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Oral Hygiene For The Diabetes Mellitus And Osteoporosis Patients.

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ABSTRACT

The aim of examination was to study the oral hygiene, condition of the periodental tissue, the teeth and the temporomandibular joint (TMJ) for diabetic and osteoporosis patients in different degree, age and sex. In this study can examine 54 diabetic patients with osteoporosis only were included: on the basis of the absolute value and t-score. Westudied peoplewere mainly DM patients, aged between 40-70 years, they were divided into three groups according to degree of osteoporosis. The clinical parameters used for determining the condition of periodontal tissues included: gingivitis, periodentitis and mobilty of the teeth and the TMJ included: protrusion of mandible, limited opening drifting to one side, TMJ clicking, TMJ tenderness and statement of teeth such as precencecaries and attrition. All the DM patient in this study have TMJ tender with clicking (100%). The protrusion of the mandible in group one is the least than the other groups. The limiting of mouth opening percentage increase with increase the degree of osteoporosis and the age, the percentage of carous teeth, attrition, gingivitis, periodentitis and mobility of the teeth were more in older patients than young also with increase degree of osteoporosis. The diabetes mellitus and osteoporosis which more effected on the oral healthy, the percentage of carious teeth, attrition, gingivitis, mobility of the teeth and periodentitis was increased with increase the degree of osteoporosis. So TMJ tender and clicking, protrusion of the mandible, drifting of the jaw to one side and limited of mouth opening percentage, and all these change found mostly in the older DM patients more than younger patients.

Keywords: dental, diabetes , gingivitis.

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INTRODUCTION

Diabetes mellitus (DM) is a heterogeneous group of metabolic conditions caused by either a lack of insulin, resistance to its effects, or both[1].

Diabetes mellitus is the fifth most common cause of death in the world and it is estimated that one in eight deaths (12.2%) among (20 to 79-year-olds) were attributable to the condition in 2010[2]. Life expectancy is reduced, on average, by more than 20 years in people with Type 1 diabetes and by up to 10 years in people with Type 2 diabetes[3]. DM is normally due to autoimmune destruction of the insulin producing cells of the pancreas (the beta cells of the islets of Langerhans). This results in an absolute deficiency in endogenous insulin production [1]. Specific destruction of the beta cells occurs when the islets of Langerhans are infiltrated with dendritic cells, macrophages and $CD4^+$ and $CD8^+$ T lymphocytes4.As a result of the advanced stage of beta cell depletion, by the time symptoms appear, these cases have an acute onset and are prone to acute ketoacidosis. Ketoacidosis is a condition where ketone bodies build up in the blood as a result of lipolysis in the absence of the insulin required for glycolysis[1].

Glycemic control is important in maintenance of homeostasis of all organs and tissues, and thus its affects are prominent not only in the pancreas, but the disease promotes development of complications such as nephropathy , retinopathy , osteoporosis, neuropathy, as well as atherosclerosis and stroke[5]. Also the bone is another tissue that is affected by diabetic conditions. Individuals seem to have higher rates of osteoporotic fractures[6] slower wound healing[7] and decreased skeletal growth during adolescence[8] .Untreated DM has been accepted as a common contraindication for dental implant treatment9.

Effects of diabetes on physical properties of bone dependent on type of DM, as well as the gender of subjects, anatomic location of the analyzed samples used[10]. Untreated experimental diabetes has been shown to decrease bone length, weights and cortical thickness in the femoral mid-shaft. Bones of uncontrolled diabetic animals are more fragile, which seems to be directly correlated to bone mass[11]. Indeed, several studies examining physical properties of diabetic bone show that impediment of bone growth/healing is often accompanied by a decrease in the mechanical strength of bone rather than decrease in bone production[12,13]. Interestingly, Einhorn et al (1988) found that while absolute strength-related properties such as tensional strength and stiffness are reduced, when normalized to decreases in mass associated with diabetes, a compensatory increase in stiffness is evident, these changes might be related to possible detrimental effects of diabetes on bone mineralization, specifically changes in bone crystal structure[13].

The oral manifestations is associated with pathological changes in theoral cavity. These changes include mucosal ulceration, fungal infection, burning mouthsyndrome, tooth loss, xerostomia, dental caries and periodontal disease[14].The histological changes that occur during the course of periodontal disease. Disease starts as sub-clinical mild inflammation (initial lesion). Thereafter, the classical signs of gingivitis become noticeable and the gingiva becomes red, swollen and bleeds readily (early lesion). If the condition is not treated, it goes into a chronic stage (established lesion). As the disease progresses, bone tissue and periodontal ligaments become involved (advanced lesion) and the transition to periodontitis starts[15]. So that the gingivitis, periodontitis is an irreversible condition, characterised by apical migration of epithelial attachment, accompanied by loss of supporting bone16.This chronic inflammatory condition leads to pathological deepening of the gingival sulcus to form a periodontal pocket [17]. If left untreated, tissue destruction may eventually lead to tooth loss18. During the early stages of the disease, there is an increase in the vascular permeability and migration of the immune cells (mainly neutrophils) to the site of infection. As the disease progresses, lymphocytes and macrophages migrate to the affected site. If the condition remains untreated, destruction of the connective tissues and bone occurs and the junctional epithelium migrates apically along the root surface to form the periodontal pocket: at this point, plasma cells and lymphocytes become predominant[19]. Clinical presentation of the disease is determined by two major components: the periodontal pathogens and the host immune-inflammatory response[20]. Osteoporosis (the greater degree of osteopenia), characterized by osteocyte cell loss leading to structural bone transformation, generally suggested that Osteoporosis does play a role in the formation periodontal disease and loss of alveolar process height and tooth loss have been proposed by Bartold et al. (2010)[21].

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MATERIAL AND METHODS

The study conducted in Marjan Teaching Hospital at Rheumatology Department from November /2015 to March 2016. This study consist of 54 pateints which (40) females and (14) males which diagnosis diabticmallitis (control) duration more than 5 years and osteoporosis only were on the basis of the absolute value of T- score, we excluding the hypertensive, cardiac disease, resparotory disease , . Patients with history of any type of endocrine diseases such as: hypo-thyroidism or hyperthyroidism, parathyroid disease, patients with Chronic digestive tract conditions that interfere with absorption of nutrients from food (examples include celiac disease and Crohn's disease), smokers, pregnant women, patients with history of cancer, secondary myositis or any inflammatory myopathy or connective tissue disease combined with RA, and patients on antiresorptive treatment. This study examined pateints with age between (40-70) years which they were divided into three groups according to degree of osteoporosis as follow:

Group1: DM patients who have osteoporosis less than 1
Group1: DM patients who have osteoporosisbetween 1 to 2
Group1:DM patients who have osteoporosis more than 2

The extra-oral and intra-oral exanimated to these patients by the clinical parameters used for determining the condition of periodontal tissue and the TMJ included: protrusion of mandible, limitation of opening, drifting to one side, TMJ clicking, TMJ tender, bleeding, gum recession, periodontitis, gingivitis, mobility of teeth and carious teeth was notified. The instruments used periodontal probe, dental probe, dental mirror, twizer and Dual X-ray absorptiometry (DXA).

Bone Mineral Density Measurement

Bone mineral density was measured using a standard protocol and Densitometry(Osteosys, Korea).

Procedure of Bone Mineral Density Measurement

Weight and height were measured for each patient. Height should be measured with a stadio meter, with shoes off, using standard techniques (patient standing erect with the head in the Frankfort horizontal plane)and weight (in kilograms) were measured with standard weighting scale, to calculate body mass index (BMI) (BMI calculated by dividing the weight of the patient in kilograms by the height in square meter) with patient age, sex, ethnic groupfor each patient was entered in densitometry 22.

Bone mineral density was measured at the lumbar spine with dual X-ray absorptiometry (DXA) by a trained operator according to themanufacturer's instruction. The instrument was calibrated daily by using appropriate phantoms.

Patient should wear loose, comfortable clothing, avoiding garments that have zippers, belts or buttons made of metal. Objects like keys or wallets that must be in the area being scanned should be removed ,in the central DXA examination, which measures bone density in the hip and spine, the patient lies on a padded table. An X-ray generator is located below the patient and an imaging device, or detector, is positioned above.

To assess the spine, the patient's legs are supported on a padded box to flatten the pelvis and lower (lumber)spine.

To assess the hip, the patient's foot is placed in a brace that rotates the hip inward, in both cases, the detector is slowly passed over the area, generating images on a computer monitor, the technologist will walk behind a wall or into the next room to activate the X-ray machine.

The DXA bone density test is usually completed within 10 to 30 minutes, depending on the equipment used and the parts of the body being examined (Figure 1).

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Figure (1) Dual Energy X-Ray Absorptiometry in Merjan Teaching Hospital.

RESULTS

Table (1) Show distrbution of the patient into groups depend on degree of osteoprosis, sex and number.

Table (1): Distribution of the patient into groups depend on degree of osteoprosis, sex and number

groups	Degree of Osteoprosis	Type of sex and numbers
Group 1 A	Less than 1	Male(4)
Group 1 B	Less than 1	Female(12)
Group 2 A	1-2	Male(8)
Group 2 B	1-2	Female(16)
Group 3 A	More than 2	Male(2)
Group 3 B	More than 2	Female(12)

Table (2,3): Group 1 A distrbuted of the male patients show with percentage of carous teeth, gingivitis, periodentitis, mobility of the teeth, attrision, TMJ tender, clicking, protrusion and drifting of the jew to one side during opening .

Table (2): Group 1 A the male patients distributed to the ages 40-49=0, 50-59=2, 60-70=2.

Ages	gingvitis	periodentitis	Carious teeth	Mobility of teeth	attrision
40-49	**0%**	**0%**	**0%**	**0%**	**0%**
50-59	**100%**	**100%**	**50%**	**50%**	**50%**
60-70	**100%**	**100%**	**100%**	**100%**	**100%**

Table (3): Group 1 A the male patients distributed to the ages 40-49=0, 50-59=2, 60-70=2

Ages	TMJ tender	TMJclicking	Limiting of opening	Protrusion of mandible	Drifting to one side during opening
40-49	**0%**	**0%**	**0%**	**0%**	**0%**
50-59	**100%**	**100%**	**100%**	**50%**	**50%**
60-70	**100%**	**100%**	**100%**	**100%**	**100%**

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Table (4,5): Group 1 B distrbuted of thefe male patients show with percentage of carous teeth, gingivitis, mobility of the teeth, periodentitis, attrision, TMJ tender, clicking, protrusion and drifting of the jew to one side during opening .

Table (4): Group 1 B the female patients distributed to the ages 40-49=6, 50-59=6, 60-70=0.

Ages	gingvitis	perodentitis	Carious teeth	Mobility of teeth	attrision
40-49	100%	66.6%	66.6%	33.3%	33.3%
50-59	100%	100%	66.6%	66.6%	66.6%
60-70	0%	0%	0%	0%	0%

Table (5): Group 1 B the female patients distributed to the ages 40-49=6, 50-59=6, 60-70=0.

Ages	TMJ tender	TMJclicking	Limiting of opening	Protrusion of mandible	Drifting to one side during opening
40-49	100%	100%	100%	0%	0%
50-59	100%	100%	100%	33.3%	33.3%
60-70	0%	0%	0%	0%	0%

Table (6,7) : Group 2 A distrbuted of the male patients show with percentage of carous teeth, gingivitis, periodentitis, mobility of the teeth, attrision, TMJ tender, clicking, protrusion and drifting of the jew to one side during opening .

Table (6): Group 2 A of the male patients distributed to the ages 40-49=0, 50-59=4, 60-70=4.

Ages	gingvitis	perodentitis	Carious teeth	Mobility of teeth	attrition
40-49	0%	0%	0%	0%	0%
50-59	100%	100%	100%	50%	100%
60-70	100%	100%	100%	100%	100%

Table (7): Group 2 A of the male patients distributed to the ages 40-49=0, 50-59=4, 60-70=4.

Ages	TMJ tender	TMJclicking	Limiting of opening	Protrusion of mandible	Drifting to one side during opening
40-49	0%	0%	0%	0%	0%
50-59	100%	100%	100%	50%	50%
60-70	100%	100%	100%	100%	100%

Table (8,9): Group 2 B distrbuted of the female patients show with percentage of carous teeth, gingivitis, periodentitis, mobility of the teeth, attrision, TMJ tender, clicking, protrusion and drifting of the jew to one side during opening .

Table (8): Group 2 B the female patients distributed to the ages 40-49=6, 50-59=4, 60-70=6.

Ages	gingvitis	perodentitis	Carious teeth	Mobilty of teeth	attrition
40-49	100%	50%	66.6%	33.3%	33.3%
50-59	100%	50%	50%	50%	100%
60-70	100%	100%	100%	100%	100%

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Table (9): Group 2 B the female patients distributed to the ages 40-49=6, 50-59=4, 60-70=6.

Ages	TMJ tender	TMJclicking	Limiting of opening	Protrusion of mandible	Drifting to one side during opening
40-49	100%	100%	100%	33.3%	33.3%
50-59	100%	100%	100%	50%	50%
60-70	100%	100%	100%	100%	100%

Table (10,11): Group 3 A distrbuted of the male patients show with percentage of carous teeth, gingivitis, periodentitis, mobility of teeth, attrision, TMJ tender, clicking, protrusion and drifting of the jew to one side during opening.

Table (10): Group 3 A of the male patients distributed to the ages 40-49=0, 50-59=2, 60-70=0.

Ages	gingvitis	perodentitis	Carious teeth	Mobility of teeth	attrision
40-49	0%	0%	0%	0%	0%
50-59	100%	100%	100%	100%	100%
60-70	0%	0%	0%	0%	0%

Table (11): Group 3 A of the male patients distributed to the ages 40-49=0, 50-59=2, 60-70=0.

Ages	TMJ tender	TMJclicking	Limiting of opening	Protrusion of mandible	Drifting to one side during opening
40-49	0%	0%	0%	0%	0%
50-59	100%	100%	100%	100%	100%
60-70	0%	0%	0%	0%	0%

Table (12,13): Group 3 B distrbuted of thefemale patients show with percentage of carous teeth, gingivitis, periodentitis, mobility of teeth, attrision, TMJ tender, clicking, protrusion and drifting of the jew to one side during opening.

Table (12): Group 3 B the female patients distributed to the ages 40-49=2, 50-59=4, 60-70=6.

Ages	gingvitis	perodentitis	Carious teeth	Mobllity of teeth	attrition
40-49	100%	100%	50%	50%	50%
50-59	100%	100%	100%	100%	100%
60-70	100%	100%	100%	100%	100%

Table (13): Group 3 B the female patients distributed to the ages 40-49=2, 50-59=4, 60-70=6.

Ages	TMJ tender	TMJclicking	Limiting of opening	Protrusion of mandible	Drifting to one side during opening
40-49	100%	100%	100%	50%	50%
50-59	100%	100%	100%	50%	50%
60-70	100%	100%	100%	100%	100%

DISCUSSION

Diabetes mellitus andosteoporosis is effected all population by different percentage, this study found the women effected about 74.07% and men effect about 25.93%, this percentage do not depend on sex but

the female more suscepected due to effect of female sex hormones which important caused for chronic inflammatory diseases because of pregnancy, menstrual cycle , menopause is etiology for osteoporosis in women and is effect by bone loss rapidly in postmenopausal women,the loss of bone mass density is rapidly after cessation of ovarian secretions[23] and estrogen decrease is an important factor causingostecyte inactive and osteoclast activation24.

Through the study no found theories to showexplain between diabetes and formation caries on the teeth, because of the cleansing and buffering capacity of the saliva is deceased in diabetic patients lead to rapid incidence of dental caries, the xerostomic patients more effected25,this agree with (Lamster et al., 2008) 26who thought that The decreasing in salivary flow in turn may lead to an increase in caries. But (Taylor et al,.2004)[27] though there does not appear to be a direct correlation between diabetes mellitus and increased dental caries.

Form this study patients sufferfrom gingivitis, teethmobile and periodentitisfor the DM patients arise percentage with arise degree of osteoporosis, that agree with (Pejcic et al., 2005)[28]. The table (2,6,10) for male and table (4,8,12) for female represent the oral investigation the DM and osteoporosis, all them suffered from gingivatitis and periodentitis due to diminished of saliva flow and changes in saliva contain, oral fungi[29,30] and delay ofhealing mucosal wound, mucosal neuro-sensory disease, dental carries and tooth missing[31].

There are many theories found to explained this result which factors like advanced glycation, alter in collagen fiber statue, and change immune function that leaddiminishedpolymorphonuclear leukocyte function iead to bacterial aggregation in the tissue and the accumulation of advanced glycation at the end, that results from elongation and chronic hyperglycaemia and arise secretion of pro-inflammatory cytokines such as tumour necrosis factor-α and prostaglandin E-2[32]. Elevation in collagenase activity together with the diminish in collagen synthesis will adversely stimulation collagen metabolism. This effect in compromised wound healing as well as periodontal tissue defect. Now aday studies refer that inflammation in periodontal tissue has a bidirectional effect on DM control in patients with diabetes[33]. The risk of formationinflammation in periodontal tissue in patients with diabetes has be 3 times more than the general population[34].

Also (Alwaeli, 2008)[35] thought periodontal disorder are occurwith many of chronic diseases like osteoporosis. the Mechanisms by which osteoporosis osteocyte cell loss may be related with periodontal attachment lost, loss of alveolar process height and tooth loss have been improved by Bartold et al. (2010)[21],which found diminish bone density in the oral bone associated with decease systemic bone: The low or loss bone density result more incidentre sorption of alveolar bone lead to occur periodontal bacteria36,and the local tissue response to affectedperiodontal tissue because ofsystemic factors causingremodeling to bone: Patients with systemic bone loss are have elevated systemic production of cytokines (interleukins (IL) 1 and 6 that may cause effect on the bone of oral cavity. Periodum infections have been display increase local cytokine production that in change increases local osteoclast activity causing in elevated bone resorption36.So that the study with (Tervonen and Karjalainen 1997)[37] show in their study that patients with uncontrolled diabetes had more subjected to loss at more sites throughout the mouth than did patients with the better to moderate controlled diabetes and that the periodontal involvement of patients with better to moderate controlled diabetes paralleled that of patients unaffected with diabetes. Also (Hugoson et al,.1989)[38] study the patients more than 40years who suffer from Type I diabetes for over show a significant increase in periodontally-advanced position and bone loss than did subjects more than 40yearsunaffected diabetes.

The table (3,7,11) for the male and the table (5,9,13) for female explain alter with movement of mandible depend on differentdegree of osteoporosis so the protrusion, lateral movement mandible increase percentage with increase degree osteoporosis and age for both sex that reason is the bones are diminished in mineral content and density, micro architectural distraction of trabeculae, elevation osteo plastic activity, decrease remodeling rate, diminished in volume of the residual ridge, and reduce in the cortical thickness.

However ,the maxilla are more suspected to change, due to of its greater vascular tissue and its spongy, and the mandible is subjected. Severity of alter is also related to local factors like the number of are percent teeth[39]. Other result foundthe percentage of attrition increase with age and osteoporosis for the DM patients due to many reason such as loss of mineral from the tooth, physical activity and bone loss and loss a lot of number of the teeth that make the pressure of the eat on the remnant lead to loose occlusal surface and attrition and other causes. No study agree or disagree this result.

CONCLUSION

With the limitation of study, we can concluded that DM and osteoporosis which more effected on the oral healthy, the percentage of carious teeth, attrition, gingivitis, mobility of the teeth and perio dentitis was increased with increase the degree of osteoporosis. So TMJ tender and clicking, protrusion of the mandible, drifting of the jaw to one side and limited of mouth opening percentage, and all these change found mostly in the older DM patients more than younger patients. Through this study the dentist must be take care during the work, and ask the patient to maintain oral hygiene and replacement missing teeth for mastication and reduce attrition and to return maxilla and mandibular normal relationship.

RECOMMENDATION

Made a study for more duration period (long duration), compare between type1 and type 2 DM patients (type of treatment). Also record the blood suger for the pateints and found relation with the dgree of ostioporosis.

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First of all, thank to God almighty for inspiring us the will, the patience and strength to complete this work.

Limitation:

The duration of the study was short period, the number of patient was little, also the inter pretatation of the present study may be limited since periodontal measures of the bone such as subtraction radiography not available.

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