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Detection of Acidic Mucins and Corpora Amylacea in Prostate Tumors

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Abstract:

This study aimed to detect the expression of acidic mucins and corpora amylacea in tissues affected with prostate cancer and benign prostatic hyperplasia. Thirty nine formalin fixed paraffin blocks (FFPB) were randomly collected, 29 (74.4%) of them were prostate cancer and 10 (25.6%) of them were benign prostatic hyperplasia. The obtained data were analyzed using SPSS computer program. The age of patients ranged from 50 to 86 years. FFPB were cut in 4 µm thickness by rotary microtome. Acidic mucin was identified using alcian blue staining technique while corpora amylacea was identified using haematoxylin and eosin stain. Acidic mucin expression were observed in 16 cases of malignant tumor and not observed in13 cases of malignant tumor, also not observed in all cases (10) of benign tumor, with significant association (P= 0.000). The Corpora amylacea expression observed in one case of malignant tumor and not observed in 28 case of malignant tumor, and observed in 7 cases of benign tumor and not observed in 3 cases of benign tumor with significant association (P= 0.002). This study concludes that acidic mucins expression associated with malignant prostate condition while Corpora

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amylacea appearance is associated with benign condition but their presence not used to exclude malignancy.

Key words: acidic mucin, corpora amylacea, prostate cancer, prostatic hyperplasia

Introduction:

Prostate cancer is the most common cancer and second leading cause of death in men. The evidence base for the diagnosis and treatment of prostate cancer is continually changing [(1)]. In 2011 prostate cancer is the second most frequently diagnosed cancer and the six leading cause of cancer death in worldwide [(2)], in Sudan, university of Gezira registry reported that prostate cancer was the commonest cancer among male patient in Gezira state [(3)].

The primary risk factors of prostate cancer are obesity, age and family history [(4)],other risk include genetic, dietary (e.g. higher meat consumption), infections or inflammation specially sexual infection, sexual factor such as many lifetime sexual partners or starting sexual activity early in life [(5)], increase level of testosterone [(6)], high blood pressure [(7)] and may lack of exercise [(8)].

For diagnosis of prostate cancer only test confirm the result is biopsy, however prior to biopsy less invasive testing can be conducted such that Digital rectal examination (DRE), prostate imaging such as ultrasound (US)[(9)], Gleason score which depend on evaluation of microscopic features of any cancer found[(10)] and tumor markers such as prostate specific antigen (PSA) to determine the origin of malignant cells that metastasized[(11)].

Treatment of prostate cancer is done by several ways according to stage such as radiation therapy, radical prostatectomy [(12)], chemotherapy, cryotherapy and hormonal therapy [(13)].

Mucin is a high molecular weight glycoprotein that is synthesized, stored and secreted by the epithelial mucosal cells, especially the goblet cells [14]. Mucins are expressed by various epithelial cell types that exist in relatively harsh environments[15]. Mucins key characteristic is its ability to form gels; therefore they are a key component in most gel-like secretions, serving functions such as lubrication, cell signaling and forming chemical barriers [16].

Corpora amylacea are small hyaline masses of found in the prostate gland, neuroglia, and pulmonary alveoli. They are derived from degenerate cells or thickened secretions occur more frequently with advancing age. Prostatic corpora amylacea, are faintly laminar and less eosinophilic masses. In the prostate, where they are also known as prostatic concretions, they usually appear in benign glands; however, their presence cannot be used to exclude cancer [17].

Previous reports, which demonstrate the presence of acid mucin secretions to be more frequent in malignant versus benign prostate lesions [18], and allow differentiation of benign and malignant hyperplastic tissue [19]. Corpora amylacea are present in the benign acini of prostate glands; however their presence cannot be used to exclude cancer [20].

Materials and methods:

Sample collection:

Paraffin embedded tissue blocks previously diagnosed as prostate tumors were randomly collected from different centers for this study.

Slides preparation:

Two sections of 5µm thickness were obtained from each formalin fixed paraffin embedded tissue using a rotary microtome one for haematoxylin and eosin stain for detection of

corpora amylacea and the other was stained by alcian blue stain for detection of acidic mucin.

Haematoxylin and eosin stain for detection of corpora amylacea:

Sections of 4µm were dewaxed in hot plate oven and cleared in two changes of xylene for two minutes, then hydrated through descending concentrations of ethanol (100%, 90%, 70%, 50%), and to water two minutes for each, then were stained with Mayer's haematoxylin solution for seven minutes, then washed in water and blued with ammoniated water for 16 second, then washed in water, then stained with eosin stain solution for two minutes, then washed in water, blotted and dried, then cleared in xylene and mount in DPX mounting media [(21)].

Alcian blue staining method for acidic mucin:

Sections of 4µm were dewaxed in hot plate oven and cleared in two changes of xylene for two minutes, then hydrated through descending concentrations of ethanol (100%, 90%, 70%, 50%), and to water two minutes for each, then were treated with alcian blue solution for 5 minutes, then blotted and dried, then stained by neutral red for 2 minutes and washed in water, then rinsed in alcohol, then cleared in xylene and mount in DPX mounting media [(21)].

Result interpretation:

Results obtained from two sections were detected by researcher and confirmed by experienced histopathologist. Negative and positive controls were used for evaluation of the test sections.

Statistical analysis:

All information about the study population was entered a computer as well as obtained results. The data was analyzed

using SPSS computer program. Frequencies, means, chi-square tests were calculated.

Results:

The study involves 39 samples, 29 of them (74.4) were malignant and 10 samples (25.6%) were benign prostatic hyperplasia as indicated in table (1). The age of the study population ranged between 50 and 86, with mean age 69 ± 9 indicated in table (2). Most patients were aggregating in the age more than 65 years representing 71.8%, and the rest were less than 65 years representing 28.2%. The acidic mucins expression observed in 16 cases and not observed in 23 cases, 16 cases were malignant as indicated in table (3). The corpora amylacea expression observed in 8 cases and not observed in 31 cases. 1/8 of the positive cases of was malignant and 7/8 positive cases were benign as indicated in table (4).

Table (1): Distribution of study samples by histological diagnosis

Sample	Frequency	Percent
Malignant	29	74.4
Benign	10	25.6
Total	39	100.0

Table (2): Distribution of age group among study subjects

Age group	Frequency	Percent
50-64	11	28.2
65-90	28	71.8
Total	39	100.0

Table (3): Relation of the acidic mucins expression with the diagnosis

Diagnosis	Acidic mucins		Total
	Positive	Negative	
Malignant	16	13	29
Benign	0	10	10
Total	16	23	39

P value 0.002

Table (4): Relation of corpora amylacea expression with the histological diagnosis

Diagnosis	Corpora amylacea		Total
	Positive	Negative	
Malignant	1	28	29
Benign	7	3	10
Total	8	31	39

P value 0.000

Discussion:

Prostate cancer tends to develop in men over the age of fifty [22]. Prostate cancer is most common in the developed world with increasing rates in the developing world. Globally it is the sixth leading cause of cancer-related death in men [23].

The age of the study population ranged between 50 and 86, with mean age 69 ± 9. Most patients were aggregating in the age more than 65 years representing 71.8%, and the rest were less than 65 years representing 28.2%, this indicates that the risk of development of prostate tumors increases by increasing age, this result agree with Bardan *et al*., [24] who report that the prostate cancer incidence is progressively with a peak around 65-70 years.

Acidic mucins expression were observed in 16 cases of malignant tumor and not observed in13 cases of malignant tumor, and not observed in all cases (10) of benign tumor, with significant association with malignant condition (P value 0.000), indicate the relation of acidic mucins with malignant cases rather than benign conditions this may related to the abnormal secretions of malignant glands of the prostate, this result agree with Mathur *et al*.,[18] study who reported that the presence of acidic mucin secretions to be more frequent in malignant versus benign prostate lesions.

Corpora amylacea bodies are small hyaline masses of unknown significance present in the prostate gland. They are derived from degenerate cells or thickened secretions and occur more frequently with advancing age. While their significance is

unknown, they can be used to identify these organs microscopically (Christian *et al*., [20].

Corpora amylacea expression observed in one case of malignant tumor and not observed in 28 case of malignant tumor, and observed in 7 cases of benign tumor and not observed in 3 cases of benign tumor with significant association with benign condition (P=0.002), indicate that the relation of corpora amylacea appearance is strongly related to benign conditions than malignant forms, this result agree with Christian et al., [20], who reported that the corpora amylacea in the prostate usually appear in benign glands and their presence can't be used to exclude cancer.

Conclusion:

This study concludes that acidic mucins expression associated with malignant prostate condition while Corpora amylacea appearance is associated with benign condition but their presence not used to exclude malignancy.

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