has been identified for children with special needs in their specific age groups. This table would be an easy ready reckoner for parents and caregivers to follow in providing food to their children daily. This will also help them plan the menu and distribute the food groups in advance and help them consider all the food groups throughout the course of the day (Narayanan, 2021).

In addition to the socio behavioral problems, diet related issues are also a recurrent concern as reported by the parents or caretakers of ASD populations. It has also been postulated that dietary aspects, gastro-intestinal complications, micro biota composition, certain foods (gluten, casein) could aggravate with the symptoms of ASD (Ristori *et al*., 2019).

Research highlights that individuals with ASD are nutritionally vulnerable (risk of micronutrient deficiencies, medical comorbidities) as they exhibit a selective or picky eating pattern and sensory sensitivity that predisposes them to restricted intakes and hence end up in vital mineral or vitamin insufficiencies. Research on the aspects of nutritional vulnerability among ASD has direct effect (Lucas and Cutler, 2015).

On their normal growth and development, among the dietary issues as reported by the parents or caregiver of ASD children, food refusal and limited food intakes, unusual behavioral patterns during the course of meal times are common (Siddiqi *et al*., 2019).

Frequent nutritional screening and assessment of children with ASD is an important clinical consideration as they may have multiple jeopardy factors that could amplify the prevalence of nutrient deficiencies. Those children often exhibit nutrition related medical issues also, gastrointestinal issues such as diarrhea, constipation (Kizilirmak, 2017).

Sensitivity to taste, texture and smell- autistic children often experience their senses very acutely, some foods may be overpowering leading to the child possibly refusing to eat, or limiting themselves to a very bland diet (Cermak *et al*., 2010).

Ahumada *et al*., (2022) have studied eating patterns in (100) autistic child via qualitative analysis of parental reports and identified categories of foods which were consumed excessively, which are found to be cereal based foods, dairy produce and strongly flavored foods. Conversely, some sufferers of autism demonstrate an „immunity‟ to even the spiciest or most intense smelling foods,

resulting in other problems, including; eating inappropriate foods and chronic indigestion. This sensory difficulty or dysfunction appears to be related to the way sensory information is processed in the brain (Nadon *et al*., 2013).

Repetitive behaviors and restricted interests, are core feature of autism, and may play a role in dietary selectivity. Children with ASD often resist novel experiences, which may include tasting new foods. In addition, many children with ASD have sensory hypersensitivities and may reject foods due to an aversion to texture, temperature or other characteristics of the foods. Recently attention has focused on the relationship between metabolic, nutritional disturbances and developmental disorders as ASD. Therefore, targeted, individualized nutritional therapy is crucial to helping of patients with chronic persistent problems like autism as it may influence the severity or dynamics of disease (Meguid et. al., 2015).

Take care when performing procedures on, administering medicine to, or feeding these children, because many are fussy eaters who at times willfully starve themselves or gag to avoid eating, and many are indiscriminate gorgers, swallowing any available edible or inedible items, such as a thermometer. Eating habits of autistic children tend to be particularly problematic for families and often involve food refusal, eating inedible items, and smelling and throwing food (Cooper and Gosnell, 2019).

2.9. Epidemiology of ASD

Several study estimated that worldwide about one in (100) child has autism. This value represents an average number, and has reported prevalence varies differ considerably across studies. Some well-controlled studies have, however, reported rates that are considerably greater. The prevalence of autism in numerous low and middle-income countries is still unidentified (Lord *et al*., 2020).

Studies reported in the USA indicate that in the year 1978, 1/10,000 children and adolescents were diagnosed with autism. Ten years later, in 1998, the

index was 1/250 children between the ages of 3 years and 10 years, and in 2007, 1/150 children at the age of 8 years. The overall prevalence of ASD in 2010, according to latest data from CDCP showed 1in every 68 children are diagnosed with ASD (Wasilewska *et al.*, 2015).

In another study, Barnevik-Olsson *et al*., (2008) assess the prevalence of ASD among children born to Somali parents living in Sweden. They report that a prevalence of (0.7 %) in children born to Somali parents which is much higher compared to those from non-Somali parents which is approximately (0.2%).

Sief *et al.*, carried out a study on the prevalence of ASD among the Arabic speaking countries that also included two North African countries (Egypt and Tunisia), which explored the prevalence of ASD in Egypt as (33.6%) and in Tunisia as (11.5%) (Bakare *et al.*, 2011).

In Canada by the National ASD Surveillance System in 2018 were reported that (1) in (66) child and youth between (5) and (17) years had been diagnosed with ASD also documented that the males are four times more frequently identified with ASD than the females (Nadon *et al*., 2023).

According to , World Health Organization (WHO) reported that (1 in 160) children (0.63%) is born with ASD, which is probably a conservative estimate. the number of individuals with ASD is currently estimated to be more than 60 million globally (Depastas and Kalaitzaki, 2022).

According to CDC, it were estimated the WHO report, (1) in every (160) child globally has ASD (Yadav and Balbir ,2020).

In the East African Region, the prevalence of ASD in Uganda according to the 2014 census report is (70 in 10,000) person. However in 2018, the prevalence is much higher at (88 in 10,000) person. In Kenya, it is estimated that there are (800,000) child with ASD. There is no current information on the prevalence of ASD in Tanzania. Generally, it is observed that boys are four times more commonly diagnosed with ASD though there is no clear explanation for this gender discrepancy (Mbaabu, 2021).

In Iraq, it is not possible to accurately determine the prevalence of the autism spectrum because most autism centers and institutes represent a non-governmental entity. Despite this, statistics indicate a clear increase in the number of children visiting centers belonging to the health departments in Baghdad and the governorates, where the total number in 2018 was 1427 increased to 1857 in 2019. The rate for 2020 and 2021 years indicated a decline1283and 1376) respectively , the first reason due to of the Corona epidemic outbreak and the second reason due to the large number of people viewing to private institutes and centers to provide better services .In 2022, the percentage increased again, and the total number was 1704(Iraqi Ministry of Health,2018-2022).

2.10. Feeding behaviors and Problems in autistic children

Feeding is an essential function that affects the quality of life of children with ASD. Pediatric feeding problems are noted if a child's eating behavior interferes with adequate nutritional intake, such as weight gain, health and development or if a child demonstrates severely maladaptive and disruptive mealtime behaviors (Rogers *et al*., 2012).

Pattern is seen in typically developing children, so the risk of nutritional deficits is higher in children with autism spectrum disorder. It is not appropriate to apply the same intervention methods to feeding problems in general children to children with autism spectrum disorder. The most commonly reported and researched eating behaviors in children with autism spectrum disorder are aggressive behaviors, such as crying, turning of the head, yelling, and pushing away utensils during a meal, and disruptive behaviors, such as spitting out food, pushing food from the table, or running away from the table. When children refuse food and begin to show problematic behavior, some parents, as a coping mechanism, reinforce the problematic behavior by allowing food rejection or by providing food that the children want to eat. From this, children learn that they can avoid eating by exhibiting problematic

behaviors, and wrong eating behaviors become the norm and interfere with proper food intake. Since these behaviors can be generalized as behaviors of escape in other situations, systematic interventions for proper food intake and eating habits are necessary (Litchford *et al*., 2020; Park *et al.*, 2020).

Feeding problems are also very common in ASD. The most frequent feeding problems, in children with ASD, are food selectivity, rituals. Food selectivity appears to be an important issue with children with ASD. Food selectivity is referred to as 'picky' eating, or eating only one particular food for a period of time then changing which food they will eat, excessive intake of few foods and selective intake of certain food groups; by texture (e.g., only soft foods without lumps, extremely hot foods) or by color (e.g., only white foods or rejecting all green food and food refusal (Sharp *et al*., 2016; Bandini *et al*., 2017).

It is suggested that factors such as texture, smell temperature, color and of the food as a result of sensory sensitivity in autism spectrum disorder contributes greatly to food selectivity which may ultimately lead to nutritional problems in these children. Food neophobia, also frequent in children with ASD (e.g., turning head when offered food or not opening up mouth to accept food. limited selection from food groups (Petitpierre *et al*., 2021).

Parents often report that it is the behavior associated with meal times and eating that causes the most problems. Difficult behavior at meal times may include any or all of the following such as not wanting to sit for meals (no social eating experiences), sniffing and inspecting food (their own and others), taking food from others' plates, gorging food, hording food in their mouthgagging on food or vomiting food they don't like, obsessive placing of food on their plates, eating only using fingers, refusal of new foods (Tonge and Brereton, 2011).

Feeding issuses not only more prevalent in children with autism spectrum disorder when compared with children without autism spectrum disorder, feeding problems are also more often classified as behavioral than functional.

There is also evidence to suggest that children with autism spectrum disorder can have comorbid medical problems that could influence food refusal such as gastroesophagalreflex, constipation, vomiting, and undiagnosed food allergies .The impact on families may also include added stress, the need for elaborate accommodations during mealtimes, and may lead to isolation of a child with autism spectrum disorder from the family during meals (Seiverling *et al*., 2018).

The reason that children with autism spectrum disorder have a higher incidence of eating problems is unknown. Although suggested, the causal relationship between characteristic attributes of autism spectrum disorder, including perseveration, impulsivity, fear of unknown, sensory impairment, concentration on details, lack of social compliance, restricted interests and activities and feeding disorders, have not been proven empirically (Sharp *et al*.,2013).

While a causal relationship between specific attributes of autism spectrum disorder and feeding disorders may not have empirical support, children with autism spectrum disorder may exhibit more learned responses that are maintained by a number of variables (escape, avoidance, attention) due to the nature of autism spectrum disorder in general (Rogers et al., 2014).

Inappropriate behaviors, during mealtime, are associated with selectivity or food refusal can include aggression, property destruction, or batting away and throwing food. Autistic children with liquid avoidance or a restrictive intake of fluids may, when are presented with liquids or non-preferred liquids, exhibit similar inappropriate behavior observed with food selectivity. Other eating problems include packing or food retention, and rapid eating (Scott and Victoria, 2022).

Findings from a longitudinal investigation (over a 20 month period) indicated that when children with autism spectrum disorder are identified with selective

eating problems, it is more likely chronic problems that do not resolve without treatment (Suarez et. al., 2013).

Management of food selectivity and concerns about dietary adequacy has been found to be major reasons for referral of children for nutrition services. Picky eating, is also referred to as food selectivity, is a considerable problem because it can be associated with inadequate nutrition as a result of the restricted diet (Mahmoud et. al., 2021).

Up to three-quarters of autistic children have problems related to eating, including food selectivity based on texture, color, or temperature; rituals around food presentation; and compulsive eating of certain foods. Behavioral refusal may also present as the child holding food in the mouth, volitional gagging, and emesis. Common related problems include pica (eating of nonfood items) and rumination (self-stimulatory emesis and re-swallowing of stomach contents). By age (16) months, children who are later diagnosed with autism spectrum disorder are observed to be more selective in their eating patterns than are other toddlers. Problems around mealtime behavior and food choice often persist into children. The frequency of feeding challenges, in children and youth with autism spectrum disorder, may relate to the core symptoms of restrictive and repetitive behavior and differences in sensory perception related to smell, taste, and texture (Hubbard *et al*., 2014).

Because feeding problems are so common among children with autism spectrum disorder, a dietary history should be obtained at health supervision visits. Physiologic needs for macronutrients and micronutrients are the same for children with autism spectrum disorder as for other children. As with other children in the US, insufficient intake of fiber, vitamin D, and calcium are common. Rare cases of severe nutritional deficiencies, such as rickets (vitamin D), scurvy (vitamin C), and keratoconus (vitamin A), have been reported in children with autism spectrum disorder with severe food aversions. If supplements are used to correct for poor vitamin D or calcium intake, it is

important to confirm that the dose is sufficient for the age and sex of the child. Food fortification, in the US, may supply adequate amounts of vitamins and minerals for some children with selective diets, so additional multivitamins may not be necessary. Consultation with a registered dietitian may be helpful to be able to guide families regarding the nutritional sufficiency of their child's diet (Maclin, 2017).

Autistic children have a variety of problems related to feeding behaviors due to disorder characteristics, including lack of communication skills, social engagement, behavioral flexibility, sensory sensitivity, and limitations in range of areas of interest. It has been reported that feeding problems are one of the characteristics of autism spectrum disorder and that there is a possible association between autism spectrum disorder children and problems related to mealtime. In previous studies, the prevalence of problem feeding behavior in children with autism spectrum disorder is reported to be (46%–89%), which is estimated to be about five times higher than that in children without ASD (Park et al., 2020).

Moreover, it is clear from the literature that children with special needs have feeding difficulties. The term feeding difficulties is a broad term used describes a variety of feeding or mealtime behaviors perceived as problematic for a child or family. This may include behaviors such as Picky Eating, Prolonged mealtimes, Disruptive Behaviors or Restricted Variety of Foods. Reviewing further, feeding difficulties are also commonly seen in typically growing children. The prevalence of feeding difficulties is approximately (25%–35%) in children with normal intellectual and adaptive development. for those with developmental disabilities, prevalence increases to (40%–80%). Specifically, the prevalence of feeding difficulties challenges is nearly 90% in children with ASD (Yang, 2017; Wolstenholme *et al*., 2020).

According to a 2008 parental survey, it is reported that the prevalence of feeding problems is (41.1%) in children between the ages (1 to 12) years. This

survey has reported that picky eating was the most prevalent feeding-related problem (81.7%), followed by prolonged mealtimes (43.1%). Picky eating is a common behavior in early childhood. There is no or the other a generally accepted definition of picky eating, nor is there assertion on the leading instrument to recognize it. Early feeding difficulties, late introduction of lumpy foods at weaning, pressure to eat and early choosiness, especially if the mother is worried by this; are some causes of picky eating. Protective factors include the provision of fresh foods and eating the same meal as the child. The consequences for the child's diet include poor dietary variety and a possible distortion of nutrient intakes, with low intakes of iron and zinc (associated with low intakes of meat, and fruit and vegetables) being of particular concern (Yen *et al*., 2019; Mc Cormick and Markowitz, 2013).

2.11. Diet Quality of Children

Kim *et al*., (2014) described trends in the contributions of fruits and vegetables to the diets of children aged (2-18) years. Eating more fruits and vegetables increases nutritional adequacy of diets, reduces the risks for leading causes of illness and death, and helps manage body weight. According CDC has analyzed (1) day of (24) hour dietary recalls from the National Health and Nutrition Examination Surveys from 2003 to 2010 to estimate trends in children's fruit and vegetable intake in Cup-Equivalents Per 1,000 Calories (CEPC) and trends by gender, age, race/ethnicity, family income to poverty ratio, and obesity status. Total fruit has included whole fruit (all fruit excluding juice) and fruit juice (from 100% juice, foods, and other beverages). Total vegetables has included those encouraged in the Dietary Guidelines for Americans (2010) (i.e. dark green, orange, and red vegetables and legumes), white potatoes, and all other vegetables. To examine trends in fruit and vegetable intake, average annual change in CEPC per year is calculated using linear regression and was reported as a percent. T-tests are used to examine differences in fruit and vegetable subgroups by socio-demographic

characteristics in 2009-2010. A p-value of <0.05 is considered statistically significant. Total fruit intake among children increased from (0.55) CEPC in 2003-2004 to 0.62 in 2009-2010 because of significant increases in whole fruit intake (0.24 to 0.40) CEPC. Over this period, fruit juice intake significantly decreased (0.31 to 0.22) CEPC. Total vegetable intake do not change (0.54 to 0.53) CEPC. No socio-demographic group met the Healthy People 2020 target of (1.1) CEPC vegetables, and only children aged (2-5) years met the target of (0.9) CEPC fruits. In conclusion, children's total fruit intake increased because of increases in whole fruit consumption, but total vegetable intake remained unchanged.

Hyman *et al*., (2012) conducted a study to characterize the nutritional intake of children with ASD, and to assess the impact of reported food aversions and restricted diets. A sample of (367) children aged (2-11) years were recruited from Autism Treatment Network sites to participate in this study. Parents of these children completed a 3-day food record containing all food, beverage, and supplements ingested by the child over 3 consecutive days including 1 weekend day. Body mass index (BMI), BMI-for-age percentile, and history of dietary restrictions were collected. This information was compared with both the NHANES data and a matched subset based on age, gender, family income, and race/ethnicity. T tests are utilized for continuous variables (nutrient intake), while Chi Square tests are utilized for categorical variables (BMI category). Children with ASD aged (2 to 5) years are more likely to be overweight ($p < .05$) or obese ($p < .001$), than the NHANES matched cohort. The analyzed food records had a sample of (252) participants. Children with ASD aged (4-8) Years consumed less energy, a lower percentage of protein, and a greater percentage of carbohydrates on average, than the NHANES (2007-2008) matched sample. Children with ASD are identified lower than recommended intakes on vitamins A, D, and K, as well as calcium, choline, fiber, magnesium, phosphorus, and potassium from food sources. The percentage of children with

nutrient intake less than the estimated average requirement (EAR) increased with age for vitamins A, C, E, B12, and foliate, and the minerals zinc and magnesium. Numerous children with ASD have nutrient intakes above the tolerable upper intake level (UL) from food alone such as copper, retinol, folic acid, zinc, and manganese. Elevated sodium was seen for all age groups studied. Primary care for all children should include nutritional surveillance and attention to BMI. In conclusion, children with and without ASD have consumed less than the recommended amounts of certain nutrients from food.

2.12. Dietary Preferences in ASD

Patients with ASD have been found to prefer soft and sweetened foods and tend to pouch food inside the mouth instead of swallowing. In addition, parents and caregivers give cariogenic snacks, such as candy, as a mode of rewarding good behavior in autistic children. A study is done by Schreck *et al.*, (2006) to examine food preferences in autistic children, has showed that more than (50%) of the children preferred foods that were high in sugar such as cakes, cookies and ice cream while rejecting those with salty or sour tastes. Similarly, in a study is done in Riyadh at KSA , parents of children with ASD reported that (70.9%) of children preferred foods that are high in sugar and 96.7% consumed soft drinks regularly. (Sedkey *et al*., 2017) carry out a study in Egypt and they find that (100%) of the children with ASD preferred a carbohydrate rich diet with (77%) of them preferred soda drinks.

2.13. GI Symptoms and Eating Behaviors of children with autism spectrum disorder

Gastrointestinal issues have long been a concern in the ASD population. Pang and Croaker's study (2011) has confirmed that children with autism spectrum deficits display more GI symptoms, such as constipation, than the general population. They have discovered that up to (25%) of patients who

attended the clinic had autism with or without neuro developmental psychiatric (NDP) deficits. These children have an earlier onset of symptoms, a longer history of GI disorders. The children with ASD with or without NDP have exhibited symptoms, such as rocklike stools, diarrhea, rectal bleeding, and pain on defecation, stomach discomfort and bloating.

Parents of children with ASD most frequently observe the selectivity of food and a very narrow range of consumer products. Eating disorders in children with ASD can be divided into the three following categories: (1) refusing to eat, (2) limited range of food consumed, and (3) frequent consumption of one product. It is shown that children with ASD choose food based on its texture (69%), occurrence (55%), taste (45%), smell (36%), and temperature (22%). There is also a reluctance to try new food products in (69%) of respondents. Children with ASD aged (2–12) years are characterized by poorer skills of independent eating, more frequent occurrence of avoidance, and neo-phobia of food in comparison to the healthy peers. These children also prefer energy-rich products, such as hotdogs, peanut butter, cakes, fries, and pasta, while they eat a few vegetables and fresh fruit. It is also found that obesity in children with ASD can occur more likely than in healthy children (Walecki *et al*., 2018).

The most common gastrointestinal complaints are constipation, diarrhea, abdominal pain, and reflux. It has been also found that they may suffer gastric acid hypo-chlorhydria, intestinal motility disorders, decreased activity of dis-accharidases, and primarily lactase in intestinal juice. It has been also observed that (70%) of children with ASD suffer from gastrointestinal problem, where in healthy children this frequency was only (28%). In accordance with the other studies, gastrointestinal problem are five times more frequent in children with ASD; abdominal pain occurs twice as often; and constipation and diarrhea are four times more often than in healthy controls. However, the higher incidence of gastrointestinal complaints in children with ASD is not clearly stated, as not all studies show such dependence. It is often suggested that gastrointestinal

problem may be related to the medication being taken and the side effects they may cause (Walecki et. al., 2018 Crnčević et. al., 2022).

In recent years, there has been a growing interest in the co-occurrence of gastrointestinal issues and ASD. Studies have confirmed an increase in the prevalence of GI issues in children with ASD compared to children with other developmental turmoil's, or those who are typically developing. However, the actual reported prevalence rates differ widely across studies, ranging from 9% to 91%, with a mean of approximately (44%).

In a meta-analysis, McElhanon *et al*,.(2014) concluded that children with ASD are (2–4) times more likely to suffer from functional GI symptoms, and the most commonly reported are constipation, diarrhea, and abdominal pain (Lai *et al*., 2020 ; Krigsman and Walker, 2021).

While, the increase in prevalence of GI symptoms among children with ASD is recognized, reasons for the increase remain unclear. Factors, such as severity of autism symptoms, intellectual levels, diets, and emotional symptoms can all, on their own or in combination, explain the increased rates of GI symptoms in children with ASD. Methodological differences among studies, such as how GI symptoms were assessed (e.g., instruments used, lifetime or current symptoms, etc.), or the characteristics of participants recruited (e.g., with or without comorbid intellectual disability and/or emotional symptoms, etc.) can all contribute to the inconsistent results (Lai *et al*., 2020; Lefter *et al*., 2019)

Gastrointestinal symptoms are distressing not only because of the pain, discomfort, and functional limitations, but also because of their effect on mental and physical health. Individuals with ASD and GI symptoms are more likely to have sleep disruptions, aggressive, irritability, externalizing, or self-injurious behaviors, anxiety and mood problems, sensory sensitivities/over-responsiveness, toileting problems such as soiling, food sensitivities and eating issues, and other psychopathology and somatic issues (Holingue *et al.*, 2022 Leader *et al*., 2021).

The high prevalence of GI symptoms in this population has contributed to the popularity of complementary and alternative medicines (CAM), which are therapies developed outside of conventional Western medicine that are either used with (complementary) or in the place of (alternative) conventional medicine. Families with a child with ASD may turn to CAM when western medical approaches have failed them. With respect to ASD, biological therapies (e.g. special diets, nutritional supplements, and chelation) in particular, are often touted as ways to heal the gut and therefore cure autism. Unfortunately, there is little data on the safety and efficacy of such CAMs. Further research needs to be done to understand the benefits and risks of these CAMs and their interaction with the gastrointestinal system (Owen-Smith *et al*., 2015).

Concern about possible GI dysfunction in ASD is intensified by high rates of feeding problems and consequent medical sequel in ASD. Children with ASD have a fivefold elevated risk of developing a feeding problem compared with their peers. Severe food selectivity (i.e., eating only a narrow variety of foods) is the most common feeding concern documented among children with ASD, predominantly in the form of strong preferences for starches, snack foods, and processed foods and a bias against fruits, vegetables, and proteins . However, feeding concerns in ASD are often overlooked in relation to other areas of clinical concerns, probably because selective eating patterns are not necessarily associated with the greater risks of compromised growth that trigger clinical attention in pediatric settings . Evidence suggests that atypical patterns of intake in autistic children place this population at risk for long-term nutritional or medical complications which are not captured by broad anthropometrics or analysis of overall energy intake, such as vitamin and mineral deficiencies and compromised bone growth (Jafari *et al*., 2022)

There is a general consensus that gastrointestinal (GI) problems are common in individuals with autism spectrum disorders (ASD), although the exact

percentage varies from study to study and depends on the age of the study population. Population based studies, which do not directly select or bias their samples, are the best way to determine incidence (Adams *et al*., 2011).

In a study of (137) children with ASD, (24%) have a history of at least one GI symptom, with diarrhea being the most prevalent occurring in (17%) of individuals. Similarly, a study of (172) child with ASD has found that (22.7%) are positive for GI dysfunction, primarily with diarrhea and/or constipation (Krajmalnik-Brown *et al*., 2015).

Another study of (160) child with ASD has found that (59%) have GI dysfunction with diarrhea or unformed stools, constipation, bloating, and/or gastro-esophageal reflux (GERD) (Adams *et al*., 2011).

Other study of (150) child [50 children with ASD, 50 controls, and 50 children with other developmental disabilities (DD)] has found that (70%) of children with ASD presented GI symptoms, compared to (28%) of typically developing children and (42%) of children with DD (Valicenti-McDermott et. al., 2009).

Additionally, study of (960) child with ASD, DD, and typical development has found that children with ASD and DD have at least one reported GI symptom, and that children with ASD that had common occurrences of abdominal pain, gases, diarrhea, and constipation (Lefter *et al*., 2019).

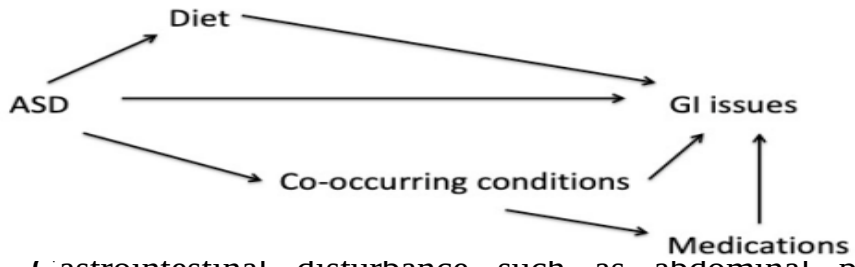
2.14. Association between GI Symptoms and ASD

Gastrointestinal (GI) symptoms may be linked to ASD is through the behavioral consequences of having significant GI distress. Gastrointestinal symptoms are likely to cause or exacerbate behaviors such as irritability, sensory sensitivities, anxiety, aggression, or even self-injurious behaviors, particularly in an individual who is not able to communicate regarding the presence or nature of their GI symptoms. Behaviors that are typically ascribed to ASD may sometimes have manifestations of underlying medical distress. Unfortunately, diagnostic overshadowing, or the process of misattributing

symptoms to a mental disorder, can lead to these GI symptoms being under recognized and therefore undertreated (Holingue *et al*., 2021).

Having ASD may be a risk factor for the development of GI symptoms. People with ASD are more likely to have a restricted, particular diet (e.g., avoiding entire food groups, eating only certain colors food, having dietary allergies or sensitivities) which can affect the health of their gastrointestinal system and lead to symptoms, such as diarrhea, constipation, and abdominal pain. The presence of physical and mental health comorbidities, such as anxiety, depression, or seizures, and the medications taken for those conditions, may also affect the gastrointestinal system (Plaza-Diaz *et al*., 2021).

The various pathways by which ASD and GI symptoms may be associated are depicted in Figure 1. 2 Pathways of ASD that May Lead to GI Symptoms (Holingue, 2019)



Gastrointestinal disturbance such as abdominal pain, constipation, diarrhea, gastro esophageal reflux, and feeding problems, are more commonly reported in children and adolescents with ASD than in those with developmental delay or typical development. A large prospective cohort study revealed differences as early as (6 to 18) months of age in stooling patterns and feeding behaviors in children who were later diagnosed with Autism spectrum disorder. Because of language delays and atypical sensory perception or report of pain, individuals with ASD may be less likely to report specific GI discomfort and may present with agitation, sleep disruption, or other behavioral symptoms rather than GI discomfort. Characteristics of Autism spectrum disorder that might affect GI symptoms include resistance to change (feeding),

comorbid anxiety (pain and motility disorders). At present there is no evidence of an association of ASD with celiac disease, specific immune dysfunction, or motility disorders (e.g., gastro-esophageal reflux) in children with Autism spectrum disorder (Chaidez *et al*., 2014; Leader et. al., 2020; Madra *et al*., 2020).

McElhanon *et a*l., (2014) have conducted a meta-analysis to identify studies utilizing empirical methods to investigate GI diagnoses, signs, and symptoms among children with Autism spectrum disorder and to summarize the evidence based upon descriptive and meta-analytic procedures. Medline, Psych INFO, and PubMed databases are searched for peer-reviewed journals. The analysis has involved studies with a comparison group, presenting quantitative data on GI symptoms, and utilizing a combination of terms for Autism spectrum disorder and GI indicators. Inclusion criteria for the meta-analysis included: a sample of a pediatric population (birth to 18) years of age with Autism spectrum disorder, a non- Autism spectrum disorder comparison group without identified neurobehavioral delays to analyze GI problems, and the study presented data on GI symptoms descriptively or statistically. Fifteen studies (n = 2215) child are yielded as a result of the systematic search. A random-effects model is utilized to calculate effect sizes and 95% confidence intervals. Autistic children experience a statistically significant (4.42%) greater increase in the prevalence of general GI symptoms compared to children without autism spectrum disorder ($p < .001$). Children with autism spectrum disorder also tend to experience a (3.53%) greater increase in the prevalence of diarrhea, and a (3.86%) greater increase in the prevalence of constipation, both being statistically significant ($p < .001$) in comparison to children without Autism spectrum disorder . Lastly, children with autism spectrum disorder experience a statistically significant (2.45%) greater increase in the prevalence of abdominal pain compared to children without Autism spectrum disorder ($p < .05$). Future studies are needed to explain the etiology, prevalence, and

remediation of GI problems in Autism spectrum disorder, with consideration of the potential linked contributions of factors, such as mucosal barrier dysfunction and immune abnormalities. In conclusion, children with autism spectrum disorder exhibit a greater risk for general GI concerns, constipation, diarrhea, and abdominal pain compared to children without autism spectrum disorder. However, conclusions about the nature and etiology of the observed associations remain uncertain.

2.15. Teaching Strategies for Parents at Home to Help with Feeding Issues

Set a Feeding Schedule and Routine. Have your child eat at the same place and follow the same mealtime schedule and routine, avoid all day eating. Do not allow snacking all day or have food/drink available for your child all day , limit Mealtime, even picky eaters do most of their eating in the first 30 minutes, limit mealtimes and snacks to 15-30 minutes, minimize distractions such as the TV can take the focus off the food and the task at hand, get your child Involved, allow your child to help with the selection and creation of meals even if they don't taste the final product , reward Positive behaviors, offer praise when your child approaches or tries new foods, Ignore negative behaviors. When possible, ignore your child when he or she is doing things such as spitting, throwing or refusing food. It is important to offer foods your child already likes, as well as foods your child does not yet like, presentation. Present new foods in small bites and in fun or familiar ways to make it more likely that your child will eat it (Autism Speaks Organization, 2018).

2.16. Therapeutic Management

Autism spectrum disorder is a perplexing condition because of the extreme variability a child may exhibit. Primary treatment for children with Autism spectrum disorder includes educational, compensatory, and behavior modalities, such as the evidence-based applied behavior analysis (ABA) treatment based on the associations between behavior and learning. Treatment, such as ABA, is

typically very intensive and can involve the entire family, taking place in the home, at agencies, at school, or in the community (Shenoy *et al*., 2017).

Although, treatment is unique to each child, parental involvement is essential to facilitate development of self-care skills and process with therapy. No specific medications are approved for the treatment of autism spectrum disorder. However, medications may be used to modify troublesome symptoms, such as high energy, inability to focus, depression, or seizures (DeFilippis and Wagner, 2016).

Atypical antipsychotic medications, such as risperidone (Risperdal) and aripiprazole (Abilify), are approved by the U.S. Food and Drug Administration (FDA) for children and teens with autism spectrum disorder. Advantages of these agents include improving sociability while decreasing tantrums, aggressive outbursts, and self-injurious behavior. "Off-label" medications may be s Autism spectrum disorder elected to relieve significant suffering in persons with autism spectrum disorder in the absence of significantly large and targeted studies. These medications include selective serotonin reuptake inhibitors (SSRIs), α2 agonists, antipsychotics, mood stabilizers, and selective norepinephrine reuptake inhibitors (SNRIs). Melatonin is an over-the-counter medication that may be recommended to reduce sleep difficulties (Alsayouf *et al.*, 2021; LeClerc and Easley, 2015).

It is important for nurses to ask at healthcare visits whether parents are finding time for both care of their child and themselves because there is a danger that excessive parental stress can lead to child maltreatment. Encourage parents of autistic children to seek support through organizations in the community to help support their own mental well-being and that of their families (Samadi *et al*., 2013).

As children mature, they develop greater awareness of and attachment to parents and other familiar adults. A day care program can help promote social awareness. Some children may eventually reach a point where they can become

passively involved in loosely structured play groups. A small number of children, typically with higher levels of functioning, may be able to lead independent lives, although social ineptness and awkwardness may continue, especially if accompanied by intellectual disability (Ilias *et al*., 2018).

There are no medications or treatments available to cure autism. The goal of therapeutic management is for the child to reach optimal functioning within the limitations of the disorder. Each child's treatment is individualized; behavioral and communication therapies are very important. Children with autism spectrum disorder respond very well to highly structured educational environments, so early, intensive behavioral interventions are necessary. Stimulants may be used to control hyperactivity, and antipsychotic medications are sometimes helpful in children with repetitive and aggressive behaviors (CDC, 2022).

Many families are drawn to the use of (CAM) therapies in attempts to treat their autistic child. They may use vitamins and nutritional supplements, herbs or restrictive diets, music therapy, art therapy, and sensory integration techniques. To date, these therapies have not been scientifically proven to improve autism (Riesgo *et al*., 2013).

2.17. Nursing Management

Therapeutic intervention for a child with autism is a specialized area involving professionals with advanced training. The most promising results have been achieved through highly structured and intensive behavior modification programs. In general, the objective in these programs is to promote positive reinforcement, increase social awareness of other people, teach verbal communication skills, and decrease unacceptable behavior. Providing a structured routine for the child to follow is key in managing autism (Miller *et al*., 2012).

When these children are in the hospital or training centers, the parents must be included in planning care and ideally stay with the child as much as possible. Recognize that not all children with autism have the same problems and that each one requires individual assessment and treatment. Decreasing stimulation, by using a private room, avoiding extraneous auditory and visual distractions, and encouraging the parents to bring in possessions that the child is attached to usually, help lessen the disruptiveness of hospitalization. Because physical contact often upsets these children, minimal holding and eye contact are sometimes necessary to prevent behavior outburst (Cooper and Gosnell, 2018).

Early interventions (such as, support for children and families that begins soon after birth, so as to minimize the extent of the problem experienced by the young child) will benefit these children over the long term, as they learn and build coping skills to deal with behavior and personal relationships. Therapies will aid in decreasing symptoms and increase capabilities in handling their environment. Treatment plans must be individualized, as not every child has the same set of symptoms or reactions to their surroundings (Linnard-Palmer, 2017).

Moreover, when children are initially diagnosed with autism, provide parents with an extensive amount of emotional support, professional guidance, and education about the disorder while they are attempting to adjust to the diagnosis. Assess the fit between the child's developmental needs and the treatment plan. Help parents overcome barriers to obtain appropriate education, developmental and behavioral treatment programs (Ricci and Kyle, 2009).

2.18. Prognosis of children with autism spectrum disorder

Autism spectrum disorder is often apparent in early infancy, but in some patients, the full disorder does not appear until after age 3 years. An initial period of seemingly normal development may be followed by developmental arrest or by regression with loss of previously developed abilities. Autistic children usually make gradual but erratic improvement, particularly during the

school-age years. Medical illness and environmental changes may precipitate behavioral dys-regulation that may include compulsive, aggressive, or self-injurious behaviors, occasionally requiring pharmacological intervention (Dulcan *et al*., 2017; Young *et al*., 2020).

Adolescents may experience either continued developmental progress or behavioral deterioration. Conditions frequently comorbid with ASD include ADHD, anxiety, depression, motor incoordination, constipation, epilepsy, avoidant/restrictive food intake disorder, and sleep problems. DSM-5 allows a diagnosis of ADHD to be made in the presence of ASD, unlike DSM-IV (Maskey *et al*., 2013).

Educational and supportive services have a marked beneficial effect. For the less severely impaired, treatment may lead to social skills and adaptations that permit employment and independent or group home living. Predictors of good adaptive outcome include higher IQ, better language skills (especially the ability to communicate verbally by age (5) years, greater social skills, and later appearance of symptoms (Rogers and Vismara, 2009).

Depending on severity, perhaps one-third of children with autism spectrum disorder are able to function independently as adults. However, even in these higher-functioning individuals, social deficits and cognitive rigidity may persist, making navigation of social interactions and life demands difficult, thereby increasing the likelihood of anxiety and depression (Dulcan *et al*., 2017).

2.19. Family Support

Autism spectrum disorder, as with so many other chronic conditions, involves the entire family and often becomes a family disease. Nurses can help alleviate the guilt and shame often associated with this disorder by stressing what is known from a biologic standpoint and by providing family support. It is imperative to help parents understand that they are not the cause of the child's condition (Perry *et al*., 2017).

Parents need expert counseling early in the course of the disorder. Information about education, treatment programs and techniques, and facilities, such as camps and group homes are provided. Other helpful resources for parents of autistic children are the local and state departments of mental health and developmental disabilities; these organizations provide important programs and in-school programs throughout the United States for autistic children (Hockenberry and Wilson, 2018).

As much as possible, the family is encouraged to care for the child in the home. With the help of family support programs in many states, families are often able to provide home care and assist with the educational services the child needs. As the child approaches adulthood and the parents become older, the family may require assistance in locating a long-term placement facility (Wilson et. al., 2019).

2.20. Previous Studies:

First study

In Tunisia, a study was conducted by Cherif *et al*., (2018) entitled Feeding Problems in children with autism spectrum disorders. Aims: to evaluate the frequency and the types of feeding problems in children with autism spectrum disorders. Comparison was made between 57 children with autism spectrum disorders and 57 control groups regarding the feeding problems. Parents completed the children's eating behavior inventory (CEBI).The more the autistic symptoms were severe, the more children exhibited feeding problems (p=0.02). They were concluded that, feeding problems are more common in children with autism. Recommended: Clinical implications trigger the need for clinicians to provide the necessary assessment and .treatment

Second study

Study conducted in Italy, Cagliari by Esposito et al., (2019) carried out Sensory processing, gastrointestinal symptoms and parental feeding practices in the explanation of food selectivity: Clustering children with and without autism. The aim

of the study, comparing a group of children with ASD with a group of TDC on different variables such as food selectivity, anthropometric measures, ,gastrointestinal disorder, diet, sensory processing and caregiver feeding practices. Moreover, the same variables described above are studied using a classification model for both groups. Results showed the group of children with ASD shows more levels of food selectivity than controls. They researcher were reported association between food selectivity, BMI, GID, sensory dimensions and parental feeding styles can be .established in both groups of children

Third study

A study that conducted by (ÖZ and Bayhan, 2019) named Examining the Eating Habits of Children with Autism Spectrum Disorder and Typical Development(TD) with Regards to Certain Demographic Variables. The aim of study was to examine the eating habits of children with (ASD) and (TD) with regards to the variables like child's age, parental age, and presence of siblings. Parents of a total of 180 children (90 with ASD and 90 with TD), who are enrolled in pre-schools, special education centers, and rehabilitation centers in Ankara-TURKEY, participated in the study. The Brief Assessment of Mealtime Behavior in Children (BAMBIC) and The Children's Eating Behavior Questionnaire (CEBQ) were used to identify children's .eating habits

Fourth study

Ali and Ghanim, (2020) carried out a study about Feeding Behaviors of Children with Autism Spectrum Disorder in Baghdad City, To assess the behavior that impedes the eating of children with ASD in Baghdad city, and find out the relationships between the behaviors that impede eating of autistic children and their demographic characteristics. The results of the study indicated that feeding behaviors of autistic children were affected at moderate level, with respect to the relation of autistic children socio-demographic data with their feeding behaviors levels, no significant association was determined. The study recommended that those children

need for special rehabilitative and behavioral programs dealing with their behavioral .problems, and to improve their feeding behaviors

Elnajjar (2021), carried out a study named Autistic Children Fifth study Eating Patterns & Feeding Problems: Parents' Perspectives, Awareness, and Attitude towards Nutrition Education Programs, to assess autistic children eating patterns and feeding problems encountered by parents during mealtimes, and parents awareness and attitude towards nutritional educational programs for ASD as well. The study design is cross-sectional, was conducted in 2019 at local rehabilitation centers for autistic children, Special Education and Rehabilitation Organization (SERO) in Egypt, 135 parents of ASD children (<15 years) took part in the study. The results of study sample show that there are inappropriate nutritional practices which have harmful effects on the health status; on the other hand there are healthy nutritional practices which have good effect on the health status of autistic children that will improve health status for them. It was found that 50% of the participants' children faced problems during feeding. The majority of the participants lack knowledge in dealing with the feeding problems faced. Due to a lack of awareness programs, 62% of the total participants never attended any awareness programs, and the common source for getting information was the internet for 83.70% of participants. The majority of participants demonstrated a positive attitude towards awareness programs in regards to feeding problems.

Chapter Three

Methodology

Chapter Three

Methodology

3.1. Design of the Study:

A descriptive correlational study design, using the assessment approach, is carried out to assess dietary patterns, eating behaviors and gastrointestinal symptoms of children with autistic spectrum disorder for the period of October 20th 2021 to June 18th 2023.

3.2. Administrative Arrangements

The administrative arrangements and ethical confirmation was fundamental and decisive part of research work, which include:

1. The initial agreement was obtained from the University of Babylon/ College of Nursing/ Higher studies committee after protocol presentation.
2. Scientific research and ethical committee at College of Nursing has approved the study and its objectives.
3. A formal requisition was sent to the Private Institutes, Center and clinic for the agreement (Appendix A).
4. On June 24th 2021, formal agreement is received from Doves of Peace Center for Autistic and Slow Speech Children, Imam Hussein AS Institute for Autistic Children, Imam Ali Institute for Learning Disability and Autism and Al-Ertiqa Clinic for the Treatment of Autism Spectrum (Appendix B).

3.3. Settings of the Study:

The original study is conducted in Al-Najaf Al-Ashraf City, at private institutes, center and clinic from July 9th 2022 to October 6th 2022. The total number of these settings, in Al-Najaf Al-Ashraf City, is four as Doves of Peace Center for Autistic and Slow Speech Children, Imam Hussein AS Institute for Autistic Children, Imam Ali Institute for Learning Disability and Autism, and Al-Ertiqa Clinic for the treatment of Autism Spectrum. These places are presented as follows:

1. Doves of Peace Center for Autistic and Slow Speech Children

The institute is established in 2016 and it is located in the District of Kufa. At the time of its foundation, the number of children is about (50) child while, in the year 2022, the number of children has increased to (225) child who suffer not only from autism but from hyperactivity disorder, as well as speech problems. It contains about (12) classes and each class has three teachers for the children.

2. Imam Hussein AS Disorder Institute for Autistic Children

This institute is established in 2014 and the number of children at the beginning of its establishment is about (88) child who are suffering from autism in addition to hyperactivity disorders. In 2022, it receives about (76) child only because the children leave the institute for many reasons, including the economic status of the child's family which is not sufficient to meet the costs and another reason the institutes on vacation .The institute has (11) classrooms in addition to a large special room for games for children with autism. The number of the teaching staff of the institute is about (22) staff member.

3. Imam Ali Institute for Learning Disability and Autism

The institute is established in 2018 its location in al Najaf center and it has six classes. The number of the teaching staff is about (12) teachers and counselors. This institute receives children with autism and learning disorder in addition to a staff specializing in psychology. This institute is considered free without payment of financial fees. It provides behavior modification programs with the social researcher. It receives children with autism and learning difficulties from (3) years old to (20) year old.

4. Al-Ertiqa Clinic for the treatment of Autism spectrum:

It is founded in 2021. The clinic receives monthly (15-20) child with autism spectrum. Each child is diagnosed definitively to determine the severity of autism and to exclude other cases such as epilepsy. Inside the clinic there is a sensory integration device. This device activates the child's cells. It is used as a

treatment for autistic children. It is the only device in this clinic and is based mainly on the theory of sensory integration. After that, the child is referred to the Therapeutic Training Center for Autistic Children. The therapeutic training center contains (8) classrooms in addition to two special rooms with games for children with autism and distraction. The clinic has individual training, meaning that each child is responsible for only one trainer. Since the establishment of the clinic, the number of diagnosed children has reached about (100) child with autism although clinic considered high payment of financial fees

3.4. Population of the Study

The accessible population for this study includes all parents of children with ASD who are attending selected private institutes, center and clinic in Al-Najaf Al-Ashraf City.

3.5. Sample of the Study

Non-probability, purposive, sample is recruited in order to achieve the study objectives, in which the participants re selected purposively according to selected criteria. The sample is comprised of (167) parent of children with ASD who fulfill the inclusion criteria are selected as sample for the study; (150) parent for the original study and (17) parent for the pilot study.

3.5a. Inclusion Criteria for Children

1. Children with autism spectrum disorder who are in the age group of 3-12 years.
2. Parents who are taking care for children with autistic spectrum disorder for more than (6) months.
3. Autistic children in centers for and have at least one biological parents as guardian.

3.5b. Exclusion Criteria for Children

1. Children who are recently diagnosed with ASD

2. Children with other medical conditions or other illness, such as cerebral palsy, attention deficit hyperactivity disorder, epilepsy, diabetes, thyroid gland problems and mental retardation.

3. Parents of autistic children who have participated in the pilot study.

3.6. Sample Size

From the accessible population of (287) autistic children, a purposive sample of (167) autistic children who have parent agreed to participate in the study and fulfilled the sample selection inclusion criteria.

The sample size is calculated using Taro Yamane formula as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Where, N= Population of study, 287

k = constant, 1

e = degree of error expected, 0.05

n=sample size

$$n = \frac{287}{1 + 287(0.05)^2}$$

$$n = 167$$

According to the early responses of the respondents, a sample size of (167) will be selected to ensure a (95) percent level of confidence.

3.7. Sampling Technique

Non probability, purposively involved, used to select the samples. Total of (167) subject are selected from two private institutes, one center and one clinic.

Table (3-1): Distribution of Study Settings and Sample

List	Settings	Number of Subjects	Total
1	Doves of Peace Center for Autistic and Slow Speech Children	114	60
2	Imam Hussein Autism Spectrum Disorder Institute for Autistic Children	76	48
3	Imam Ali Institute for Learning Disability and Autism	24	12
4	Al-Ertiqa Clinic for the Treatment of Autism Spectrum Disorder	73	47
Total		287	167

3.8. Ethical Considerations

All parents, who have participated in the study, have signed consent form for their agreements willingness for the participation in the study. All participants are introduced with the study objectives and they are presented with the opportunity of being aware of the study affairs to ensure confidentiality (Appendix B).

3.9. Study Instruments

Self-administered questionnaire is modified and adopted tool of dietary pattern for the purpose of the present study through systematic review of literature. Such questionnaire is consisted of (4) parts and presented as follows: (Appendix D)

Part Ia: Parents' Demographic Characteristics

It comprises of (11) item that include age, sex, , education level , occupation , residency, Income , the type of family , number of children in the family , number of children affected with autism, Any family history of child with autism , parents information about dietary pattern.

Part Ib: Children with Autism Spectrum Disorder Demographic Characteristics

It consists of (8) item that include age, sex, order of the child, type of birth, age at diagnosis, type of treatment and body mass index.

Table (3-2): BMI of Children and Teens according to Age, Weight Status Categories and the Corresponding Percentiles

Weight Status Category	Percentile Range
Underweight	Less than the 5th percentile
Normal or Healthy Weight	5th percentile to less than the 85th percentile
Overweight	85th to less than the 95th percentile
Obese	95th percentile or greater

https://www.cdc.gov/obesity/childhood/defining.html

Part II: Dietary Patterns

This part is developed from the WHO (2013) Simplified Oral Health Questionnaire and the Youth and Adolescent Food Frequency Questionnaire 2012. It is consisted of six food group with subcategories items to assess the dietary patterns of autistic children, the scale is once daily, twice daily, once a week, twice a week, occasionally, and never (Kolodziejczyk et. al., 2012).

The food Frequency Questionnaire is used in the current study lists foods that were categorized in to one of six categories by are glistered dietician: vegetable, fruit, starch, protein, dairy, combination (foods that include more than one food group, for example, soups). The food frequency intake questionnaire has asked for how often per day, week and month the child consumes one serving, which is listed, of a particular food item. Families are asked to select what they observed over this time.

Part III: Eating Behaviors

Lukens and Linscheid (2008) are the first who develop a standardized measure to examine mealtime behaviors specifically in children with ASD.

While, eating behaviors of children, is developed in England by Wardle and colleagues (2001) Children's Eating Behaviors Questionnaire (CEBQ) and it is a 5-level type Likert scale that is containing (8) sub-categories, translated into many languages, used in various studies, comprehensive, assessing the eating behaviors of children over (5) scores of 1 = never to 5 = always in (35) different items.

Furthermore, rating scale is used to assess the eating behaviors of autistic children. It is consisted of (35) items to assess the eating behaviors, such as satiety responses, emotional under eating, desire to drink, in eating, food refusal, limited variety of eating by Jyothsna at (2017) as well, the reference to the permission and scoring system is taken from the author via online communication that is found in Appendix (C).

Brief Autism Mealtime Behaviors Inventory (BAMBI) is considered to be the only validated questionnaire that is designed specifically to measure mealtime behaviors in children with ASD. The questionnaire addresses the child's difficulties at the mealtime including foods offered, presentation, texture, smell and sitting at the table.

The instrument aims at assessing symptoms unique to the population, such as ritualistic and repetitive behavior during meals and sensory feeding problems (Cermak et. al., 2010). The 18-item version is shown to reflect three underlying factors of limited variety, food refusal and features of autism (Lukens and Lindscheid, 2008).

The third factor is scored rarely in typically developing children, making the instrument less suitable for use in the general population. In a more extensive study on the BAMBI, the number of items was reduced to (15) with four underlying factors of food selectivity, food refusal, disruptive mealtime behaviors and mealtime rigidity (DeMand et. al., 2015).

Eating behaviors scale has been used by Al-Tamimi and Sayed Ahmed (2014). The scale consists of four dimensions that have been represented behaviors

which are considered as barriers for eating, food refusal and behavioral problems associated with eating, and excessive selectivity to eat and the answer is decided the scale by choosing one of four answers that represent the degree of occurrence of the behavior, ranging from always occurs, sometimes and it never happens.

Part IV:Gastrointestinal Symptoms

It is three point rating scale which is used to assess the gastrointestinal symptoms of autistic children. It is consisted of (14) item. The items are related to symptoms like nausea, vomiting, foul smelling stools, abdominal pain, indigestion, constipation, diarrhea etc. These symptoms are assessed based on no or transient symptoms, occasional or frequent episodic symptoms and continuous or severe symptoms (Gan *et al*., 2023).

3.10. Pilot Study

During the first two weeks of July 2022, a pilot study was applied to 17 parents of autistic children who had the same criteria of the study sample .Such sample was excluded from the original sample of the study.

The initial pilot study objectives are to emphasize the following points:

1. The approval for sampling.
2. Time estimation is essential for data collecting.
3. The detection of boundaries, which could be numerous during the data gathering.

a. Results of the Pilot Study:

The results of the pilot study simplify the following:

1. The time needed for filling the questionnaire was clearly estimated.
2. The items of the study instrument are clear and understood.
3. The questionnaire is reliable.

3.11. Validity of the Questionnaire:

Validity is defined as the extent to which the research tool measures what it is supposed to measure that has been characterized as the validity of the

instrument. The tool should cover all aspects of the subject under investigation (Polit and Hungler, 2013).

Content validity is determined for the questionnaire throughout panel of experts in the fields of Pediatric Nursing, Pediatric Medicine and Community Health Nursing and psychiatric and mental health nursing

The questionnaire is presented to (18) experts to evaluate the content clarity and adequacy of the questionnaire. These experts are (4) faculty members from the University of Babylon Faculty of Nursing, (4) faculty members from the University of Baghdad College of Nursing, (3) faculty members from the University of Kufa Faculty of Nursing, (1) faculty member from the University of Babylon Collage of Medicine, (1) faculty member from Hawler Medical University Collage of Nursing, (1) faculty member from the University of Karbala College of Nursing, (1) faculty member from the Kut University College , (1) faculty member from the University of Mosul College of Nursing , (1) faculty member from Al-Toosi University College Department of Nursing, (1) faculty member from Al- Bayan University College of Nursing (Appendix D).

Polit and Beck (2010) have stated that a panel of at least three experts is required, but a larger number may be beneficial if the content is complex. All logical and scientific opinions which have been introduced by the connoisseurs were added and utilized. The practical and scientific experience of the experts whose opinions are taken ranged between (10-40) years. Experts' recommendations and suggestions for modification and change are considered as a result of their evaluation.

3.12. Reliability of the Questionnaire

The reliability has many definitions in research; ones defined it as the extent to which measurements are repeatable when different people perform the measurement on different occasion, under different condition, supposedly with alternative instruments which measure the construct or skill (John, 2015).

The internal consistency type of reliability is determined in the current study; internal consistency reliability measures the consistency between different items of the instrument. It has been stated that it measures the consistency within the instrument and questions on how well a set of items measures a particular characteristic of the test. Single items within a test are correlated to estimate the coefficient of reliability (Edwin, 2019).

The internal consistency between items is determined by using Cronbach`s alpha coefficient which was calculated through the application of split-half technique on a sample of (17) parent of autistic children (Table 3-2).

Table (3-2): Internal Consistency Reliability of the Questionnaire (N= 17)

Scales	Items	Cronbach Alpha Correlation Coefficient	Evaluation
Dietary Patterns	37	0.813	Reliable
Eating Behaviors	38	0.878	Reliable
Gastrointestinal Symptoms	14	0.781	Reliable

The Cronbach's alpha depicts that the questionnaire was adequate measure for measuring dietary patterns, eating behaviors and gastrointestinal symptoms (r = 0.813, 0.841 and 0.781) respectively. Such findings can be interpreted in a way that the questionnaires had adequate level of internal consistency and equivalent measurability.

3.13. Rating and Scoring:

The scale of dietary patterns has used a 6-level type Likert scale which is scored as Never = 0, Occasionally = 1, twice a week = 2, once a week = 3, twice daily = 4 and once daily = 5. The overall level of dietary patterns is estimated by calculating the range score of the total score after calculating the range from minimum score and maximum score; the range score is rated into three levels and scored as follows: Poor = (0 - 61.66), Moderate = (61.67 –

123.33), Good = (123.34 – 185). The level of each item, in scale, is estimated by calculating the cutoff point and rated into three levels as follows: Low = (0 – 1.66), Moderate = (1.67 – 3.33) and High = (3.34 – 5).

The scale of eating behaviors has used a 3-level type Likert scale of Never = 3, Sometimes = 2 and Always =1 for all item except item (5) in limited variety subscale and items 1, 2 and 3 of emotional underrating subscale which are scored as Never = 1, Sometimes = 2 and Always = 3. The overall level of eating behaviors is estimated by calculating the range score for mean of total score after calculating the range from minimum score and maximum score; the range score is rated into three levels and scored as follows: Poor =(38 - 63.33), Moderate = (63.34 – 88.67) and Good = (88.68 – 114). The level of each item, in scale, is estimated by calculating the cutoff point and rated into three levels as follows: Poor = (1 – 1.66), Moderate = (1.67 – 2.33) and Good = (2.34 – 3).

The scale of gastrointestinal symptoms has used a 3-level type Likert scale of Never = 0, Sometimes = 1, and Always =2 for all items. The overall level of symptoms is measured by calculating the range score for mean of total score after calculating the range from minimum score and maximum score; the range score rated into four levels and scored as follows: No problem = (0 – 7), Mild problem = (7.1 – 14), Moderate Problem = (14.1 – 21) and Severe problem = (21.1 – 28). The level of each item, in scale, is estimated by calculating the cutoff point and rated into four levels as follows: No problem = (0 – 0.5), Mild problem= (0.6 – 1), Moderate Problem = (1.1 – 1.5) and Severe problem = (1.6 – 2).

Rating scale is used to assess the eating behaviors of autistic children. It consisted of 35 items to assess the eating behaviors such as satiety responses, emotional under eating, desire to drink, slowness in eating, food refusal, limited variety of eating and other habits etc. The scale legends for eating behaviors were ‘Always’, ‘Sometimes’ and ‘Never’. A frequency score is the

determined by calculating the sum of the Likert responses with the following items reverse-scored.

3.14. Data Collection:

Self-administered questionnaire is used to collect the demographic data of children with ASD and their parents and data about the dietary patterns, eating behaviors and gastrointestinal symptoms of children with ASD.

Parents of both male and female children with ASD between the age group of (3-12) years are selected as samples. After self-introduction with the samples, a brief introduction about the study is given to the parents. The informed consent is obtained from the parents for their willingness to participate in the study. After verification of informed consent, the data are collected. It takes approximately (30 – 45) minute to gather the data from each participant.

3.15. Data Analysis

3.15.1. Descriptive Statistical Data Analysis Approach:

a. Frequency (F)

b. Percentage

c. Mean:

d. Standard Deviation

3.15. 2. Inferential Statistical Data Analysis Approach:

a. Cronbach Alpha (α): Cronbach's alpha coefficient measures the internal consistency, or reliability, of a set of survey items. Such statistic is used to determine whether a collection of items consistently measures the same characteristic. Cronbach's alpha quantifies the level of agreement on a standardized 0 to 1 scale. Higher values indicate higher agreement between items (Polit & Hungler, 2013). It is used to estimate the internal consistency of the study questionnaire.

b. Independent t-test: The independent t-test, is also called the two sample t-test, independent-samples t-test or student's t-test, is an inferential statistical test that determines whether there is a statistically significant difference

between the means in two groups (Leard Statistics, 2019). It is used to determine the significant differences in dietary patterns and eating behaviors with regard to some variables of parents and their children.

c. Analysis of Variance (ANOVA): It is a collection of statistical models which are used to analyze the differences among groups' means and their associated procedures, such as "variation" among and between groups.

ANOVAs are useful for comparing (testing) three or more means (groups or variables) for statistical significance. It is conceptually similar to multiple two-sample t-tests, but is less conservative (results in less type I error) and is therefore suited to a wide range of practical problems (Fisher& Yates, 2016). It is used for determining the significant differences in dietary patterns and eating behaviors with regard to some variables of parents and their children.

d. Spearman's rank correlation coefficient: It is the measure of the strength of the correlation for the measurable and non-measurable features that can be and set in the form of a correlation series. Spearman's coefficient has similar properties as Pearson's linear correlation coefficient, since it shows the force (absolute value) and the direction (sign) of the correlation of the two features of the analyzed population. The value of this coefficient is in the closed interval (-1, 1). The closer to the ends of this range the stronger the correlation between the features (Borowski, 2022). It is used to determine the relationship between gastrointestinal symptoms with demographic and clinical variables of autistic children.

e. Linear Regression: A simple linear regression model establishes the relationship between the independent variable and dependent variable as a straight line. Simple linear regression model serves two purposes: It describes the linear dependence of one variable on another and it can predict values of one variable from values of another based on historical relationship between independent and dependent variable (MBaskool, 2019). It is used to determine

the effect of dietary patterns and eating behaviors on gastrointestinal symptoms among children with autism spectrum disorder.

3.16. Limitation of the Study:

The study has encountered the limitation of insufficient and irrelevant national research studies.

Chapter Four

Results of Study

Chapter Four

Results of the Study

Table (4-1): Distribution of Parents according to their Socio-Demographic Characteristics

List	Characteristics		f	%
1	Parents	Father	73	48.7
		Mother	77	51.3
		Total	*150*	*100*
2	Age (years) M±SD= 36±7	20 – 29	30	20
		30 – 39	65	43.3
		40 – 49	51	34
		50 and more	4	2.7
		Total	*150*	*100*
3	Residency	Urban	127	84.7
		Rural	23	15.3
		Total	*150*	*100*

Table (4-1): Continued

List	Characteristics		f	%
4	**Monthly income**	Insufficient	35	23.3
		Barely sufficient	77	51.4
		Sufficient	38	25.3
		Total	***150***	***100***
5	**Type of family**	Nuclear	106	70.7
		Extended	44	29.3
		Total	***150***	***100***
6	**Number of children in the family** **M±SD= 5±1**	1 – 3	73	48.7
		4 – 6	74	49.3
		7 – 9	3	2
		Total	***150***	***100***

F: Frequency, %: Percentage, M: Mean, SD: Standard Deviation

Results, out of this table, depict that more than half of the sample is mothers of autistic children (51.3%) with average age of (36±7) years in which (43.3%) of them are associated with age group of (30-39) years.

Regarding the residency, (87%) of the participants is living in urban area while only (15.3%) are living in rural area.

Relative to monthly income, (51.4%) of participants have reported barely sufficient monthly income while (25.3%) has reported sufficient monthly income.

The type of family refers to nuclear among (70.7%) of participants and the remaining are living with extended families.

The average number of children in family refers to 5±1 in which 49.3**% of participant reported they have 4-6 children in their families.**

Table (4-2): Distribution of Parents according to Their Level of Education

Level of Education	Mother		Father	
	f	%	f	%
Unable to read and write	3	2	0	0
Able to read and write	11	7.3	8	5.3
Primary school	25	16.7	31	20.7
Intermediate school	28	18.7	26	17.4
High school	17	11.3	23	15.3
Diploma Degree	15	10	20	13.3
Bachelor Degree	43	28.7	35	23.3
Postgraduate Degree	8	5.3	7	4.7
Total	***150***	***100***	***150***	***100***

f: Frequency, %: Percentage

Results, out of this table, show that the highest percentage of education is refer to Bachelor Degree among mothers and fathers of children with autism as being reported among (28.7%) of mothers and (23.3%) of fathers.

Table (4-3): Distribution of Parents according to Their Occupational Status

Occupation	Mother		Father	
	f	%	f	%
Governmental Employee	48	32	68	45.3
Housewife	96	64	6	4
Self-employed	6	4	73	78.7
Others	0	0	3	2
Total	***150***	***100***	***150***	***100***

f: Frequency, %: Percentage

Results, out of this table, reveal that (64%) of mothers are housewives and (32%) are governmental employees; (78.7%) of fathers are self-employed and (45.3%) are working as governmental employees.

Table (4-4): Distribution of Parents according to Variables related to Autism History in Family

List	Characteristics		f	%
1	**Number of children affected with autism**	1	125	83.3
		2	25	16.7
		Total	***150***	***100***
2	**Family history of autism**	No	118	78.7
		Yes	32	21.3
		Total	***150***	***100***
3	**Parents' information about dietary patterns and eating behaviors**	No	57	38
		Yes	93	62
		Total	***150***	***100***
4	**Parents' kinship**	Relative	84	56
		Stranger	66	44
		Total	***150***	***100***

5	**Parents' information about autism**	No	61	40.7
		Yes	89	59.3
		Total	***150***	***100***

f: Frequency, %: Percentage

This table reveals that (83.3%) of participants have reported that they have only one child who is affected with autism.

Regarding to family history of autism, only (21.3%) of participants have reported that they have positive history of autism in their families.

Concerning knowledge about dietary patterns and eating behaviors, (62%) of participants have responded that they have knowledge about dietary patterns and eating behaviors and (59.3%) of them have knowledge about autism.

The kinship between parents and relative is found among (56%) and stranger among (44%) of participants.

Table (4-5): Distribution of Autistic Children according to Their Socio-demographic Characteristics

List	Characteristics		f	%
1	Age (years) M±SD= 6±2	3 – 6	79	52.7
		7 – 10	62	41.3
		11 and more	9	6
		Total	*150*	*100*
2	Sex	Male	126	84
		Female	24	16
		Total	*150*	*100*
4	Birth order	First	55	36.7
		Second	31	20.7
		Third	22	14.7
		Fourth	25	16.7
		>Fifth	17	11.2

	Total	*150*	*100*

f: Frequency, %: Percentage, M: Mean, SD: Standard deviation

Results, out of this table, indicate that average age of children with autism is (6±2) years in which (52.7%) of children are with age group of (3-6) years.

Regarding to their sex, (84%) of children are males while only (16%) of them are females.

The birth order refers to firstborn among (36.7%) of children with autism as a high percentage seen in this study.

Table (4-6): Distribution of Autistic Children according to Their Clinical Characteristics

List	Characteristics		f	%
1	Child's age at diagnosis (years)	2	25	16.7
		3	101	67.3
		4	16	10.7
		5	5	3.3
		> 6	3	2
		Total	*150*	*100*
2	Types of treatment	With medications	7	4.7
		Training	83	55.3
		Training & medication	60	40
		Total	*150*	*100*
4	Autism severity	Mild	47	31.3
		Moderate	80	53.4
		Severe	23	15.3
		Total	*150*	*100*
5	Body mass index	Underweight	24	16
		Normal	38	25.3
		Overweight	55	36.7
		Obese	33	22
		Total	*150*	*100*

f: Frequency, %: Percentage

Results, out of this table, present that (67.3%) of children are diagnosed at age of three years as reported by their parents.

The type of treatment refers to training among (55.3%) of children while it denotes to training and medications among (40%) of them.

The severity of autism is moderate among (53.4%) of children and only (15.3%) are seen with severe autism.

The highest percentage regarding body mass index is accounted for overweight among (36.7%) of children with autism.

Table (4-7): Overall Assessment of Dietary Patterns among Children with Autism

Dietary Patterns	f	%	M	SD
Poor	23	15.3	92.65	28.219
Moderate	104	69.4		
Good	23	15.3		
Total	*150*	*100*		

f: Frequency, %: Percentage, M: Mean for total scores, SD: Standard Deviation for total scores, Poor= 0 – 61.66, Moderate= 61.67 – 123.33, Good= 123.34 – 185

Results, out of this table, indicates that children with autism have been associated with moderate dietary patterns (M±SS= 92.65±28.219) in which (69.4%) of them are seen with moderate level of such patterns.

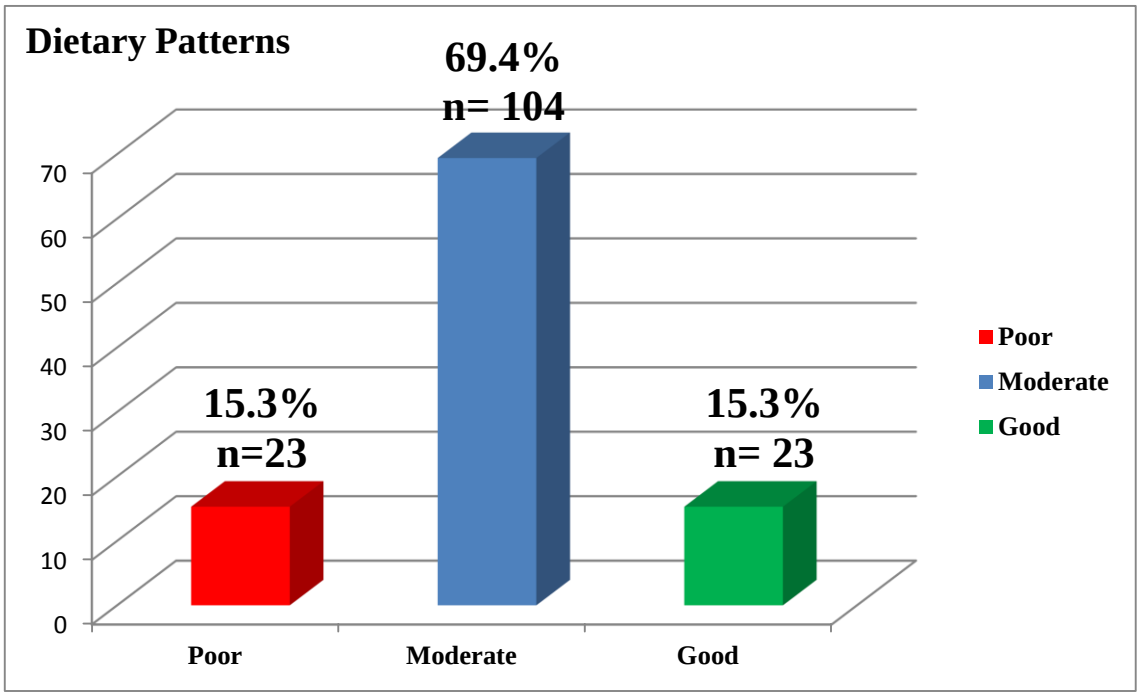


Figure (4-1): Levels of Dietary Patterns among Children with Autism (N=150)

This figure shows that (69.4%) of children with autism have moderate dietary patterns.

Table (4-8): Assessment of Dietary Patterns among Children with Autism

Food		Once daily	Twice daily	Once a week	Twice a week	Occasionally	Never	Mean (Assessment)
		f(%)	f(%)	f(%)	f(%)	f(%)	f(%)	
Animal foods	Beef	28(18.7)	6(4)	29(19.3)	30(20)	34(22.7)	23(15.3)	2.30 (M)
	Fish	6(4)	2(1.3)	49(32.7)	25(16.7)	39(26)	29(19.3)	1.83 (M)
	Eggs	83(55.3)	14(9.3)	9(6)	20(13.3)	15(10)	9(6)	3.69 (H)
	Chicken	20(13.3)	3(2)	39(26)	52(34.7)	20(13.3)	16(10.7)	2.35 (H)
	Sausages/ smokies	10(6.7)	1(.7)	21(14)	15(10)	36(24)	67(44.7)	1.22 (L)
	Sheep meat	21(14)	2(1.3)	20(13.3)	22(14.7)	45(30)	40(26.7)	1.75 (M)
Legumes	Beans	8(5.3)	0 (0)	29(19.3)	11(7.3)	53(35.3)	49(32.7)	1.35(L)
	Green grams	5(3.3)	2(1.3)	61(40.7)	23(15.3)	43(28.7)	16(10.7)	2.03(M)
	Peas	5(3.3)	0(0)	24(16)	20(13.3)	39(26)	62(41.3)	1.17(L)
	Lentils	8(5.3)	1(.7)	46(30.7)	19(12.7)	45(30)	31(20.7)	1.77(M)
	Mung bean	4(2.7)	0(0)	22(14.7)	15(10)	61(40.7)	48(32)	1.18(L)
	Chick peas	4(2.7)	3(2)	33(22)	18(12)	53(35.3)	39(36)	1.47 (L)
Starches	Rice	105(70)	25(16.7)	3(2)	8(5.3)	4 (2.7)	5(3.3)	4.36 (H)
	Bread	68(45.3)	63(42)	1(.7)	6(4)	4 (2.7)	8(5.3)	4.07(H)
	Spaghetti/macaroni	22(14.7)	11(7.3)	46(30.7)	12(8)	32(21.3)	27(18)	2.32 (M)
	Chips	67(44.7)	19(12.7)	15(10)	11(7.3)	16(10.7)	22(14.7)	3.29(M)
	Maize	15(10)	7(4.7)	20(13.3)	22(14.7)	49(32.7)	37(24.7)	1.17 (L)

	Bananas	65(43.3)	11(7.3)	12(8)	24(16)	24(16)	14(9.3)	3.18(M)
	Potatoes	57(38)	20(13.3)	27(18)	20(13.3)	11(7.3)	15(10)	3.31(M)
Vegetables & Fruits	Fresh	44(29.3)	9(6)	22(14.7)	18(12)	28(18.7)	29(19.3)	2.57 (M)
	Frozen or Packaged	14(9.3)	6(4)	21(14)	10(6.7)	27(18)	72(48)	1.36(L)
Fast food	Cheeseburger	28(18.7)	5(3.3)	20(13.3)	8(5.3)	33(22)	56(37.3)	1.79(M)
	Pizza	36(24)	14(9.3)	22(14.7)	8(5.3)	37(24.7)	33(22)	2.37(M)
	Sandwich	27(18)	12(8)	23(15.3)	11(7.3)	27(18)	50(33.3)	2.01(M)
Beverages	Fresh fruit juices	51(34)	8(5.3)	20(13.3)	9(6)	25(16.7)	37(24.7)	2.60(M)
	Artificial juices	70(46.7)	19(12.7)	17(11.3)	13(8.7)	13(8.7)	18(12)	3.44(H)
	Tea	44(29.3)	12(8)	17(11.3)	11(7.3)	28(18.7)	38(25.3)	2.46(M)
	Soda/soft drinks	44(29.3)	8(5.3)	23(15.3)	20(13.3)	20(13.3)	35(23.3)	2.54(M)
	Fresh Milk	66(44)	15(10)	13(8.7)	13(8.7)	18(12)	25(16.7)	3.15(M)
	Yorghurt	62(41.3)	17(11.3)	12(8)	13(8.7)	16(10.7)	30(20)	3.04(M)
Confectionaries	Chocolates	67(44.7)	19(12.7)	8(5.3)	22(14.7)	22(14.7)	21(14)	3.22(M)
	Cookies/biscuits	56(37.3)	34(22.7)	17(11.3)	9(6)	22(14.7)	12(8)	3.38(H)
	Ice cream	49(32.7)	15(10)	25(16.7)	13(8.7)	27(18)	21(14)	2.89(M)
	Crisps	29(19.3)	6(4)	14(9.3)	24(16)	33(22)	44(29.3)	1.95(M)
	Candies	51(34)	24(16)	7(4.7)	16(10.7)	24(16)	28(18.7)	2.86(M)
	Cake	59(39.3)	31(20.7)	12(8)	18(12)	18(12)	12(8)	3.39(H)
	Sweets	65(43.3)	21(14)	13(8.7)	16(10.7)	14(9.3)	21(14)	3.29(M)

F: Frequency, %: Percentage, L: Low (0-1.66), M: Moderate (1.67-3.33), H: High (3.34-5)

Results, out of this table, displays that the assessment of dietary patterns according to food types shows that the animal foods has low consumption of sausage or smokiest; moderate for beef, fish, and sheep meat; and high for eggs and chicken.

The legumes indicate low consumption of beans, peas, hung bean, and chick peas; and moderate for green grams and lentils.

The starches show low consumption of maize, moderate for spaghetti, chips, bananas, and potatoes; and high for rice and breed.

The fruits and vegetables consumption is moderate for fresh consuming and low frozen packaged.

The fast foods consumption is moderate among all items of cheeseburger, pizza, and sandwich.

The beverages consumption is moderate for fresh juice, tea, soft drink, fresh milk, and yogurt, while it is high for artificial juice.

The confectionaries consumption is moderate for chocolate, ice cream, crisps, candies, and sweets, while it is high for cookies and cake.

Table (4-9): Overall Assessment of Eating Behaviors among Children with Autism

Eating Behaviors	f	%	M	SD
Poor	11	7.3	78.45	10.378
Moderate	115	76.7		
Good	24	16		
Total	*150*	*100*		

F: Frequency, %: Percentage, M: Mean for total scores, SD: Standard Deviation for total scores, Poor= 38 – 63.33, Moderate= 63.34 – 88.67, Good= 88.68 – 114

Results, out of this table, reveal that children with autism are associated with moderate eating behaviors (M±SS= 78.45±10.378) in which (76.7%) of them are seen with moderate level of such behaviors.

Table (4-10): Assessment of Eating Behaviors related to Food Refusal among Children with Autism (N=150)

List	Food Refusal	Scale	f (%)	M	Assess.
1	Child refuses to sit at the table for meals	Always	34(22.7)	1.98	Moderate
		Sometimes	85(56.7)		
		Never	31(20.6)		
2	Child refuses to self-feed	Always	41(27.3)	2.07	Moderate
		Sometimes	58(38.7)		
		Never	51(34)		
3	Expels food that he/she has eaten	Always	18(12)	2.37	Good
		Sometimes	59(39.3)		
		Never	73(48.7)		
4	Is disruptive during mealtimes	Always	32(21.3)	2.15	Moderate
		Sometimes	63(42)		
		Never	55(36.7)		
5	Closes mouth tightly when food is presented	Always	26(17.3)	2.27	Moderate
		Sometimes	56(37.3)		
		Never	68(45.4)		
6	Child Cries or scream during mealtimes	Always	24(16)	2.35	Good
		Sometimes	48(32)		
		Never	78(52)		
7	Child Turn his/her face or body	Always	28(18.7)	2.28	Moderate

	away from food	Sometimes	51(34)		
		Never	71(47.3		
Total				***2.21***	***Moderate***

M: Mean, Assess: Assessment, Poor= 1–1.66, Moderate= 1.67–2.33, Good= 2.34-3

Results, out of this table, indicate that children with autism are associated with moderate food refusal behaviors; the mean scores are moderate among all items except item 3 and 6 which are good (Expels food that he or she has eaten) and (Child cries or screams during mealtimes).

Table (4-11): Assessment of Eating Behaviors related to Disruptive Eating Behaviors among Children with Autism (N=150)

List	Disruptive eating behaviors	Scale	f (%)	M	Assess.
1	Remains seated at the table until meal is finished	Always	81(54)	1.63	Poor
		Sometimes	43(28.7)		
		Never	26(17.3)		
2	Is aggressive during mealtimes	Always	20(13.3)	2.44	Good
		Sometimes	44(29.4)		
		Never	86(57.3)		
3	Displays self-injurious behavior during mealtimes	Always	17(11.3)	2.51	Good
		Sometimes	39(26)		
		Never	94(62.7)		
4	Refuses to eat foods that require a lot of chewing	Always	71(47.3)	1.89	Moderate
		Sometimes	25(16.7)		
		Never	54(36)		
5	Child spills food from mouth that he /she has eaten	Always	22(14.7)	2.37	Good
		Sometimes	51(34)		
		Never	77(51.3)		
6	Child is not flexible about mealtime behavior	Always	27(18)	2.23	Moderate
		Sometimes	62(41.3)		
		Never	61(40.7)		
7	Child is selective/sensitive to flavor, color, texture and temperature of food	Always	114(76)	1.35	Poor
		Sometimes	20(13.3)		
		Never	16(10.7)		
8	Child wants to eat foods from particular restaurants	Always	37(24.7)	2.19	Moderate
		Sometimes	47(31.3)		
		Never	66(44)		
9	Child wants to eat non- food substances	Always	32(21.3)	2.16	Moderate
		Sometimes	62(41.3)		
		Never	56(37.4)		
10	Child steals food from others	Always	41(27.3)	2.03	Moderate
		Sometimes	63(42)		

		Never	46(30.7)		
11	Child tries to vomit to get out of the meal	Always	20(13.3)	2.50	Good
		Sometimes	35(23.4)		
		Never	95(63.3)		
12	Child plays with food	Always	29(19.3)	2.22	Moderate
		Sometimes	59(39.4)		
		Never	62(41.3)		
13	Child only eats food with spoon and dislikes to touch the food	Always	45(30)	2.06	Moderate
		Sometimes	51(34)		
		Never	54(36)		
14	Child puts food into his/her mouth but won't chew	Always	27(18)	2.34	Good
		Sometimes	45(30)		
		Never	78(52)		
Total				*2.14*	*Moderate*

M: Mean, Assess: Assessment, Poor= 1-1.66, Moderate= 1.67–2.33, Good= 2.34-3

Results, out of this table, reveal that children with autism are associated with moderate disruptive eating behaviors; the mean scores is poor among items 1 and 7; moderate among items 4, 6, 8, 9, 10, 12, and 13; and good among items 2, 3, 5, 11, and 14.

Table (4-12): Assessment of Eating Behaviors related to Limited Variety among Children with Autism (N=150)

List	Limited Variety	Scale	f (%)	M	Assess.
1	Is willing to try new foods	Always	12(8)	2.58	Good
		Sometimes	39(26)		
		Never	99(66)		
2	Dislike certain foods and won't eat them	Always	116(77.3)	1.25	Poor
		Sometimes	30920)		
		Never	4(2.7)		
3	Prefers the same food at each meal	Always	115(76.7)	1.32	Poor
		Sometimes	30(20)		
		Never	4(2.7)		
4	Prefers "crunchy" foods	Always	51(34)	1.95	Moderate
		Sometimes	57(38)		
		Never	42(28)		
5	Prefers food prepared in particular way	Always	36(24)	1.75	Moderate
		Sometimes	40(26.7)		
		Never	74(49.3)		
6	Prefers only sweet foods	Always	38(25.3)	2.16	Moderate
		Sometimes	50(33.4)		
		Never	62(41.3)		
7	Prefers to have food served in	Always	27(18)	2.29	Moderate

	particular way	Sometimes	53(35.3)		
		Never	70(46.7)		
8	Accepts or prefers a variety of foods	Always	21(14)	2.50	Good
		Sometimes	33(22)		
		Never	96(64)		
Total				*1.97*	*Moderate*

M: Mean, Assess: Assessment, Poor= 1–1.66, Moderate= 1.67–2.33, Good= 2.34-3

Results, out of this table, present that children with autism associated with moderate limited variety behaviors; the mean scores is poor among items 2 and 3; moderate among items 4, 5, 6, and 7; and good among items 1 and 8.

Table (4-13): Assessment of Eating Behaviors related to Satiety Responsiveness among Children with Autism (N=150)

List	Satiety responsiveness	Scale	f (%)	M	Assess.
1	Child has excessive appetite	Always	61(40.7)	1.94	Moderate
		Sometimes	37(24.6)		
		Never	52(34.7)		
2	Child leaves food on his/her plate at the end of a meal	Always	34(22.7)	2.05	Moderate
		Sometimes	75(50)		
		Never	71(27.3)		
3	Child gets full before his/her meal is finished	Always	46(30.7)	1.93	Moderate
		Sometimes	69(46)		
		Never	35(23.3)		
4	Child finishes his/her meal very quickly within 5-10 minutes	Always	30(20)	2.33	Moderate
		Sometimes	40(26.7)		
		Never	80(53.3)		
5	Child takes more than 30 minutes to finish a meal	Always	76(50.6)	1.74	Moderate
		Sometimes	37(24.7)		
		Never	37(24.7)		
6	Child takes more water	Always	102(68)	1.45	Poor
		Sometimes	28(18.7)		
		Never	20(13.3)		
Total				*2.89*	*Good*

M: Mean, Assess: Assessment, Poor= 1–1.66, Moderate= 1.67–2.33, Good= 2.34-3

Results, out of this table, show that children with autism are associated with good satiety responsiveness behaviors; the mean scores is moderate among all items except item 6 that is poor which is (Child takes more water).

Table (4-14): Assessment of Eating Behaviors related to Emotional Underrating among Children with Autism (N=150)

List	Emotional underrating	Scale	f (%)	M	Assess.
1	Child eats less when she/he is angry	Always	52(34.7)	1.98	Moderate
		Sometimes	43(28.6)		
		Never	55(36.7)		
2	Child eats less when she/he is tired	Always	36(24)	1.89	Moderate
		Sometimes	61(40.7)		
		Never	53(35.3)		
3	Child eats less when she/he is upset	Always	49(32.7)	1.97	Moderate
		Sometimes	48(32)		
		Never	53(35.3)		
Total				*1.95*	*Moderate*

M: Mean, Assess: Assessment, Poor= 1–1.66, Moderate= 1.67–2.33, Good= 2.34-3

Results, out of this table, indicate that children with autism are associated with moderate emotional underrating behaviors; the mean scores is moderate among all items.

Table (4-15): Overall Assessment of Gastrointestinal Symptoms among Children with Autism

Symptoms	f	%	M	SD
No problems	21	14	11.85	4.680
Mild problems	91	60.7		
Moderate problems	33	22		
Severe problems	5	3.3		
Total	*150*	*100*		

F: Frequency, %: Percentage, M: Mean for total scores, SD: Standard Deviation for total scores, No problem= 0 – 7, Mild= 7.1-14, Moderate= 14.1 – 21, Severe= 21.1 – 28

Results, out of this table, indicate that children with autism are associated with mild to moderate gastrointestinal problems (M±SS= 11.85±4.680) in which (60.7%) of them are seen with mild problems and (22%) are with moderate problems.

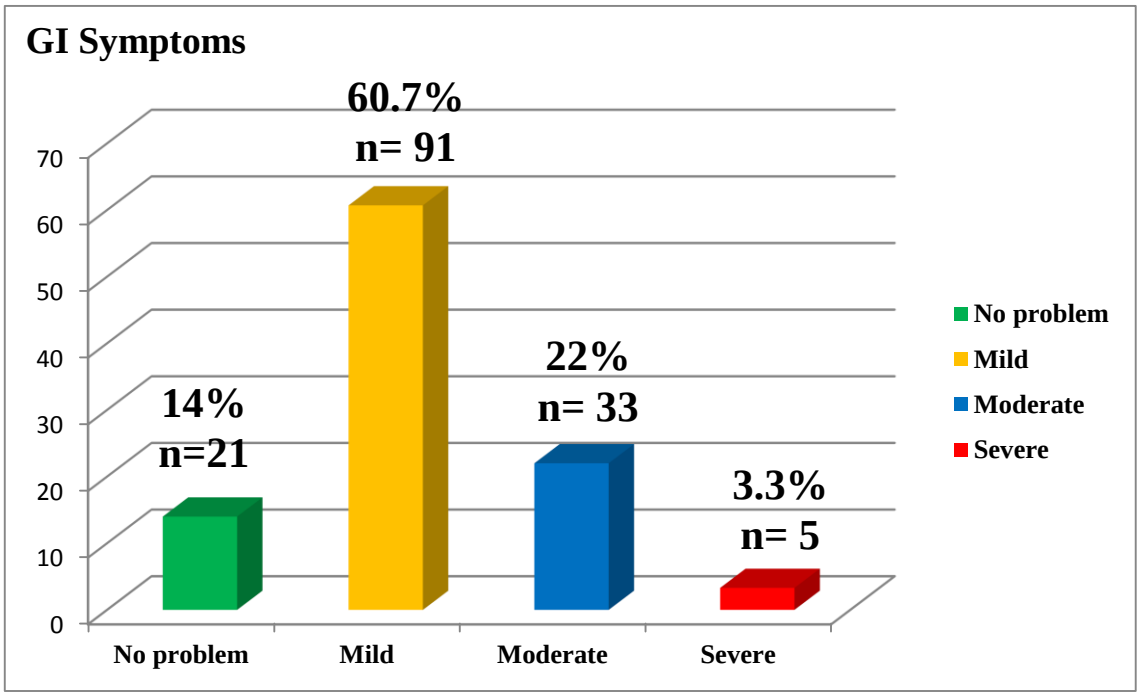


Figure (4-2): Severity of Gastrointestinal Symptoms among Children with Autism (N=150)

This figure shows that (60.7%) of children with autism have mild problems of gastrointestinal symptoms.

Table (4-16): Assessment of the Severity of Gastrointestinal Symptoms among Children with Autism (N=150)

List	Symptoms	Never f (%)	Sometimes f (%)	Always f (%)	M	Assess
1	Nausea	91(60.7)	46(30.7)	13(8.6)	.48	No problem
2	Vomiting	83(55.3)	49(32.7)	18(12)	.57	Mild
3	Abdominal pain	52(34.7)	61(24.7)	37(24.6)	.90	Mild
4	Diarrhea	79(52.7)	53(53.3)	18(12)	.59	Mild
5	Constipation	31(20.7)	33(22)	86(57.3)	1.37	Moderate
6	Bloating , Gaseousness or Abdominal distension	32(21.3)	44(29.4)	74(49.3)	1.28	Moderate
7	Dysphagia	93(62)	34(22.7)	23(15.3)	.53	Mild
8	Flatus	43(28.7)	57(38)	50(33.3)	1.05	Moderate
9	Burping	64(42.7)	48(32)	38(25.3)	.83	Mild
10	Indigestion	83(55.3)	47(31.4)	20(13.3)	.58	Moderate
11	Urinary incontinence or bedwetting	67(44.7)	34(22.6)	49(32.7)	.88	Moderate
12	Discolored watery stools	110(73.3)	27(18)	13(8.7)	.35	No problem
13	Fecal incontinence	58(38.7)	28(18.6)	64(42.7)	1.04	Moderate
14	Foul smelling stools	23(15.3)	44(29.3)	83(55.4)	1.40	Moderate

M Mean, Assess: Assessment, No problem= 0-0.5, Mild= 0.6-1, Moderate= 1.1-1.5, Severe= 1.6-2

This table presents the problems of gastrointestinal symptoms among children with autism. The findings show that nausea and discolored watery stool are not problematic; vomiting, abdominal pain, diarrhea, dysphagia, and burping are mild problems; constipation, bloating, flatus, indigestion, urinary incontinence, fecal incontinence, and foul smelling stools are moderate problems.

Table (4-17): Regression Analysis for Measuring Effect of Dietary Patterns and Eating Behaviors on Gastrointestinal Symptoms among Children with Autism (N=150)

GI Symptoms / Variables	Unstandardized Coefficients		Standardized Coefficients	t-test	Significance
	B	Std. Error	Beta		
Dietary Patterns	0.043	0.012	0.258	3.469	0.001
Eating Behaviors	-0.151	0.034	-0.335	-4.509	0.001

Dependent variable: GI symptoms

This table indicates that dietary patterns and eating behaviors have highly significant effect on gastrointestinal symptoms among autistic children evidenced by p-value of 0.001 and 0.001 respectively.

This table shows that there are no significant differences in dietary patterns and eating behaviors of children with autism regarding to monthly income.

Table (4-18): Independent Sample Test for Dietary Patterns and Eating Behaviors among Children with Autism Regarding to Family Type (N=150)

Variables / Family type		M	SD	t	df	p≤ 0.05	Sig.
Dietary patterns	Nuclear	89.61	28.197	2.070	148	.040	**S**
	Extended	99.98	27.205				

Eating behaviors	Nuclear	78.68	10.311	.413	148	.680	N.S
	Extended	77.91	10.637				

M: Mean, SD: Standard deviation, t: t-test, dF: degree of freedom, Sig.: Significance, p: Probability value, N.S: Not significant, S: Significant, H.S: Highly significant

This table indicates that there is significant difference in dietary patterns with regard to family type at p-value= .040 while there is no significant difference in eating behaviors regarding to family type.

Number of Children / Variables	Source of variance	Sum of Squares	df	Mean Square	F	Sig.
Dietary patterns	Between Groups	499.133	2	249.567	.311	.734
	Within Groups	118148.840	147	803.734		
	Total	118647.973	149			
Eating behaviors	Between Groups	386.863	2	193.431	1.816	.166
	Within Groups	15660.311	147	106.533		
	Total	16047.173	149			

DF: Degree of freedom, F: F-statistics, Sig.: Significance

This table reveals that there are no significant differences in dietary patterns and eating behaviors of children with autism regarding to number of children in the family.

Table (4-19): Independent Sample Test for Dietary Patterns and Eating Behaviors among Children with Autism Regarding to Affected Children with Autism in the Family (N=150)

Affected children / Variables		M	SD	t	df	p≤ 0.05	Sig.
Dietary patterns	1	91.55	27.823	-1.069	148	0.287	N.S
	2	98.16	30.101				
Eating behaviors	1	78.97	9.977	1.362	148	0.175	N.S
	2	75.88	12.088				

M: Mean, SD: Standard deviation, t: t-test, DF: Degree of freedom, Sig.: Significance, p: Probability value, N.S: Not significant, S: Significant, H.S: Highly significant

This table depicts that there are no significant differences in dietary patterns and eating behaviors of children with autism regarding to number of affected children with autism in the family.

Table (4-20): Independent Sample Test for Dietary Patterns and Eating Behaviors among Children with Autism Regarding to Family History of Autism (N=150)

History / Variables		M	SD	t	df	p≤ 0.05	Sig.
Dietary patterns	No	89.47	28.523	2.712	148	0.007	S
	Yes	104.41	23.992				
Eating behaviors	No	79.04	10.150	1.338	148	0.183	N.S
	Yes	76.28	11.072				

M: Mean, SD: Standard deviation, t: t-test, DF: Degree of freedom, Sig.: Significance, p: Probability value, N.S: Not significant, S: Significant, H.S: Highly significant

This table indicates that there is significant difference in dietary patterns with regard to family with positive history of autism at p-value= .007 while there is no significant difference in eating behaviors regarding to family history of autism.

Table (4-21): Independent Sample Test for Dietary Patterns and Eating Behaviors among Children with Autism regarding to Parents' information about Dietary Patterns and Eating Behaviors (N=150)

Variables \ Knowledge		M	SD	t	df	p≤ 0.05	Sig.
Dietary patterns	No	98.49	27.939	2.004	148	0.047	S
	Yes	89.08	27.937				
Eating behaviors	No	77.25	11.134	-1.117	148	0.226	N.S
	Yes	79.19	9.874				

M: Mean, SD: Standard deviation, t: t-test, DF: Degree of freedom, Sig.: Significance, p: Probability value, N.S: Not significant, S: Significant, H.S: Highly significant

This table shows that there is significant difference in dietary patterns with regard to parents' knowledge about dietary patterns and eating behavior at p-value= 0.047.

Table (4-22): Independent Sample Test for Dietary Patterns and Eating Behaviors among Children with Autism Regarding to Parents' Kinship (N=150)

Variables \ Kinship		M	SD	t	df	p≤ 0.05	Sig.
Dietary patterns	Relative	93.10	26.733	.216	148	0.830	N.S
	Stranger	92.09	30.203				
Eating behaviors	Relative	77.71	11.187	-.984	148	0.327	N.S
	Stranger	79.39	9.245				

M: Mean, SD: Standard deviation, t: t-test, DF: Degree of freedom, Sig.: Significance, p: Probability value, N.S: Not significant, S: Significant, H.S: Highly significant

This table depicts that there are no significant differences in dietary patterns and eating behaviors of children with autism regarding to parents' kinship.

Table (4-23): Independent Sample Test for Dietary Patterns and Eating Behaviors among Children with Autism Regarding to Parents' information about Autism (N=150)

Variables \ Knowledge		M	SD	t	df	p≤ 0.05	Sig.
Dietary patterns	No	99.77	27.128	2.607	148	0.010	S
	Yes	87.78	28.059				
Eating behaviors	No	76.62	10.429	-1.802	148	0.074	N.S
	Yes	79.71	10.212				

M: Mean, SD: Standard deviation, t: t-test, DF: Degree of freedom, Sig.: Significance, p: Probability value, N.S: Not significant, S: Significant, H.S: Highly significant

This table indicates that there is significant difference in dietary patterns with regard to parents' knowledge about autism at p-value= 0.010 while there is no significant difference in eating behaviors relative to parents' such knowledge.

Table (4-24): Analysis of Variance for Dietary Patterns and Eating Behaviors among Children with Autism Regarding to their Age (N=150)

Variables \ Age of Children	Source of variance	Sum of Squares	df	Mean Square	F	Sig.
Dietary patterns	Between Groups	903.696	2	451.848	.564	.570
	Within Groups	117744.277	147	800.981		
	Total	118647.973	149			
Eating behaviors	Between Groups	241.445	2	120.722	1.123	.328
	Within Groups	15805.728	147	107.522		
	Total	16047.173	149			

df: Degree of freedom, F: F-statistics, Sig.: Significance

This table depicts that there are no significant differences in dietary patterns and eating behaviors of children with autism concerning to age of autistic children.

Table (4-25): Independent Sample Test for Dietary Patterns and Eating Behaviors among Children with Autism Regarding to their sex (N=150)

Sex / Variables		M	SD	t	df	p≤ 0.05	Sig.
Dietary patterns	Male	91.67	28.719	-.973	148	.332	N.S
	Female	97.79	25.362				
Eating behaviors	Male	78.00	10.113	-1.228	148	.221	N.S
	Female	80.83	11.612				

M: Mean, SD: Standard deviation, t: t-test, DF: Degree of freedom, Sig.: Significance, p: Probability value, N.S: Not significant, S: Significant, H.S: Highly significant

This table reveals that there are no significant differences in dietary patterns and eating behaviors with regard to sex of autistic children.

Table (4-26): Analysis of Variance for Dietary Patterns and Eating Behaviors among Children with Autism Regarding to their Age at Diagnosis (N=150)

Age of Children / Variables	Source of variance	Sum of Squares	df	Mean Square	F	Sig.
Dietary patterns	Between Groups	4421.447	5	884.289	1.115	.355
	Within Groups	114226.526	144	793.240		
	Total	118647.973	149			
Eating behaviors	Between Groups	545.323	5	109.065	1.013	.412
	Within Groups	15501.851	144	107.652		
	Total	16047.173	149			

DF: Degree of freedom, F: F-statistics, Sig.: Significance

This table reveals that there are no significant differences in dietary patterns and eating behaviors of children with autism regarding to age of children at diagnosis.

Table (4-27): Analysis of Variance for Dietary Patterns and Eating Behaviors among Children with Autism Regarding to their Birth Order (N=150)

Birth Order / Variables	Source of variance	Sum of Squares	df	Mean Square	F	Sig.
Dietary patterns	Between Groups	4612.506	4	1153.127	1.466	.215
	Within Groups	114035.467	145	786.451		
	Total	118647.973	149			
Eating behaviors	Between Groups	102.546	4	25.637	.233	.919
	Within Groups	15944.627	145	109.963		
	Total	16047.173	149			

DF: Degree of freedom, F: F-statistics, Sig.: Significance

This table depicts that there are no significant differences in dietary patterns and eating behaviors of children with autism regarding to their birth order.

Table (4-28): Analysis of Variance for Dietary Patterns and Eating Behaviors among Children with Autism Regarding to Their Type of Treatment (N=150)

Type of Treatment / Variables	Source of variance	Sum of Squares	df	Mean Square	F	Sig.
Dietary patterns	Between Groups	992.763	2	496.382	.620	.539
	Within Groups	117655.210	147	800.376		
	Total	118647.973	149			

Eating behaviors	Between Groups	109.240	2	54.620	.504	.605
	Within Groups	15937.933	147	108.421		
	Total	16047.173	149			

DF: Degree of freedom, F: F-statistics, Sig.: Significance

This table exhibits that there are no significant differences in dietary patterns and eating behaviors of children with autism regarding to their type of treatment.

Table (4-29): Analysis of Variance for Dietary Patterns and Eating Behaviors among Children with Autism Regarding to the Severity of Autism (N=150)

Severity / Variables	Source of variance	Sum of Squares	df	Mean Square	F	Sig.
Dietary patterns	Between Groups	162.921	2	81.460	.101	.904
	Within Groups	118485.052	147	806.021		
	Total	118647.973	149			
Eating behaviors	Between Groups	273.699	2	136.850	1.275	.282
	Within Groups	15773.474	147	107.303		
	Total	16047.173	149			

DF: Degree of freedom, F: F-statistics, Sig.: Significance

This table shows that there are no significant differences in dietary patterns and eating behaviors of children with autism regarding to the severity of autism.

Table (4-30): Analysis of Variance for Dietary Patterns and Eating Behaviors among Children with Autism Regarding to Their Body Mass Index (N=150)

Body Mass Index / Variables	Source of variance	Sum of Squares	df	Mean Square	F	Sig.

Dietary patterns	Between Groups	20722.556	3	6907.519	10.299	0.001*
	Within Groups	97925.418	146	670.722		
	Total	118647.973	149			
Eating behaviors	Between Groups	215.936	3	71.979	0.664	0.576
	Within Groups	15831.237	146	108.433		
	Total	16047.173	149			

DF: Degree of freedom, F: F-statistics, Sig.: Significance *(Post-hoc test: with those overweight at p-value=.001)

This table indicates that there is highly significant difference in dietary patterns with regard to their body mass index at p-value= 0.001 while there is no significant difference in their eating behaviors relative to their body mass index.

Table (4-31): Relationship between Gastrointestinal Symptoms of Children with Autism and Their Demographic Characteristics

Demographic Characteristics		Gastrointestinal symptoms					Correlation
		No problem	Mild	Moderate	Severe	Total	
Age (Years)	3 – 6	11	50	16	2	79	*r* = 0.080 P-value= 0.332 Sig,= N.S
	7 – 10	8	35	16	3	62	
	11 and more	2	6	1	0	9	
	Total	21	91	33	5	150	
Sex	Male	17	77	27	5	126	*r* = 0.043 P-value= 0.603 Sig.= N.S
	Female	4	14	6	0	24	
	Total	21	91	33	5	150	
Delivery type	Normal	8	46	17	2	73	*r* = 0.014 P-value= 0.863 Sig.= N.S
	Cesarean	13	45	16	3	77	
	Total	21	91	33	5	150	
Birth order	First	8	30	15	2	55	*r* = 0.109 P-value=0.186 Sig.= N.S
	Second	4	18	8	1	31	
	Third	5	9	6	2	22	
	Fourth	1	21	3	0	25	
	>Fifth	3	13	1	0	17	
	Total	21	91	33	5	150	

r = Spearman correlation coefficient, P= Probability, Sig.= Significance, N.S= Not significant, S= Significant, H.S= Highly significant

This table depicts that there is no significant relationship between gastrointestinal symptoms of autistic children and their demographic characteristics of age, gender, delivery type, and birth order.

Table (4-32): Relationship between Gastrointestinal Symptoms of Children with Autism and their Clinical Characteristics

Clinical Characteristics		Gastrointestinal symptoms					Correlation
		No problem	Mild	Moderate	Severe	Total	
Child's age at diagnosis (Years)	2	5	17	3	0	25	*r* = 0.015 P-value= 0.856 Sig.= N.S
	3	15	57	24	5	101	
	4	0	12	4	0	16	
	5	1	3	1	0	5	
	> 6	0	2	1	0	3	
	Total	21	91	33	5	150	
Type of Treatment	Medication	0	5	1	1	7	*r* = 0.070 P-value= 0.393 Sig.= N.S
	Training	13	52	17	1	83	
	Both	8	34	15	3	60	
	Total	21	91	33	5	150	
Severity of Autism	Mild	7	27	10	3	47	*r* = 0.074 P-value= 0.371 Sig.= H.S
	Moderate	12	50	17	1	80	
	Severe	2	14	6	1	23	
	Total	21	91	33	5	150	
Body Mass Index	Underweight	3	15	6	0	24	*r* = 0.068 P-value= 0.410 Sig.= N.S
	Normal	8	25	3	2	38	
	Overweight	4	32	17	2	55	
	Obese	6	19	7	1	33	
	Total	21	91	33	5	150	

r = Spearman correlation coefficient, P= Probability, Sig.= Significance, N.S= Not significant, S= Significant, H.S= Highly significant

This table shows that there is no significant relationship between gastrointestinal symptoms of autistic children and their clinical characteristics of age at diagnosis, type of treatment, severity of autism and body mass index.

Chapter Five
Discussion

Chapter five

Discussion of study results

5. 1 Distribution according to their Socio-demographic Characteristics

Table (4-1)

The results of current study showed that more than half of sample is mothers of autistic children with average age 36±7 years in which 43.3% of them are associated with age group of 30-39 years. Regarding residency, 84.71% of participants were living in urban areas while only 15.3% are living in rural area. Relative to monthly income, 51.4% of participants reported barely sufficient monthly income while 25.3% reported sufficient monthly income. The type of family refers to nuclear among 70.7% of participants and remaining is living in extended families.

The average number of children in family refers to 5±1 in which 49.3% of participant reported they have 4-6 children in their families. Concerning level of education, the results depict that the highest percentage of education is refer to bachelor degree among mothers and fathers of children with autism as reported among 28.7% of mothers and 23.3% of fathers. Regarding to occupation, the finding of current study shows that 64% of mothers are housewives and 32% are governmental employees; 78.7% of fathers are working as free workers and 45.3% are working as governmental employees.

The findings of current study are in the same line with (Elnajjar, 2021) who carried out a study about autistic Children Eating Patterns & Feeding Problems: Parents' Perspectives, Awareness, and Attitude Towards Nutrition Education Programs and indicated that the age of the majority of responders was 31-40 years. Regarding residency, majority of participants were living in

urban areas. This result in compatible with (Abbas et al., 2018) reported that more than two third of sample living in urban area.

According to the researcher point of view, can be explained in a way that people prefer to be within areas where services are widely distributed primarily in urban areas and are easily accessible, also, because most them prefer to live in close places to their work. NCPP, 2012 reported more than (70%) of dwelling population in Al-Najaf located in urban area (Al-Hamoodi et al, .2017).

Relative to monthly income, more than half of participants reported barely sufficient monthly income. These finding identical with (Abdul-Hussain and Yasir, 2018) their results indicate that half of sample is making moderate socio-economic status. According to the researchers opinion this may be due to that the current study had a sample their economic status was enough from their point of view, as is individual perception regardless of the income of the family.

Concerning the type of family the finding of present study refers to more than two third of participants living in nuclear family. These findings go along with study that carried out by (Mathew, 2018) who reported that most of family belongs to nuclear family. This may be due to nature of Iraqi society culture, and traditional.

In regarding the average number of children in family, the results refer to less than of participant reported they have 4-6 children in their families. This finding in the same line with (Elnajjar, 2021) who studied Autistic Children Eating Patterns & Feeding Problems: Parents' Perspectives, Awareness, and Attitude Towards Nutrition Education Programs , and found that, more than half of the participants, they have 4-6 member.

5.2: Distribution of Parents according to Their Level of Education

Table (4-2)

Concerning level of education, the results depict that the highest percentage of education is refer to bachelor degree among mothers and fathers of children with autism. This finding in the same line with study that conducted by (Obaid *et al*., 2019) who reported that the parents' educational attainment for both fathers and mothers highest percentage are graduated from diploma and above .So, descriptive study was planned to evaluate traditional baby care practices employed by mothers in the Turkish province of Trabzon that carried out by who reported that, the majority of participants were graduated from a university .

5.3 Distribution of Parents according to Their Occupational Status

Table (4-3):

Concerning to occupation, the finding of current study shows that more than half of mothers are housewives. This result in parallel with (Khalid and Mohammed, 2021) carried out a study and reported that most participants were housewives. According researcher point of view this may be due to the economic conditions that Iraq is going through from financial crises and the lack of job grades. Another reason is the husband's unwillingness (refusal) to work for his wife.

In regarding occupation of fathers the results show that more than three quarter of fathers are working as free workers. This finding inconsistent with (Zoromba *et al*., 2022) who reported that more than half of fathers were employees

5.4 Distribution of Parents according to Variables related to Autism History in Family Table (4-4):

In this study we found the highest percentage (21.3%) of participants reported they have positive history of autism in their families.

The findings of current study agreement with (Xie et al., 2020) who carried out a study about, and concluded that family history of ASD was associated with higher risk of ASD, especially if the affected relative was closer relative.

In other study that carried out by (Bai et al., 2020) , about Inherited Risk for Autism Through Maternal and Paternal Lineage their results indicated that among their maternal/paternal aunts and uncles, 1744 (0.24%) and 1374 (0.18%) were diagnosed with ASD, respectively.

The existing study underhand reveals that majority of participants reported they have only one children affected with autism. The findings of recent study in similarity with study that conducted on children with autism in India, and stated that Majority of parent's had one child affected with autism (Jyothsna, 2017).

While, It incongruent with (AL-Shimery et al., 2011) who reported that majority of participants had no family history of autism.

According to, CDC, (2022). Having a family health history of ASD makes you more likely to have a child with ASD, or to have ASD yourself. If you have a child with ASD, you are more likely to have another child with ASD, especially if you have a daughter with ASD or more than one child with ASD. Your other family members would also be more likely to have a child with ASD.

Dietary and eating behaviors knowledge was more than two third of participants are responding. This finding in the same line with (Al-Hamoodi

and Al Dujaili, 2017) who conducted a study about issues of Children's parents with ASD, and illustrated that, more than two third of parents had information about dealing with ASD from more than one source of information; that indicator for increased awareness of parents about ASD and readiness to receive information about their child state.

The findings of recent study in similarity with study that carried out by (Alyami et al., 2022), to explored the knowledge of the general population in KSA regarding ASD and assessed variables associated with an accurate understanding of ASD, and their results indicated that overall, study participants reported a moderate level of knowledge about autism.

By contrast, this result controverts previous findings of study that conducted on Autistic Children Eating Patterns & Feeding Problems: Parents' Perspectives, Awareness, and Attitude towards Nutrition Education Programs, and demonstrated that, the majority of the participants lack knowledge in dealing with the feeding problems faced (Elnajjar, 2021).

According to researcher point of view since parents have a high level of education they will be aware of caring for their children diagnosed with autism, in addition to, making them aware of their children's nutritional information and finding out the sources for what they need.

Concerning the kinship between parents, the result of recent study refers to relative among more than half of participants. This result congruent with (Al-Hamoodi and Al Dujaili, 2017) who carried out a study, indicated that, more than half of parents married from kindred. One possible reason for this is the research showing that ASD may be caused by genetic.

5.5 Discussion of Autistic Children according to their Socio-demographic Characteristics Table (4-5)

The results of current study reveal that average age of children with autism is 6±2 years in which more than half of children are with age group 3-6 years, this result congruent with (Shuhaimi and Mohamad, 2019) who their results indicated that more than half of sample their age 4-6 year. This may be due to the prominent age of diagnosis autism at 3 years.

Regarding sex 84% of children were males while only 16% of them are females. This finding parallel with (Hossain *et al*., 2020) who found that there were higher number of male child in compare with female with ASD. According to researcher point of view this may be due to origin in biological differences between the sexes.

The birth order is refers to firstborn among 36.7% of children with autism as a high percentage seen in this study. This result in the same line with (Zoromba et al., 2022) who found that more than one half children were the youngest among their siblings.

In the same context, (Galvan et al., 2020) who reported that the first-born children seem to be at higher risk of ASD compared to the later ones. However, existing literature provides a mixed result on the association between birth order and ASD. Also, Ugur et al. (2019) in their case control study illustrated that significant difference for being the first-born child in the ASD group.

The researcher point of view one possible reason for this pattern could be that parents may be worried of having another child after their first-born child was autistic. Also, a possible explanation for the correlation between firstborn

children might be that parents are reluctant to have a second child if the first is diagnosed with ASD.

5.5 Distribution of Autistic Children according to their Clinical Characteristics Table (4-6)

The findings of present reveals that more than two third of children are diagnosed at age of three years as reported by their parents. This result harmonizing with (Kareem and Ali, 2014) who carried out a study about Quality of Life for Parents with Children who have Autism in Erbil Iraq and pointed that, the highest percentage was within the age group 3-6 years old. The possible explanation by the researcher may be the nature of centers to age accepted for children and the awareness of parents of their child's symptoms

By contrast, this result controverts previous findings in KSA, Riyadh a study was conducted out by Alotaibi *et al*., (2021) who illustrated that the age group 20-24 months, Researcher's opinion, this suggests that children in our sample were diagnosed more promptly after parents sought help for their identified developmental concerns.

These differences may be due to sample size and demographics; however, it does highlight the need for better understanding of the pathway to care for children at risk of ASD.

Concerning the treatment type, the results refer to training among more than half of children. The finding of current study in the same line with (Ali and Ghanim, 2020) who illustrated that, three quarters of the study sample were used training in the treatment of their autistic children.

This may be due to the no specific medication for treatment of autism spectrum disorder.

In another study, that carried out by (Al-Khalidi, 2016) who proposed that Create a typical governmental Institute for the care of an autistic child is fully supported by the State and the training of professional cadres especially to take care of these children

Concerning the autism severity, the findings of study underhand refers to moderate among more than half of children. These finding in the same line with (Taylor,2016) that carried out a study and reported that, more than half of participants were moderate autism spectrum disorder severity.

Regarding body mass index, the findings of recent study depict that the highest percentage regarding body mass index refer to overweight among children with autism. These results in the same line with (Raspini et al., 2021) who found that the prevalence of overweight and obesity in the ASD group were higher percentage more than those of typically developing peers.

In other study that carried out to determine the prevalence of overweight/obese status in children with autism spectrum disorder ,identify associated characteristics, and develop a model to predict weight status, and concluded that The prevalence of obesity in children with ASD was greater than a national sample (de Vinck-Baroody *et al*., 2015).

The possible reason for explanation may be due to the research suggesting that autistic children have higher levels of food selectivity and that their diets may be characterized by calorically dense foods low in nutrient content. As well, the results of present study consistent with (Bicer and Alsaffar, 2013) who found that the majority of the children were overweight or obese.

5.6 Overall Assessment of Dietary Patterns among Children with Autism table (4-7)

The existing study found that the overall children with autism associated with moderate dietary patterns in which more than two third of them seen with moderate level of dietary patterns. The findings of recent study in the same line with (Jyothsna, 2017) who reported that majority of the children had moderate dietary pattern.

In the same direction (Wang et al., 2022) that carried out a study about explore the association between dietary quality and executive functions in autistic children. Illustrated that Compared to typical development children, children had a higher proportion of moderate dietary intake and moderate level of unbalanced dietary intake.

As well, according to the study that carried out by (Ahumada *et al*., 2022) this may be autism spectrum disorder is accompanied by high food selectivity, and autistic children have reported that texture, appearance, packaging, temperature, food presentation, color, taste and smell are all characteristics that influence on children's food choices.

The researcher point of view this may be due to Insufficient and unbalanced dietary intake problems may be caused by the following factors, first, autistic children often exhibit repetitive and stereotypical behaviors and other uncontrolled behaviors at mealtimes. These behaviors put them at higher risk for eating problems such as food rejection, high frequency of single food intake.

5.7 Distribution of assessments the Dietary Patterns among Children with Autism table (4-8)

The results of current study display the assessment of dietary patterns according to food types; the animal foods show low consumption of sausage or smokies; moderate beef, fish, and sheep meet; and high eggs and chicken. The legumes indicate low beans, peas, mung bean, and chick peas; moderate green grams and lentils. The starches show low maize, moderate spaghetti, chips, bananas, and potatoes; high rice and bread. The fruits and vegetables show moderate fresh consuming and low frozen packaged. The fast foods show moderate consumption among all items of cheeseburger, pizza, and sandwich. The beverages show moderate consumption of fresh juice, tea, soft drink, fresh milk, and yogurt, while show high artificial juice. The confectionaries show moderate consumption of chocolate, ice cream, crisps, candies, and sweets, while show high consumption of cookies and cake.

The findings of current study in the same line with (Plaza-Diaz *et al.*, 2021) who reported that A higher percentage of autistic children consumed four to six servings per day of cereals and pasta compared with the control group. A significantly higher percentage of autistic children consumed more than six servings of milk and dairy products compared with the control children. A high percentage of autistic children consumed less than three servings/wk of lean meats and eggs compared to the control children.

In contrast, both groups of children consumed an excess of fatty meats and their foodstuffs. The majority of autistic children consumed 2–3 servings of fat daily, whereas 22.8% of the control children consumed more than 3 servings/d. Finally, more than 85% of both ASD and control children

consumed more servings than those recommended for beverages, snacks, sweets, bakery, and pastry.

Base on the researcher the feeding difficulties in children with ASD are unlikely to be due to decreased exposure to arrange of foods because of caregiver and family selectivity.

In the same context (Haroldson *et al*., 2016) who carried out a study about and their results indicated that commonly consume 1-2 servings/day of fruits, vegetables, meat, other protein sources, sweets, fats, sugar-sweetened beverages, and snacks. Dairy and grains were the favored food groups, with common intakes of 3-4 servings/day. The majority of the subjects (85.7%) did not adhere to any special diet (i.e., gluten-free, and/or casein-free). In addition to dietary intake, 43% of participants recorded regular intake of a vitamin or mineral supplement. Fruit and vegetable intakes were below the recommended daily amounts for this age group, with 76.2% and 90.5% of participants consuming ≤ 2 servings of fruits and vegetables per day, respectively. Additionally, the daily intakes of sweets, fats, sugar sweetened beverages and snacks were above recommendations for this age group.

In Northern Cyprus , a study was conducted out by (Zeybek and Yurttagul, 2020) who found that Nutrient status, diet quality and growth parameters of children with ASD , and their finding indicated that the nutrients that children with nutritional selectivity omitted to consume were vegetables, fruits, meat and meat products and dairy products, respectively. Foods were pasta, potato chips, rice, meatballs and cookies/pie. The consumption rates of these foods were 42.5%, 35.0%, 17.5%, 15.0% and 15.0% respectively. The most popular drinks were cola (42.5%) and juice (25.0%).

As well, most of children have food selectivity and most common foods they refused to consume were vegetables (57.1%) and fruits (32.1%).

5.8 Overall Assessment of Eating Behaviors among Children with Autism table (Figure 4-2)

The existing study reveal that the overall children with ASD associated with moderate eating behaviors in which more than three quarters of them seen with moderate level of eating behaviors. This result compatible with (Ali and Ghanim, 2020) carried a study about and their findings revealed that autistic children concerning behaviors that impede eating items, in general, are at a moderate level in all items.

In the same direction, (Pinto, 2008) conducted a study about and clarified that When comparing children with and without autism, it can be seen that those with autism suffer a greater number of feeding problems due to their characteristic behavior's, as documented by caregivers.

According to researcher point of view this may be due to the presence of eating behavior problems which are associated with delayed development of sensory motor, tactile sensitivity, abnormal response to taste, and these behaviors may due to disability in expressing their needs associated with autistic disorder, anatomical, metabolic, and gastrointestinal.

5.9 a. Distribution of assessments the Eating Behaviors related to Food Refusal among Children with Autism (table 4-9)

The results showed that autistic children associated with moderate food refusal behavior; the mean scores indicate moderate among all items except item 3 and 6 that show good which are (Expels food that he/she has eaten) and (Child Cries or scream during mealtimes). This result in the same line with

(Qaraqish, 2017) carried a study and reported that the autistic children have moderate level from food refusal domain.

Another study consistent with presented study by (Kasnawi and Jambi, 2021) to investigate the association of Food Selectivity domain food refusal (FR), high frequency single food intake (HFSFI), had limited food repertoire (LFR), restricted diets, and appetite-affecting medications with nutritional adequacy in autistic children aged 6-12 years in the Western region of Saudi Arabia (SA). Who found that autistic children refused a large number of food items with varying frequency? In addition, autistic children were rejected more items in the "milk & cheese group" than other food groups

Previous study also mentioned food refusal might be due to sensory difficulties, instance of sameness and lack of communication to express refusal verbally (Handayani *et al*., 2012).

Another study that revealed this refusal food due to disliked strong odors, and Neophobia. Moreover this may be related to impairments in sensory processing, oral or tactile sensitivity, or behavioral rigidity (Hubbard et al., 2014).

5.9.b Distribution of assessments the Eating Behaviors related to Disruptive Eating Behaviors among Children with Autism (table 4-10)

This results showed that children with autism associated with moderate disruptive eating behavior; the mean scores indicate poor among items 1 and 7; moderate among items 4, 6, 8, 9, 10, 12, and 13; while show good among items 2, 3, 5, 11, and 14.

The findings of present study in the same line with (Palta and Saxena, 2013) who carried out a study about and their results indicated that highest percentage of children were “Always” showing aggressive behavior during

mealtime. This may be due to Presence of any physical problem, anxiety or inability to express the feelings properly can cause aggression in these children.

In other study that conducted by (Al-Kindi et al., 2016) who found that autistic children exhibited significantly more disruptive eating behavior than typically developing children. Moreover, the current study also confirmed previous study that autistic children were more aggressive during mealtimes (Handayani et al., 2012).

5.9 c. Distribution of assessments the Eating Behaviors related to Limited Variety among Children with Autism (table 4-11)

This results indicated that children with autism associated with moderate limited variety behavior; the mean scores indicate poor among items 2 and 3; moderate among items 4, 5, 6, and 7; and good among items 1 and 8.

The findings of present study in the same line with (Al-Kindim et al., 2016) who found that According to the perceptions of the parents, autistic children displayed many more problems of disruptive eating habits, limited choice of food variety, and more pronounced autistic features than typical developing children. Also, the findings of current study congruent with the causal-comparative study design that conducted by (Amin et al., 2022) to compare the eating behaviors, food preferences, and body mass index of children with and without Autism residing in Lahore, Pakistan , who reported that the limited variety was exhibited by highest percentage of the children with ASD.

In the same direction (Tanner et al., 2015) who done a study about Behavioral and Physiological Factors Associated With Selective Eating in Children with ASD, and their results indicated that the selective eating group had

significantly lower intake of foods, higher food refusal rates, and higher Limited Variety scores on the BAMBIC.

This may be due to early tactile sensitivity may contribute to some of the eating/ feeding behaviors, such as avoiding certain foods, textures, tastes, smells and temperatures seen in children with ASD. Indeed, these children are often more likely to accept only low-texture foods, such as those that have been pureed. In addition, tactile defensiveness and oral defensiveness may be part of a larger problem in modulating sensory input, which can take different forms, and affect various activities of daily living including eating/feeding (Vissoker *et al*.,2018).

5.9. d. Distribution of assessment of Eating Behaviors related to Satiety Responsiveness among Children with Autism (table 4-12)

The results indicated that children with autism associated with good satiety responsiveness behavior; the mean scores indicate moderate among all items except item 6 that show poor which is (Child takes more water).

The results of current study come with (Harris et al., 2022) that carried out a study about and reported that high children with ASD expressed increased satiety responsiveness decreased enjoyment in food. As well, the finding of recent study congruent with (ÖZ and BAYHAN, 2019) who reported that those who have at least one sibling among the ones with ASD show more enjoyment of food and food responsiveness than typically developing ones with no sibling.

5.10 .e. Distribution of assessments the Eating Behaviors related to Emotional Underrating among Children with Autism (table 4-13)

The results showed that children with autism associated with moderate emotional underrating behavior; the mean scores indicate moderate among all items. This finding also agreed with the study conducted by (van't Hof *et al*., 2020) who carried out a study about and concluded that autistic traits were associated with more emotional overeating and emotional under eating.

In addition to above study, Wallace et al., (2021) reported both emotional over-eating and emotional under-eating behaviors for autistic children more than their typically developing peers. By contrast, this result controverts previous findings (Harris *et al*., 2022) who illustrated ASD high children expressed increased emotional overeating.

This difference may be due to sex differences in these emotional eating behaviors were not observed in the typically developing children, girls with autism spectrum disorder were rated as experiencing more emotional over-eating behaviors than boys with autism spectrum disorder. Finally, among all children with autism spectrum disorder, emotional over-eating was linked with increased consumption of sweet foods and decreased consumption of vegetables (Wallace *et al*., 2021).

Brede *et al*,. (2020) proposed a model of autism-specific traits that may influence the development and maintenance of restrictive eating problems. These traits included sensory sensitivities, social interaction and relationship difficulties, sense of self and identity issues, difficulties with emotions, autistic thinking styles, and a need for control and predictability that may interact to influence a variety of restrictive eating presentations directly and indirectly

5.11: Overall Assessment of Gastrointestinal Symptoms among Children with Autism (Figure 4-3)

The existing study found that the overall autistic children associated with mild to moderate gastrointestinal issues in which more than half of them seen with mild problems and highest percentage are with moderate problems.

The findings of current study versus results of a cross-sectional study that carried out by (Kumar *et al*., 2021), who found that It shows that children with ASD significantly had higher GI symptoms, such as constipation, bloating, and abdominal pain.

The cause of these GI issuse is unclear, but it appears to partly relate to abnormal gut flora and possibly to the excessive use of oral antibiotics which can alter gut flora. Several studies by our group and others have reported significantly higher oral antibiotic use in children with autism vs. typical children. Oral antibiotics were primarily used for treating otitis media (ear infections), which may suggest an impaired immune system (Krajmalnik-Brown *et al*., 2015).

Commonly used oral antibiotics eliminate almost all of the normal gut microbiota, which play an important role in the breakdown of plant polysaccharides, promoting gastrointestinal motility, maintaining water balance, producing some vitamins, and competing against pathogenic bacteria. Loss of normal gut flora can result in the overgrowth of pathogenic flora, which can in turn cause constipation and other problems (Adams et al., 2011).

5.12 Assessment the Severity of Gastrointestinal Symptoms among Children with Autism (table 4-14)

This table presents the problems of gastrointestinal symptoms among children with autism; the findings show that nausea and discolored watery

school are no problematic. , vomiting, abdominal pain, diarrhea, dysphagia, and burping are of mild problems. Constipation, bloating, flatus, indigestion, urinary incontinence, fecal incontinence, and foul smelling stools are moderately problematic.

This finding come with (Chaidez *et al*., 2014) who carried out a study about Gastrointestinal Problems in Children with Autism, Developmental Delays or Typical Development, and reported that ASD children were more likely to have at least one frequent GI symptom. Restricting to ASD children, those with frequent abdominal pain, gaseousness, diarrhea, constipation or pain on stooling.

In the same direction (Prince , 2013) who carried out a study about , and reported that Children with ASD exhibited GI Symptoms such as constipation, diarrhea, stomach pain, and other symptoms associated with GI disorders.

5.13 Regression Analysis for Measuring Effect of Dietary Patterns and Eating Behaviors on Gastrointestinal Symptoms among Children with Autism (table 4-15)

The results showed that dietary patterns and eating behaviors have high effect on gastrointestinal symptoms among autistic children evidenced by significant differences at p-value= .001 and 001 respectively.

The findings of current study in the same line with (Vissoker *et al.*, 2015) who conducted a study about Eating and feeding problems and gastrointestinal dysfunction in Autism Spectrum Disorders and their results indicated that a strong relationship and significant correlations between eating problems and gastrointestinal dysfunction.

But in contrast with study that carried out by (Leader *et al*., 2022) who reported that no statistically significant correlation was found between parent-

reported FS and GI symptoms. This may be due to certain foods can cause exacerbate gastrointestinal (GI) problems such as reflux and abdominal pain that they may be suffering from.

5.14.I. Independent Sample Test for Dietary Patterns and Eating Behaviors among Children with Autism with regard to Family Type (table 4-16)

The analysis of variance showed that there were statistically significant difference in dietary patterns with regard to extended families at p-value= .040 while no significant difference is seen in eating behaviors with regard to family type.

The findings of recent study come with (Hossain *et al*., 2020) who carried out a study to explore the need for special food intake pattern that may affect ASD's life and its associated factors that can be barrier to raise ASD children with the part of the society, and their results indicated that non-significant relationship between eating patterns like hot foods with type of family at p-value= 0.058.

5.14.J Analysis of Variance for Dietary Patterns and Eating Behaviors among Children with Autism with regard to Number of Children in Family (4-17)

The analysis of variance showed that there were no significant differences in dietary patterns and eating behaviors with regard to number of children in family.

The findings of current study incongruent with study that carried out by (Kapila and Zhong, 2012) that reported that number of children in a family

related to dietary patterns, and behaviors. This may be due to different in the sample selection, and culture.

5.15 .a Independent Sample Test for Dietary Patterns and Eating Behaviors among Children with Autism with regard to Affected Children with Autism in Family (Table 4-18)

The results showed that there were no significant differences in dietary patterns and eating behaviors with regard to number of affected children with autism in family.

The results of present study in the same line with (Jyothsna , 2017) who clarified that was no significant association between dietary pattern of children and demographic variables of the caregivers such as number of children affected with autism, at p-value = 0.804

5.15 b. Independent Sample Test for Dietary Patterns and Eating Behaviors among Children with Autism with regard to Family History of Autism in Family (table 4-19)

The analysis of variance showed that there were significant difference in dietary patterns with regard to family with positive history of autism at p-value= .007 while there is no significant difference in eating behaviors with regard to family history of autism.

The findings of study underhand come with (Alkhalidy *et al*., 2021) who conducted a study about and pointed that family history of autism was one determinants of ASD in children.

5.15.c. Independent Sample Test for Dietary Patterns and Eating Behaviors among Children with Autism with regard to Parents' Knowledge about Dietary Patterns and Eating Behaviors (table 4-20)

The results showed statistically significant difference in dietary patterns with regard to parents' knowledge eating behavior at p-value= .047.

The finding of current study in the same line with study that conducted by (Ismail et al., 2022) who reported that basic knowledge of the need to increase fruit and vegetable consumption was good but participants lacked the knowledge of how many servings to consume daily or which vegetables contain the most antioxidants and vitamins as well, It was found that awareness of such guidelines was positively associated with better and healthier dietary intakes.

The researcher point of view caregivers had gained more knowledge regarding dietary habits through experience and interest in helping their children with autism.

5.15.d Independent Sample Test for Dietary Patterns and Eating Behaviors among Children with Autism with regard to Parents' Kinship (table 4-21)

There were no statistically significant differences in dietary patterns and eating behaviors with regard to kinship between parents.

Similar findings were illustrated by (Demir and Özcan, 2022) who their results indicated that there was non-significant relationship between the nutritional behavior of children with autism spectrum disorder and Kinship between parents at p-value= 0.163

5.15.e Independent Sample Test for Dietary Patterns and Eating Behaviors among Children with Autism with regard to Parents' Knowledge about Autism (table 4-22)

Findings demonstrated that There were significant difference in dietary patterns with regard to parents' knowledge about autism at p-value= .010

while there were no significant difference in eating behaviors with regard to parents' knowledge.

The findings of present study matching with (Al-Sheraji *et al*., 2021) who that illustrated that it was established in the literature that there is a relationship between parents' adequate knowledge and the nutritional status of children with ASD.

5.15. f Independent Sample Test for Dietary Patterns and Eating Behaviors among Children with Autism with regard to their Gender (table4-23)

There were no significant differences in dietary patterns and eating behaviors with regard to gender of autistic children.

The findings of present study in the same line with (Hossain *et al*., 2020) who reported that This study also showed that male child likes hot food more than female child but this association between gender and choice of hot food is not significant (p value 0.197).

As well, (Al-Sheraji *et al.*, 2021) that carried out a study about assess nutritional status in Yemeni children with (ASD) and to evaluate their parents' perspective and knowledge. These results indicated that non-statistical significant relation between nutritional status according to gender at p value = 0.516.

By dissimilarity, this result controverts previous findings of (Lundin Remnélius *et al*., 2022) carried out a study about Eating Problems in Autistic Females and Males: A Co-twin Control Study, and pointed that stronger association between autistic eating problems and females. behavioral

differences between males and females might reflect both biological and sociocultural influences .

5.15.g Independent Sample Test for Dietary Patterns and Eating Behaviors among Children with Autism with regard to Type of Delivery (table 4-24)

The result indicated that no significant difference in dietary patterns with regard to delivery type while there is significant difference in eating behavior with regard to delivery type at p-value=0.050.

The result of present study consistent with (Alkhalidy *et al*., 2021) who reported that vaginal delivery considered as determinant of autistic children and related to nutritional status.

As well, the findings of study underhand consistent with (Kazek *et al*., 2021) who their results illustrated that, Children's eating behaviors develop throughout the entire period of development, starting from the prenatal period.

But, in contract with (Jyothsna, 2017). Who carried out a study to assess the dietary pattern, eating behavior and gastrointestinal symptoms of children with autism spectrum disorder, and reported that there were non-significant association between eating behavior and type of delivery These differences may be due to culture disparity, and sampling selection.

5.16. Analysis of Variance for Dietary Patterns and Eating Behaviors among Children with Autism with regard to their Age at Diagnosis (table 4-25)

The analysis of variance showed that there were no significant differences in dietary patterns and eating behaviors with regard to age of children at diagnosis.

This result come with (Ali and Ghanim, 2020) who clarified that no-significant relationship between age of children at diagnosis and their behaviors that impede eating at p-values of ≥ 0.05.

According, the researcher's point of view this result may be attributed to Considering most of the children were diagnosed at the age of 3 years, in addition to the fact that most of them have food behaviors and food-related problems that are minor and not severe, and according to studies and theories, eating disorders among autistic children increase with age, and development of the children.

5.17 Analysis of Variance for Dietary Patterns and Eating Behaviors among Children with Autism with regard to their Birth Order (Table 4-26)

The analysis of variance showed that there were no significant differences in dietary patterns and eating behaviors with regard to birth order of autistic children.

These findings unrelated with (Wtwt and Farhood, 2015) who carried out a study about , and concluded that there was significant Association of child nutritional status by demographic factors like birth order at p-value= 0.001.

While, in the same line with (Ali and Ghanim, 2020) who studied Feeding Behaviors of Children with Autism Spectrum Disorder in Baghdad City, and reported that no-significant relationship between the child's hierarchy among his family members and their behaviors that impede eating at p-values of ≥ 0.05.

5.18. Analysis of Variance for Dietary Patterns and Eating Behaviors among Children with Autism with regard to Type of Treatment (table 4-27)

The analysis of variance showed that there were no significant differences in dietary patterns and eating behaviors with regard to type of treatment for autistic children.

The results of present study in similarity with (Ali and Ghanim, 2020) who their results indicated that, no-significant relationship between the child's type of treatments and their eating behaviors at p-values of ≥ 0.05.

But, inconsistent with (Al-Hamoodi and Al Dujaili, 2017) who explained that there is significant relationship among the severity of ASD on child types of treatments used with a child.

5.19 Analysis of Variance for Dietary Patterns and Eating Behaviors among Children with Autism with regard to Severity of Autism (table 4-28)

The analysis of variance showed that there were no significant differences in dietary patterns and eating behaviors with regard to autism severity.

The findings of current study in the same line with study that carried out by (Piwowarczyk *et al*., 2018) who their results indicated that A systematic review that included 6 trials on 214 participants from autistic children with the purpose to see the effectiveness of a gluten-free and casein-free (GFCF) diet as a treatment for autism spectrum disorders (ASD) in children had established that there were no statistically significant differences in ASD core symptoms between groups, as measured by standardized scales.

In the same context (Robinette *et al*., 2022) that studied and reported that the lack of association with total diet quality could be explained by the relatively good baseline diet quality and mild symptom severity in ADHD.

While , in contrast with study that carried out by (Cherif *et al*., 2018) who pointed that The more the autistic symptoms were severe, the more children exhibited feeding problems at p-value=0.02.

Moreover (Johnson *et al*., 2014) who carried out a study about, and their results illustrated that There was no significant association between ADOS and BAMBI scores

According researcher point of view It is possible that this occurred because parents of children with greater ASD symptoms have adapted to their child's problematic behaviors, and therefore, do not perceive their child's mealtime behavior as problematic, leading them to endorse very few of the BAMBI items.

5.20. Analysis of Variance for Dietary Patterns and Eating Behaviors among Children with Autism with regard to Body Mass Index (table 4-29)

The analysis of variance showed that there were high significant difference in dietary patterns with regard to body mass index of children at p-value= .001 while there is no significant difference in eating behaviors.

This findings in the same line with (Gutiérrez-Pliego *et al*., 2016) who their result indicated a positive correlation between BMI and high scores for westernized and high in protein/fat pattern

In the same direction (Evans et al., 2012) that carried out a study and found that sample, only fruits and vegetables were positively associated with BMI z-score.

In other cross-sectional, stratified cluster sample study representative of the national, regional, and state levels, and of urban and rural areas. That carried out by (Rodríguez-Ramírez et al., 2011) their results stated that children with sweet cereal and corn dishes and western dietary patterns showed an

association with overweight and obesity (prevalence ratio 1.29 and 1.35, respectively, using as reference the rural dietary pattern).

Patterns characterized by high intakes of sugary cereals, sweetened beverages, industrial snack, cakes, whole milk, and sweets were associated with a higher risk of overweight/ obesity among in Mexican school-age children. it may be a chance finding or it may be a result of reverse causation, in that parents of heavier children may encourage greater consumption of fruits and vegetables.

According to researcher point of view this high prevalence in overweight and obesity in children with ASD is attributed to limited food preferences where children prefer foods in high calories and sugar content, lack of physical activity and some antidepressant medications that increase appetite and may be accompanied by weight gain.

5.21. Association between Gastrointestinal Symptoms among Children with Autism with their Demographic Characteristics (table 4-30)

There were no significant association among gastrointestinal symptoms among children with their variables of age, gender, delivery type, and birth order.

The results of recent study identical with cross-sectional study that carried out by (Jafari *et al*., 2022) to evaluated the gastrointestinal symptoms of patients with autism spectrum disorder in Mashhad, Iran , and their results indicated that no significant difference between the gastrointestinal symptoms and gender or age of the patients (P>0.05).

But, these findings dissimilarity with (Yang *et al*., 2018) carried a study about were Gastrointestinal and Sleep Problems Associated with Behavioral Symptoms of ASD? And reported that significantly associated with GI symptoms in the ASD group with their gender.

5.22 Association between Gastrointestinal Symptoms among Children with Autism with their Clinical Characteristics (table 4-31)

The results showed that there were no significant association among gastrointestinal symptoms among autistic children with their variables of age at diagnosis, treatment type, autism severity, and body mass index.

The findings of present study congruent with (Alkhowaiter *et al*., 2021) study who reported that There was no significant difference between the gastrointestinal symptoms and gender or age of the patients (P>0.05). no significant relationship between BMI and existence of none of gastrointestinal symptoms (P>0.05).

Chapter Six

Conclusion and Recommendation

Chapter six:

Conclusions and Recommendations

6.1. Conclusion:

With respect to the results of the present work, their interpretations and systematically deriven discussion, the present study concludes that:

6.1.1. More than two thirds of the children have advanced moderate dietary patterns and more than three quarters of them have moderate eating behaviors.

6.1.2. More than half of the children have developed mild gastrointestinal symptoms associated problems.

6.1.3. Dietary patterns and eating behaviors have high effect on gastrointestinal symptoms of autistic children.

6.1.4. The majority of the parents have reported that they have only one child affected with autism, most of the parents have a history of autism in their families, more than half of the parents have knowledge about dietary and eating behaviors.

6.1.5. More than two thirds of children are diagnosed at age of three years, more than half of them the treatment type where training, the have experienced moderate severity of autism and most of them are overweight.

6.1.6. Parents' age, education, occupation, residency, monthly income, kinship, number of children, and number of children affected with autism have not influenced their dietary patterns and eating behaviors.

6.1.7. Dietary patterns and eating behaviors have been influenced by type of family, family history of autism, and parent information about autism, dietary patterns and eating behaviors.

6.1.8. Child age, gender, age at diagnosis, type of treatment, birth order, severity of autism have not been influencing dietary patterns and eating behaviors. While, body mass index have been influenced them.

6.1.9. Gastrointestinal symptoms are found to be not affected by age, gender, delivery type, and birth order of autistic children.

6.1.10. Gastrointestinal symptoms of autistic children are not affected by their age at diagnosis, type of treatment, autism severity, and body mass index.

6.2. Recommendations:

Based on the early stated conclusion, the present study can recommend that:

6.2.1. **S**pecial rehabilitative and behavioral programs dealing with the eating behavioral problems of autistic children are needed to be implemented by the specialized institutes, center and clinic for autism care.

6.2.2. For improvement of the nutritional status and well-being of autistic children, trained dietitians should be assigned as members of health care team in autistic institutions

a. Evaluation of autistic feeding problems can be initiated as soon as the diagnosis is established for early helping the parents and caregivers.

b. The findings allow endorsing the importance of incorporating the evaluation of nutritional and feeding behaviors associated problems as far as the clinical routine is concerned in order to avoid nutritional deficiencies that lead to lose weight, malnutrition and inadequate growth.

6.2.3. For Conducting Research

a. A Comparative study can be steered regarding the eating behaviors of children with autism spectrum disorder and children without Autism spectrum Disorder of similar age group.

b. A Study can be conducted on sensory perceptions and nutritional issues of children with autism spectrum disorder

c. Further research is needed to identify most common child eating problems and aid in the development of strategies to facilitate appropriate eating habits and promote social aspects of mealtimes in this population.

6.2.4. The Ministry of Health and Environment and the Ministry of Labor and Social Affairs

a. Appealing to Ministries of Health and the Labor and Social Affairs policy the autistic children support and high quality of services to help them to coping with this disorder.

b. Continuous health education and counseling programs are necessary to improve mothers' knowledge about nutrition of their autistic children.

c. The need to early investigate feeding behaviors and to develop practical feeding approaches for ASD children to maintain nutritional adequacy.

d. Media awareness to aid health team professionals in prompting tolerance and understanding of autism with a clear explanation and a focus on increasing awareness.

e. Educational and preventive programs should target the parents of children with ASD, since these children may also model their eating behavior on the family habits and lifestyle or on the attitudes of their parents/caregivers with respect to food.

Chapter Seven

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Appendices

خبراء تحيكم الاستبانة **Appendix C**

ت	الإسم والشهادة	المرتبة العلمية	الإختصاص الدقيق	مكان العمل	سنوات الخبرة
1	د. منى عبد الوهاب خليل	أستاذ متمرس	تمريض صحة الأسرة والمجتمع	جامعة البيان الأهلية	43
2	د. سجاء محمد هاشم	أستاذ متمرس	تمريض الصحة النفسية والعقلية	جامعة بابل/ كلية التمريض	41
3	د. امين عجيل ياسر	أستاذ	تمريض صحة الأسرة والمجتمع	جامعة بابل/ كلية التمريض	38
4	د. سلمى كاظم جهاد.	أستاذ	تمريض صحة الأسرة والمجتمع	جامعة بابل/ كلية التمريض	38
5	د .نهاد محمد قاسم	أستاذ	تمريض أطفال	جامعة بابل/ كلية التمريض	34
6	د. كافي محمد ناصر	أستاذ	تمريض صحة الأسرة والمجتمع	كلية الطوسي الجامعة	32
7	د. هاله سعدي عبدالواحد	أستاذ	تمريض صحة الأسرة والمجتمع	جامعة بغداد/ كلية التمريض	29
8	د. فاطمه وناس خضير	أستاذ	تمريض صحة الأسرة والمجتمع	جامعة الكوفة/ كلية التمريض	25
9	د. علي كريم خضير	استاذ	تمريض الصحة النفسية والعقلية	جامعة كربلاء/ كلية التمريض	17
10	د. معن حميد إبراهيم	أستاذ مساعد	تمريض الصحة النفسية والعقلية	كلية الكوت الجامعة	20
11	د.كريم رشك ساجت	أستاذ مساعد	تمريض الصحة النفسية والعقلية	جامعة بغداد/ كلية التمريض	20
12	د. شكر سليم حسن	أستاذ مساعد	تمريض أطفال	جامعة هولير الطبية / كلية التمريض	16
13	د. قحطان قاسم محمد	أستاذ مساعد	تمريض الصحة النفسية والعقلية	جامعة بغداد / كلية التمريض	14
14	د. حيدر حمزة علي	أستاذ مساعد	تمريض الصحة النفسية والعقلية	جامعة الكوفة/ كلية التمريض	13
15	د. وليد عزيزمهدي	أستاذ مساعد	استشاري طب نفسي	جامعة بابل / كلية الطب	13
16	د. حسن علي حسين	أستاذ مساعد	تمريض الصحة النفسية والعقلية	جامعة بغداد/ كلية التمريض	12
17	د. حسام مطشرزان	أستاذ مساعد	تمريض الصحة النفسية والعقلية	جامعة الكوفة/ كلية التمريض	11
18	د. نصر موفق حمدون	أستاذ مساعد	تمريض صحة الأسرة والمجتمع	جامعة الموصل/ كلية التمريض	11

الخلاصة :

يعد اضطراب طيف التوحد هو اضطراب نمو عصبي غير متجانس سريريًا يتجلى على أنه ضعف مستمر في التفاعل الاجتماعي والتواصل الاجتماعي، مع السلوك المتكرر أو النمطي الذي يتراوح من معتدل إلى شديد. يواجه الأطفال المصابون باضطراب طيف التوحد تحديات غذائية فريدة ونقصًا في التغذية يؤدي غالبًا إلى نمط غذائي سيء يفتقر إلى العناصر الغذائية الموسى بها والمهمة للنمو والتطور السليم . إلى جانب النمط الغذائي السيئ، لديهم أيضًا مشكلة في سلوكيات الأكل وأعراض الجهاز الهضمي.

اهداف الدراسة: تهدف الدراسة الحالية إلى تقويم الأنماط الغذائية وسلوكيات الأكل واعراض الجهاز الهضمي بين اطفال، ومعرفة العلاقة بين الأنماط الغذائية وسلوكيات الأكل وتأثيرها على أعراض الجهاز الهضمي.

منهجية البحث: تم استخدام تصميم دراسة ارتباطية وصفية في مدينة النجف الاشرف، اختيرت لتأكيد أهدافه خلال خلال الفترة من 20 أكتوبر 2021 إلى 18 مايو 2023. استخدمت استبانة معدله مكونه من أربعة أجزاء تضمنت الصفات الديموغرافية لعينة الدراسة والأنماط الغذائية وسلوكيات تناول الطعام والأعراض المعدية-المعوية. وقد تم التحقيق من صحة الاستبانة من قبل 18 خبير لإثبات صحته وموثوقيته. من خلال الدراسة التجريبية التي استبعدت من العينة الأصلية. جمعت البيانات باستخدام طريقة المليء الذاتي وتحليلها من التطبيق الوصفي والتحليل الإحصائي الاستنتاجي

نتائج الدراسة: اشارت الدراسة الحالية أن الأنماط الغذائية وسلوكيات تناول الطعام لأطفال التوحد كانت متوسطة. كان للأنماط الغذائية وسلوكيات تناول الطعام لأطفال التوحد تأثير عالي على الأعراض المعدية-المعوية للأطفال المصابين بالتوحد.

الاستنتاج: استنتجت الدراسة بأن أكثر من ثلثي الأطفال لديهم أنماط غذائية متوسطة، وأكثر من ثلثي الأطفال لديهم سلوكيات غذائية متوسطة، وأن الأنماط الغذائية وسلوكيات الأكل لها تأثير كبير على الأعراض الهضمية لدى الأطفال المصابين بالتوحد. عمر الطفل، الجنس، العمر عند التشخيص، نوع العلاج، ترتيب الميلاد، شدة مرض التوحد لم تؤثر على الأنماط الغذائية وسلوكيات الأكل. بينما تأثر مؤشر كتلة الجسم بهم.

التوصيات: توصي الدراسة بتحسين الحالة الغذائية والرفاهية للأطفال المصابين بالتوحد، ويجب تعيين أخصائي تغذية مدربين كأعضاء في فريق الرعاية الصحية في مؤسسات التوحد، كما أن برامج التثقيف والإرشاد الصحي المستم ضرورية لتحسين معارف الأمهات حول تغذية أطفالهن الذين يعانون من التوحد.

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة بابل
كلية التمريض

تقويم الأنماط الغذائية و سلوكيات الاكل واعراض الجهاز الهضمي بين أطفال التوحد

أطروحة من قبل

لينا نضال سجاد

مقدمة الى مجلس كلية التمريض /جامعة بابل
جزء من متطلبات نيل شهادة الدكتوراه-فلسفة في التمريض

اشراف
الاستاذ الدكتور عبد المهدي عبد الرضا حسن
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حزيران 2023 ميلادية ذو القعدة 1444 هجرية