Role of Combine Alcian Blue and Periodic Acid Schiff's in Demonstration of Adenocarcinomas and Poorly Differentiated Cancers

Manahil Fthelrhman Hamadoba[1], Mohammed Abdelgader Elsheikh[1], Ahmed Mohammed Ahmed[2], Marium Faez Habib[1], Tibyan Abd Almajed Altaher[3], Ghanem Mohammed Mahjaf [4] and Mosab Nouraldein Mohammed Hamad[5]*

[1]Department of Histopathology, Faculty of Medical Laboratory Sciences, Shendi University, Sudan.
[2]Department of Pathology, Faculty of Medicine, Shendi University, Shendi, Sudan,
[3]Department of Clinical Chemistry, Faculty of Medical Laboratory Sciences, Shendi University, Sudan.
[4]Department of Medical Microbiology, Faculty of Medical Laboratory Sciences, Shendi University, Sudan.
[5]Assistant professor, Department of Microbiology, Faculty of Medicine, Elsheikh Abdallah Elbadri University, Sudan.

*Corresponding Author:** Mosab Nouraldein Mohammed Hamad, Assistant professor, Head of Microbiology Department Faculty of Medicine, Elsheikh Abdallah Elbadri University, Sudan.

Abstract

Background: *Mucins are complex carbohydrates secreted by various types of epithelial cells and glandular tissue in many organs. Mucin's pathological expression has been implicated in cancer development and progression. Diagnosis of adenocarcinoma is based on morphological appearance under light microscopy. Detection of mucins may also help identify adenocarcinoma and poorly differentiated carcinomas.*

Objective: To demonstrate mucin expression in adenocarcinoma and poorly differentiated carcinoma.

Materials and Methods: This is a hospital-based descriptive cross-sectional study. Sections were obtained from archival paraffin blocks containing 60 randomly selected adenocarcinoma and poorly differentiated carcinomas, and the sections used were stained with combined Alcian blue-PAS to examine mucin expression. We use Master Cheat for data collection and SPSS for data analysis.

Results: The most common age group was 61-80 years old. Seventy percent of the cases were female, and mucin was present in 90% of the study samples. Mixed-type mucins were the most common type (55%), followed by neutral mucins (35%), with all samples lacking only acidic mucins.

Conclusions: Mucin expression can be regarded as a differentiating agent between different tumor grades of adenocarcinoma types and further distinguish between poorly differentiated adenocarcinoma and poorly differentiated squamous cell carcinoma.

Keywords: Adenocarcinoma, Alcian Blue, Mucins, Periodic Acid Schiff's, Sudan

Introduction

Similar to proteoglycans, mucins consist of polysaccharide chains covalently attached to a protein core [1]. Carbohydrate moieties are usually attached to serine or threonine via O-glycosidic bonds. The serine- and threonine-rich protein core can contain hundreds to thousands of amino acids. The distinct structure of epithelial mucin is the presence of pairwise repeated amino acid sequences within the protein core. Mucins are numerically classified into functionally distinct families

based on differences in paired amino acid sequences and protein core structures [2]. Glycosaminoglycans, which are strongly acidic polyanions, the polysaccharide chains of mucins vary from neutral or weakly acidic to strongly acidic Sul formycins. They also show a more diverse composition of monosaccharide units. Neutral mucins contain high levels of uncharged monosaccharides such as mannose, galactose and galactosamine, and are found in high concentrations in the epithelium of the gastric mucosa, the duodenal Brunner's gland, and the prostate epithelium. Sialic acids are a diverse group of nine-carbon monosaccharides containing a carboxylic acid group at the 1carbon

position [3]. It is ionized at physiological pH, giving the whole molecule a negative charge. Mucin function depends on the tissue location of mucin-producing cells and the type of mucin. Secreted mucins typically provide lubrication and protection to nearby secretory cells and/or tissues. The role of membrane-bound mucins is not fully understood. These mucins may be involved in regulating cell functions such as cell proliferation and cell adhesion [4]. Cancer is one of the leading causes of death worldwide. It is estimated that the global cancer burden will increase further in the next few years, reaching 21.4 million new cases [5]. Cancer grading is a histological method designed to help predict prognosis based on certain morphological features. This is usually based on structural or cytological features (nuclear grade or mitotic sequence), or sometimes a combination of both. Grading usually ranges from well-differentiated (grade 1) to least differentiated (grade 3 or 4). The number of notes ranges from 2 to 5 [6,7,8]. Highest grade tumors (grade 3 or 4) lack specific differentiation. Adenocarcinoma is a malignant neoplasm that arises from epithelial cells of glandular or gland-like structures and can occur in several parts of the body. The most common sites of adenocarcinoma are the breast, lung, prostate, and gastrointestinal tract, including the colon, rectum, pancreas, stomach, and esophagus. Adenocarcinoma also accounts for 70% of cancers of unknown origin [9]. Adenocarcinoma is easily diagnosed and distinguished from other cancerous tissues by light microscopy. Diagnosis is usually based on light microscopic identification of glandular structures. These features are common to all types of adenocarcinomas, making it impossible to diagnose the primary site of these tumors, especially for metastatic tumors. Also, in poorly differentiated adenocarcinoma, light microscopy shows little or no glandular formation, but immunohistochemistry (IHC) can be used to further diagnose adenocarcinoma types because special stains can distinguish mucins. is an important tool to help with [10]. The combination of Alcian Blue and Schiff Periodic Acid is one of the specialized stains used for mucin evaluation. This combination of techniques distinguishes between neutral and acidic mucins in tissue sections [11].

Materials and methods

Study Design

This is a hospital-based, cross-sectional descriptive study aimed at evaluating the role of the combination of Alcian blue and PAS in detecting mucin expression in adenocarcinoma and poorly differentiated carcinomas of various grades.

Study Area

The study was conducted in the Shendi region of the Nile State at the Institute of Histopathology, El-mek Nimir University Hospital during the period from August to December 2021.

Study Population

The study population was paraffin tissue blocks obtained from patients with adenocarcinoma and poorly differentiated carcinoma types of various tumor grades.

Inclusion and Exclusion Criteria

All specimens employed in this study were paraffin tissue blocks with adenocarcinoma of various tumor grades and poorly differentiated forms of cancer. Other types of cancer were excluded from this study.

Study Sample and Sample Size

Sixty formalin-fixed paraffin-embedded tissue blocks (FFPE) diagnosed with adenocarcinoma and poorly differentiated carcinoma were involved in this study.

Data Collection Tools and Variables

Information for the archived blocks was obtained from datasets such as patient age, sex, and diagnosis. Alcian blue and PAS methods were combined to detect mucin expression.

Sample Processing

All blocks were cut to 3 microns using a rotary microtome. All sections were then spread in a water bath, placed on frosted top-coated glass slides, deparaffinized in xylene, rehydrated in low alcohol content, and washed in water. Sections were then stained with a combination of Alcian Blue and PAS.

Interpretation of Results

Stained slides were viewed under a microscope with 10x/0.25 and 40x/0.65 lenses. The presence of blue color in cells indicated acidic mucin positivity, the presence of red magenta color in cells indicated neutral mucin positivity, and various shades of purple in cells indicated acidic mucin positivity. and neutral mucin.

Quality Management

Quality control for cutting, staining and mounting was done by him Llewellyn.

Data Analysis and Presentation

Data analysis was performed using the Computerized Statistical Package for Social Science SPSS (16.0). Frequencies, subject chi-square tests.

Ethical Considerations

This study was performed after written approval from the Department of Histopathology and Cytology, Department of Medical Laboratory Sciences and approval from the Department of Advanced Research and Scientific Research, Shendi University. Specimen collection and processing were performed after ethical approval by hospital administrators. The benefits and results of this study will be published under confidentiality.

Results

Table1: Diagnosis of Tissue Types

Variables	Tissue type								
Diagnosis/ Grade	Prostate	Ovary	Breast	Colon	Gastric	Cervix	Esophagus	Endometrium	Total
Poor diff. ca.	9	2	0	1	3	4	4	2	25
Moderate diff. ade	8	6	1	3	2	0	2	3	25
Well diff. adenoca.	3	1	1	1	2	0	0	2	10
Total	20	9	2	5	7	4	6	7	60
Percentage	33.3%	15%	3.3%	8.3%	11.7%	6.7%	10%	11.7%	100%

Table2: Correlation of Mucin Expression with Study Samples.

Variables	Mucin expression			P. Value
Study sample/grade	Present	Absent	Total	
Poor diff. ca.	19	6	25	**0.009**
Moderate diff. adenoca.	25	0	25	
Well diff. adenoca.	10	0	10	
Total	**54**	**6**	**60**	
Percentage	**90%**	**10%**	**100%**	

Table 3: Correlation of Mucin Type Expression with the Tumor Grade.

Variables	Mucin expression					P.value
Study sample/Grade	Neutral	Acid	Mixed	Absent	Total	
Poor diff. ca.	10	0	9	6	25	
Moderate diff. adenoca.	9	0	16	0	25	**0.015**
Well diff. adenoca.	2	0	8	0	10	
Total	**21**	**0**	**33**	**6**	**60**	
Percentage	**35%**	**.0%**	**55%**	**10%**	**100%**	

Table 4: Correlation of Mucin Expression Degree with Tumor Grade.

Variables	Degree of mucin expression					P. value
Study sample/ grade	Strong	Moderate	weak	Absent	Total	
Poor diff. ca.	3	6	10	6	25	
Moderate diff. adenoca.	7	16	2	0	25	**0.000**
Well diff. adenoca.	8	1	1	0	10	
Total	**18**	**23**	**13**	**6**	**60**	
Percentage	**30%**	**38.3%**	**21.7%**	**10%**	**100%**	

Discussion

This is a descriptive cross-sectional look executed all through the duration from August to December 2021, aimed to stumble on the expression of mucin in adenocarcinomas and poorly differentiated cancers. Our look contained 60 cancerous tissues, 35 samples had been adenocarcinomas, and at the same time as the remainder, 25 samples had been poorly differentiated cancers. Regarding the distribution of age amongst look at populations; our look at found out tow 0.33 of sufferers had superior age, age is one of the hazard elements related to the improvement of most cancers, and the most typical age amongst instances ranged from 61-eighty years antique with a median suggest of age sixty-two years antique, this result close to that bring about a look at carried out through Agrawal and his colleagues, they concluded that; the occurrence of carcinoma become observed to boom with the age because the height occurrence become above to the age of 70 years antique [12], any other look at carried out through Kelsy and Bernstein on 1996 and Howell et al., on 2014 they concluded that most cancers occurrence accelerated with age [13,14]. Regarding the distribution of gender amongst look at populations our look confirmed that; greater than two-thirds of sufferers had been girls and much less than one-0.33 of sufferers had been men, on a look at

carried out by Siegel et al., in 2016, they summarized that; the mortality of most cancers mentioned to be more in guys than in women, especially, lung, colorectal and belly cancers, which might be the main reasons of most cancers' deaths [15]. Executed a retrospective cohort look at 1,422 sufferers with histologically verified CRC wherein 55.4% had been men and 44.6% had been girls [16]. Gender variation in the incidence of cancer may be due to the geographical distribution and poor cancer epidemiological data in our country. Concerning mucin expression in our study we found that; all adenocarcinomas showed positive expression of mucin, while 6 out of 25 poorly differentiated cancers showed negative expression for mucin, and this suggests the positive role of mucin in the detection of adenocarcinomas especially when the adenocarcinoma graded poorly differentiated, the well-trained pathologist suggest that the negative sample for mucin were not adenocarcinomas and explained they might be with squamous cell carcinoma, this finding similar to that obtained in a national study of Eiman and Esam, who studied demonstration of mucins in Gastrointestinal Tract carcinoma lesions (adenocarcinomas) in Sudanese patients, they found that; mucin was present in all studied samples [17]. study about the role of mucin histochemistry in the distinction between prostate carcinoma and benign prostate lesions, they concluded that; prostatic carcinomas showed positive expression of both neutral and acidic mucins while the benign lesions expressed only neutral mucin, our result was similar to the above study result because all prostate carcinomas were showed positive expression of both types of mucins [12].studied mucin histochemistry in normal and adenocarcinoma of the colorectum, in colon adenocarcinoma sialomucins were seen as more predominant than neutral and sulphomucins. They concluded that mucin histochemistry is a valuable and inexpensive tool for determining mucin-type, one of the key prognostic markers in the early detection of colorectal cancer [18]. Regarding the level of mucin expression, our results showed the following. Levels of mucin expression generally increased when differentiation was good and decreased when differentiation was poor. Our study is consistent with studies conducted by Sumana and his colleagues examining mucin histochemistry in normal colorectal adenocarcinoma and colorectal adenocarcinoma of the colon, where they came to the following conclusions: Did. Of the 25 carcinomas, 18colontissuesshowedmoderatereaction (++) and7showedweakreaction (+) on his PAS staining. When PAS with diastase staining was applied to all50 colon cancer cases and normal colon specimens, we observed that all normal colon cases showed Avery strong positive reaction (++++) [18].

Conclusions

Adenocarcinoma and poorly differentiated carcinoma increased with age. Females were the most common gender in the study population. Mucinhelps identify adenocarcinoma. Mucins play arolein identifying poorly differentiated adenocarcinoma. Mucins and mucinsubty pesalsoplayanimportantroleindistinguishingbetweenbenignandmalignantglandularlesions, asinprostate lesions.

Sources of Funding

Conflict of Interest

The author has affirmed that there are no conflicting interests.

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