Galectin-3 Level Insera Patients with Bladder Cancer in Babylon Province

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Abstract

For the assessment of Galectin-3 leveland toinvestigate the possible relation of Galectin-3 with age, gender and different stage and grade of bladder cancer in Babylon province. Galectin-3 was measured in two hundred subjects; 100 diagnosed with bladder cancer and 100 healthy subjectswere registered in this revision.The age of patients and control ranged between (38-79) years.The level of Galectin-3was assessed in serum by enzyme- linked immunosorbent assay (ELISA)technique.Serum levels of Galectin-3displayed a significant increase in bladder cancer group associated with control group ($p<0.01$). Amongbladder cancer patients in Babylon province, increase Galectin-3 concentration indicate the significant relationshipwithbladder cancer.

Keywords: *Bladder cancer, Galectin-3; Patients; health; Enzyme*

Overview

A multifacetedillnessconnected with high morbidity and death rates if not cured is Bladder cancer (BC)[(1)].The most common type of BC is superficial tumors consist about 70% of all cases, it can repeated but in general is not lethal, on the other hand muscle-invasive tumors represent 30% of all cases associatedwith danger of death[(2).]

For Iraq and United State America (USA) BC is concerning as second and fourth greatestcommunal cancer, in male and in female as tenth and eleventh greatestcommunal cancer respectively[(3).]

Bladder cancer occur mostlyin subject with age greater than 50 years old. 69 years old considered as the age of diagnosis in males, while in female 71 years old, that mean the risk of BC is increase with increase of age [(4)].

The main risk factor for BC is smoking, consist about 50% of cases[(5).] While Industrialcontact to chemical consist about 10% of all cases [(6)].

The family of broadly distributed carbohydrate-binding proteins are Galectins[(7)].Galectins have one or two highly preserved carbohydrate recognition domains (CRDs) in Mammalian, the main function of CRDs is to recognizing-galactoside residues[(8)].

There are three subgroups of Galectinsrendering to the number and function of CRD: (1) single CRD that form non-covalent homodimers is found in Prototype Galectins.(2) two distinct CRDs linked by a non-conserved 70 amino acid sequence is found in Tandem-Repeat Galectins these amino acidallowsgalectin to bind two carbohydrate epitopes[(9)].

(3) one CRDassociated to a unique N-terminal domain of about 120 amino acidsis found in Chimera-type Galectin (galectin-3),these amino acid rich in proline and glycine. Based on the concentration and presence of the ligands theN-terminal domain in Gal-3 is able to form homo-dimers and oligomers[(10).]

Galectin-3 (Gal-3) is a multifunctional protein that plays essential roles in various biological functions like cell spread, migration, apoptosis, immunity, cell adhesion,infection, anddifferent disease like cardiovascular remodeling, in various autoimmune and inflammatory processes, tumor progression as well as metastasis. Dependent on the particular tissue and subcellular position galectin have different types for activities[(11)].

The roles of Gal-3 in cancer have been heavily investigated, through cancer progression, numerousresearchstated that Gal-3 concentration is elevated[12].

Pathologically Gal-3expressed in varioustumors. Anti-apoptotic activity is the probablereason for cancer, found that it correlate with high level of Gal-3 in the circulation[13].

For now,cells during injury and inflammationsecreted Gal-3 to the surface and into natural fluids, as a result in various cancer Gal-3 can be used as a diagnostic or predictive biomarker[14].

Methods

Ethical issues

Dependent on the native ethics group these study was agreed,all patients participated give an idea about the purpose of the review, agree, and signed consent were informed.

Study design

This revision designated as a case-control study.

Patients and control

The present study included 200 subjects. One hundred subjects with bladder cancer were divided into two groups (clinically diagnosis depend on pathological stage), the first group includes46subjects with non-muscle invasive bladder cancer, the second group includes54patients with muscle-invasive bladder cancer, were participate in this study, complete historyfrom all patients was taken, which include: of age , gender, family history , residence ,smoking habits and occupation status.

The third group include 100 apparently healthy individuals (control group).

Patients with another type of cancer,immunological diseases, Secondary Bladder cancer invasion from adjacent cervix, prostate, or intestine carcinoma, patients with Systematic lupus erythematosus (SLE) and Anti-phospholipid syndrome (APS), all were excluded from the study.The age of these groups from 38 to 79 years. SPSS version 20 was used forthe statistical analysis. All the results as Mean ± SD, P values less than 0.05 give an idea that the result is significant.

Chemicals and methods

Determination of serum Galectin-3 concentration by the sandwich-ELIZA kit as the method. In this kit, an antibody specific to Galectin-3 was pre-coated to the micro- ELIZA plate (Bioassay Technology Laboratory, ELIZA kit).

Results

The study groups consist of 200 adults designate on two categories:

1- Adults havebladder cancer (n=100)

2- Adults as control group (n=100)

Age

The variance in age (as mean) recorded no significant different between control and bladder cancer group,demonstrated in Table. 1.The frequency distribution of patients with bladder cancer according to age was as following: 16(16 %) cases from 38-48 years, 20 (20%) casesbetween 49-59 years, 30 (30%) from 60-69 and 34 (34%) from 70-79 , as shown in Figure 1.

Gender

The study include 100 patients with bladder cancer of bothgenders ,78 (78%) men and 22 (22%) women, so men were at higher risk to get bladder cancer as compared with women, as shown in Figure 2.

Table (1):The Age of studied groups.

Groups	Number	Age Means ±SD	Range	P-value
Bladder cancer group	100	63.3 ± 11.8	38-79	P >0.05
Control group	100	60.2 ± 8.6	30-69	

SD: standard deviation; non-significant at p > 0.05

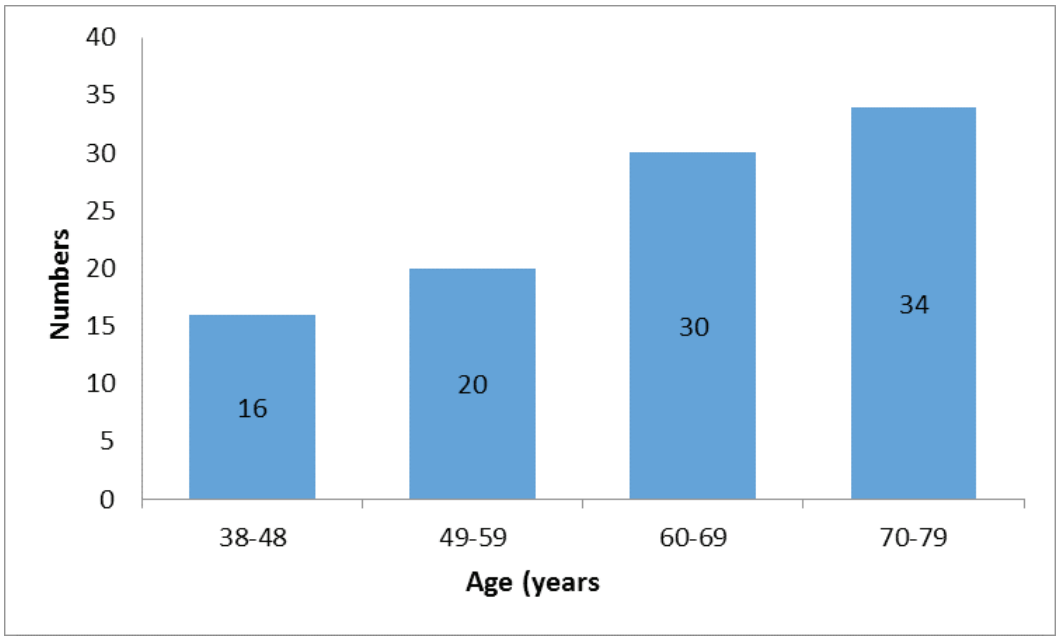

Figure (1):The frequency distribution of bladder cancer patients according to age.

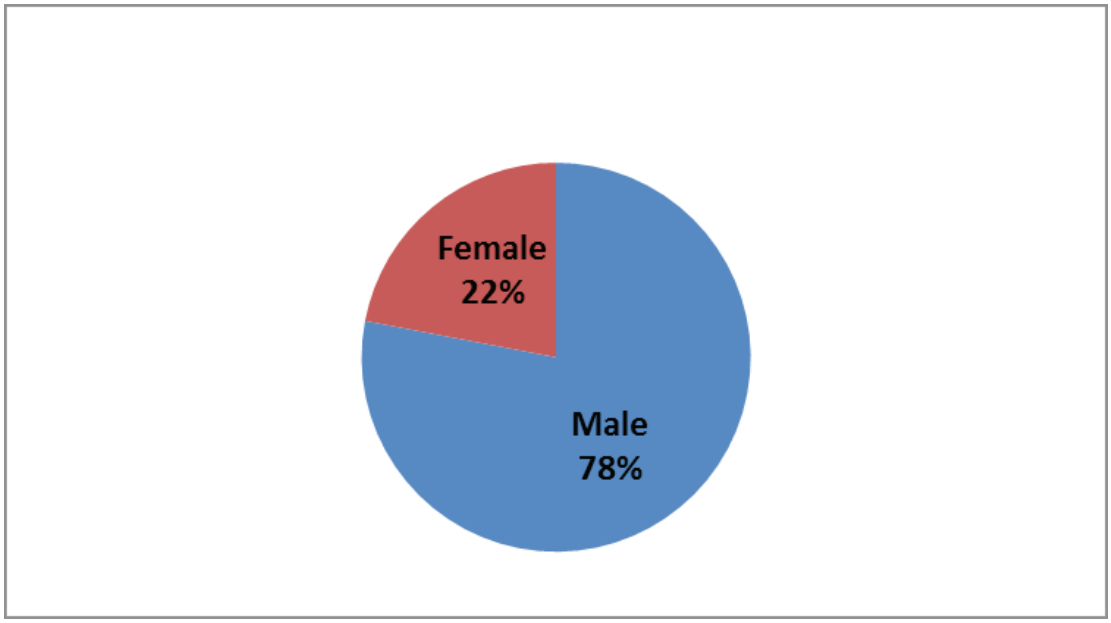

Figure (2): The ratio of females to males in Bladder cancer patients.

Correlation ofGalectin-3 level with age, gender and different stage and grade of Bladder cancer patients.

Table (2) shows increase concentration of Gal-3 with significant mean differences between bladder cancer patients and control group. While, there were no significant association of Gal-3 level with different age and gender groups.

Based on deepness of invasionpatients with NMI TCC were categorizedinto Ta, T1, and CIS tumors.The median and range of Gal-3 in different stage and grade were demonstrated in table (3):

Table (2):Mean difference of Galectin-3 in Bladder cancer patients and control and different age and gender.

Groups	**No.**	**Galectin-3 Pg/ml (Mean ± SD)**	**P value**
CA Bladder group	100	256.96 ± 68.62	< 0.05
Control group	100	166.46 ± 64.95	
Age groups (years)			
38-48	16	220 ± 14.1	> 0.05
49-59	20	238.2 ± 20.6	
60-69	30	267.7 ± 76.8	
70-79	34	271.6 ± 98.09	
Gender Groups			
Male	78	256.3 ± 104.4	> 0.05
Female	22	257.1 ± 56.5	

SD= standard deviation;p< 0.05: significant

Table (3): Galectin-3 in the studied groups.

Groups	No.	Median (range) Galectin-3 level (pg/mL)
MI	54	229 (188-550)a
NMI	46	210 (150-356)
Ta	20	207 (150-356)b
T1	14	240 (170-290)c
CIS	12	280 (150-345)
PUNLMP	22	160 (150-356)
Low grade TCC	24	217 (150-345)
High grade TCC	54	229 (188-550)d
a p< 0.05 vs. NMI group. b p< 0.05vs. MI and CIS groups. c p> 0.05 vs MI, Ta and CIS groups. d P<0.05 vs. low grade and PUNLMP groups.		

TCC: Transitional cell carcinoma; NMI: Non-muscle invasive bladder cancer; MI: Muscle invasive bladder cancer; PUNLMP= Papillary urothelial neoplasm of low malignant potential; Ta: tumors invading the lamina propria ;T1: tumor invade sub-epithelial connective tissue ; CIS: carcinoma in sito.

Discussion

Diversity of neoplastic cell types is associated with cell growing, cellular adhesion method, transformation , cell proliferation, metastasis, and apoptosis, these cases is accompanied with elevated expression of Galectin-3 (a member of the galectin gene family)[15].

Oncogenic signalsand decrease apoptosiscan improved by intracellular galectins which stimulate tumor transformation and proliferationin tumor cells[16].

The present findings were coinciding an Egyptian study done by GendyH,*et al*[13]were reported significantly elevated serum Gal-3 in patients than control group. This fact was confirmed with the study conducted by JohannesL ,*et al.* [17]recommended that leakage of Galectin-3 fromtissue may be the main causes of highly serum Galectin-3 level, that make it as a promising biomarker for the disease.

Age , body mass index or sex is not associated with Gal-3 that madeGal-3 is a stable biomarker[18]. Still, Gal-3 does not display circadian variation and risesslightlyafter exercise, recurring to usual levels later(1-3 hrs)[19].Our finding in harmony with some previous studies [11,20]observed that serum Gal-3 values are virtually independent on age and sex, but our finding opposed other research that foundgreater Gal-3 concentration in females[21,22].

On the other hand, the level of Gal-3 is increased in relation to the increasing degree of tumor differentiation and reported that Patients with muscle-invasive bladder cancer have higher serum Gal-3 level,associated with patients with muscle non-invasive tumors. Also patients with high-grade transitional cell carcinoma when likened with low-grade tumors and PUNLMP. Furthermore,patients with MI and CIS have elevatedGal-3 level($p>0.05$) compared with Ta tumors, while there are no significant different when compared MI tumours to tumours invading the lamina propria (T1), and when linking T1 to Ta and T1 to CIS.

The epithelial–mesenchymal transition (EMT) can be activated by Gal-3 to stimulate cancer metastases[23].

Besides, Gal-3 could inhibit cell apoptosis, it could also facilitated angiogenesis by its carbohydrate recognitiondomains (CRDs) [24].These finding is consisting with the earlierstudiesshowed that elevated Gal-3 is dangerous, the depth of invasion, lymph nodemetastasis, distant metastasis and TNM stages in different kind of cancer was associated with Gal-3 level[25,26,27].

However, Gendya H,*et al*[28] failed to demonstrate this relation and informed no major statistical change in serum Gal-3 levels indiverse stage and grade of bladder cancer.

Conclusion

Among bladder cancer patients in Babylon province, increaseGalectin-3; indicate the significant linked between Galectin-3and bladder cancer.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq

Conflict of Interest: None

Funding: Self-funding

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