International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2020): 7.803

Evaluation of Cytological Changes among Smoker Patients with Pulmonary Tuberculosis

Faris MerghaniA Elmahdi [1], Lobna Elfadil Ali[2], Sadeem Mohammed AAlsaif[3], Mayan Nawaf M Alharbi[4]

[1]Department of Histology, College of Medicine, Alrayan Colleges, Madinah, Kingdom of Saudi Arabia

[2]Department of Histopathology and Cytology, Faculty of Medical Laboratory Science, Portsudan Alahlia University

[3, 4] College of Medicine, Alrayan Colleges, Madinah, Kingdom of Saudi Arabia

Corresponding Author Email: *alfaris-sust[at]hotmail.com*

Abstract: ***Background: Pulmonary Tuberculosis (TB) is a major public health concern worldwide: despite a regular, although slow, decline in incidence over the last decade. Therefore, the aim of this study was to evaluate cytological change of sputum in smoker patients with TB. Methodology: A total of 200 sputum samples (100smoker patients were ZN stain positive (case) and 100 patients were Zn negative). Data were collected by questionnaire and the collected sputum smear were subjected to Papanicolaou stain and microscopically analyzed for studying cytological alterations. Results: The cytological finding of the case groups was as follows 28% reported with chronic inflammatory changes, 64% micro nuclear changes, 8% metaplastic changes, P. value was 0.00, there were significant with TB patients. Conclusion: significant changes in sputum sample associated smoker Patients with TB that requires further consideration.***

Keywords: Cytological Changes, Smokers, Pulmonary Tuberculosis

1. Introduction

Tuberculosis (TB) is one of the major public health threats, 10 million cases were estimated to have occurred in 2020, approximately 5.6 million men and 3.3 of whom were in women. TB is present in all countries and age groups. But TB is curable and preventable. Most cases are estimated to be in Asia and Africa (58% and 27% respectively), with the highest incidence in India (range 2.0–2.4 million) and China (0.9 −1.1 million), together accounting for 38% of the total number of cases [1]. AIDS is one of the important causes for change in etiological profile as well as increasing cases of extra pulmonary tuberculosis [2]. Smoking affects both innate and adaptive immunity in humans and thus weakens defensive immunity [3]. That seems the reason why smokers are also at increased risk for extra - pulmonary tuberculosis [4]

Exfoliative cytology is particularly valuable for mass screening purposes; with a sensitivity of 94%, and specificity of 100% [5]. Recent advances in technology facilitates the use of reliable quantitative techniques such as cytomorphometry, histometric, and computer - assisted image analyzer. The evaluation of parameters such as nuclear area (NA), cytoplasmic area (CA), and ratio of NA/CA (N/C), may increase the sensitivity of exfoliative cytology for early diagnosis since these are precise, objective, and reproducible [6]. Cytology become a reliable tool for the detection of pulmonary carcinoma cell in spontaneous cough and induced sputum, bronchial washing, bronchial brushing, and fine needle aspiration may be used to study cytological detection of malignant cells and microorganism [7]. Sputum cytology is simple and effective method of obtaining diagnosis in 80% of these centrally located tumors. Squamous cell tumors are more often diagnosed than adenocarcinoma with is technique. Cytological examination of the fresh morning sample of sputum (3 consecutive days) is optimal method of assessment. The potential problem specimen includes inadequate samples number (less than three), poor sample preparation and unexperienced cytologists [8].

2. Materials and Methods

The research proposal was approved by University of Sudan board, sputum specimen was taken with permission from ministry of health at Red Sea state and Port - Sudan teaching hospital, verbal consent was taken from patient after good explanation of study objective. Two hundred patients attending TB clinic having signs and symptoms of T. B infection, 100 smoker patients whom sputum smears showed ZN stain positive considered to be the case group and 100 nonsmoker patients having signs and symptoms of TB infection and ZN stain was negative considered to be control group both sex and all age group were included. Sputum was collected on three consecutive days, early morning before eaten, the sputum was from a deep cough, collected in sterile container. Three smears were prepared from each patient by using wooden stick, two smears were fixed wet using 95 % ethyl alcohol, and the third one was subjected for air drying and post fixed in absolute methanol. Sputum smear fixed wet in 95 % ethyl alcohol for 30 minutes. hydrated in 70% Ethyl alcohol for two minutes, rinsed in water for two minutes, stained in Harris's Hematoxylin for five minutes, rinsed in water, followed by differentiation in 1% acid alcohol for two seconds, then blued in tap water for 10 minutes, dehydrated in 70 % alcohol for two minutes and two change of 95 % alcohol each for two minutes, then stained with OG6 for two minutes. followed by rinses in two change of 95 % alcohol for two minutes each, and stained with EA50 for three minutes, also rinsed in 95 % alcohol for one minutes, smears were allowed for air drying then rinsed in xylene, and mounted in Diesterene, Dibutyl phthalate, Xylene (DPX).

Statistical analysis: Statistical analysis was carried out on all samples using the Frequencies, cross tabulation and chi - square were calculated, to determine statistical significance (P<0.05) with 95% confidence level.

3. Results

Two hundred patients were evaluated cytologically, one hundred (non - smokers) of whom were free from TB infection (control group) using Z. N stain, while the othersuffered from TB infection are smokers. There were different age groups participated within this study. Their age was range from 20 years to 78 years; the mean age was 32.6 years. Within the case group the most frequent age group was (41 - 50 years). as shown in (Table - 1).
The cytological finding of the case groups was as follows 28% reported with chronic inflammatory changes, 64% micro nuclear changes, 8% metaplastic changes, P. value was 0.00, there were significant with TB patients and cytological finding, as shown in (Table - 2).

The association between age and cytological finding among case group the age group 40 - 50 years showed 6%metaplastic changes, 26% micronuclear changes, 16% chronic inflammatory changes, while the age group 60 - 70 years there was lower incidence of metaplastic changes (2%), as shown in (Table - 3). P value was 0.156. There were no significant differences among case group.

Table 1: Distribution of the study population by age

Age (year)	Smokers (ZN positive)	Control (nonsmokers –ZN negative)
20 - 30	22%	45%
31 - 40	25%	27%
41 - 50	35%	17%
51 - 60	14%	11%
>60	4%	0%

Table 2: Frequency of cytopathological changes among the study population.

Results	Smokers (T. B patients)		Control (non - smoking –TB negative)	
	N	%	N	%
Acute inflammation	0	0	69	69
Chronic inflammation	28	28	2	2
Micronuclear	64	64	0	0
Metaplasia	8	8	11	11
Normal	0	0	18	18

Table 3: Relationship between of cytopathological changes and age

	20 - 30	31 - 40	41 - 50	51 - 60	>60
Acute inflammation	0	0	0	0	0
Chronic inflammation	1	3	16	5	3
Micronuclear	0	1	26	12	15
Metaplasia	0	0	6	0	2
Normal	0	0	0	0	0

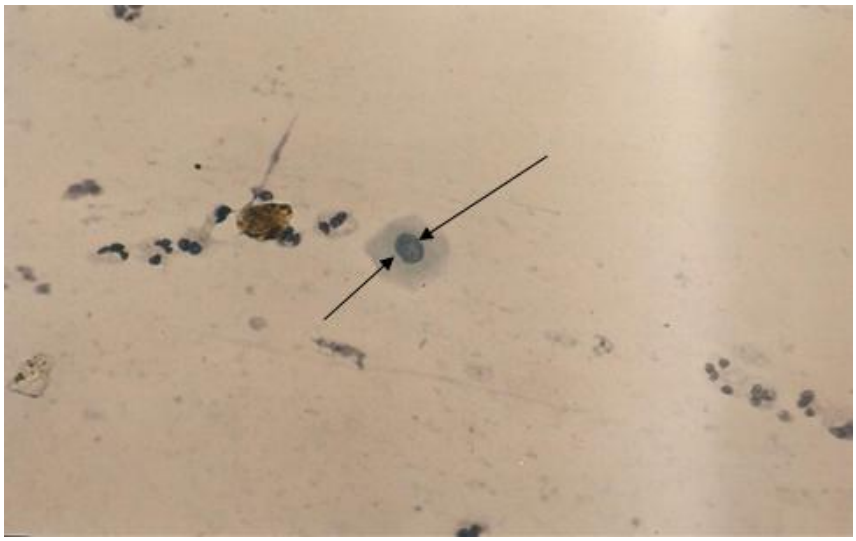

Figure 1: Photomicrograph of sputum - case groupcontainingmetaplasia (Pap Stain 400x)

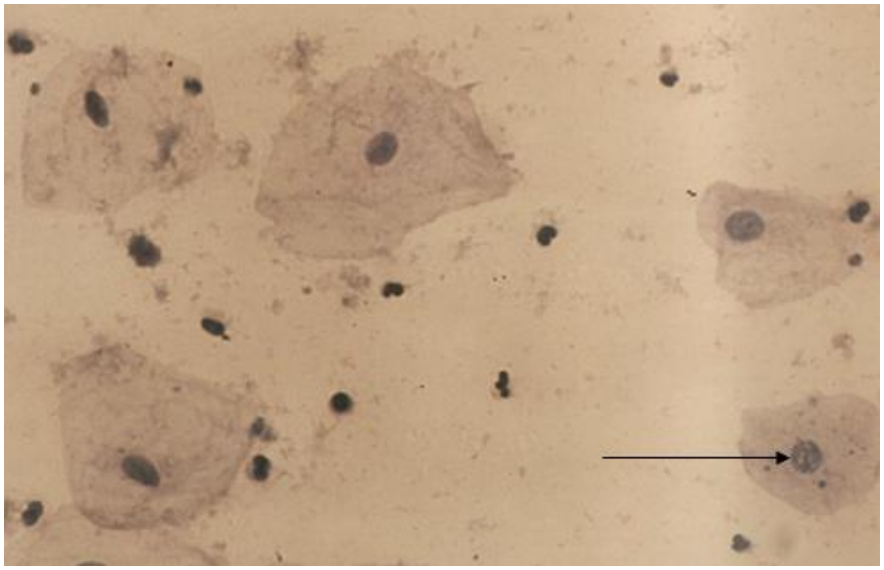

Figure 2: Photomicrograph Epithelial cell (case group) showing nuclear enlargement (micro - nuclear changes)

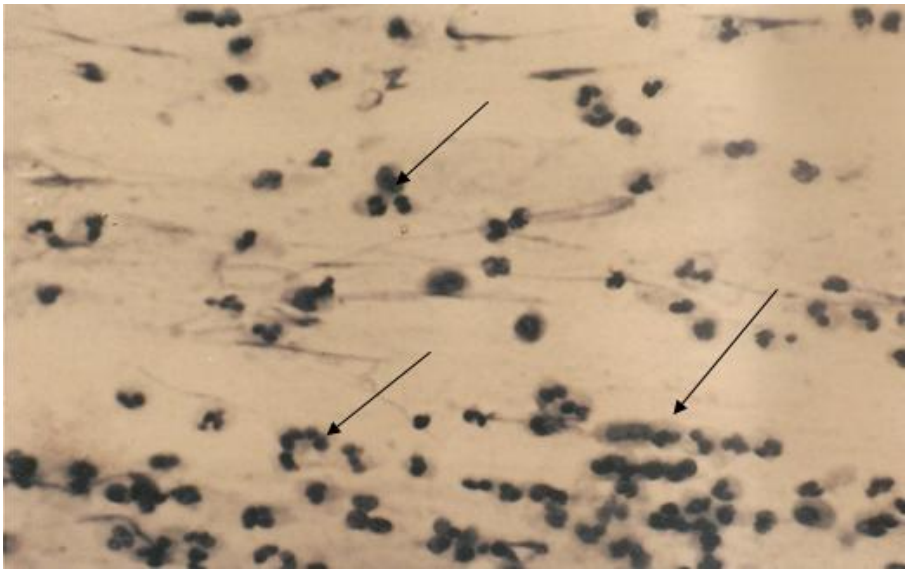

Figure 3: Photomicrograph (case group sputum) containing lymphocyte and macrophage (Pap Stain 400x)

4. Discussion

TB is the 13th leading cause of death and the second leading infectious killer after COVID - 19 (above HIV/AIDS) [9].
It is common in area that loss the health care and the rural area. TB is usually association with HIV patient, diabetes mellitus patient, malnutrition, Malaria, alcoholism, and chronic renal failure's is world greatest infectious that kills women at reproductive age. Report found that smoking more than 20 cigarette a day also increase the risk of TB [10].

Our study confirms previous studies that showed an association between smoking and tuberculosis infection in at risk groups. [11]. For example, in an immigrant population Plant *et al* [12]. reported a higher risk of infection among smokers which increased with duration of smoking. In contrast to previous studies investigating specific high - risk groups, the current study is the first to investigate the association between smoking and tuberculosis infection in a cross - sectional population survey in a high incidence community. The reason for the increased risk of infection in smokers is unclear but may be explained by the effects of smoking on pulmonary host defenses. Smoking has been shown to reduce natural killer cytotoxic activity, to suppress T cell function in both lung and blood, to impair mucociliary clearance of particles, and to increase numbers of alveolar macrophages in the lower respiratory tract. Cells of the macrophage - phagocytic group influence immediate or innate immunity through their handling and elimination of mycobacteria, and products of cigarette smoke may therefore favour persistence and/or replication of ingested mycobacteria by impairing the macrophage or dendritic cell function. [13, 14]. We Recommended large sample size to evaluate the relation between tuberculosis and lung cancer should be taken in future studies. Specialized technique in TB infection detection may be used to confirm diagnosis e. g., Immunocytochemistry and polymerase chain reaction (PCR)

References

[1] NasiellM, Roger V. Cytological findings in sputum in pulmonary tuberculosis. Lakartidinining.2020; 74 (5): p.330 – 335.

[2] S. Battacharya et al. (1998). FNAC diagnosis of Tuberculosisa an eight year study at Mangalore, Indian Jr. of Medical Sci., 52: 498 - 506.
[3] Qiu F, Liang C - L, Liu H, Zeng Y - Q, Hou S, Huang S, Lai X, et al. Impacts of cigarette smoking on immune responsiveness: Up and down or upside down? Oncotarget 2017, 8 (1): 268. pmid: 27902485
[4] Maurya V, Vijayan VK, Shah A. Smoking and tuberculosis an association overlooked. The international journal of tuberculosis and lung disease: the official journal of the International Union against Tuberculosis and Lung Disease 2002, 6 (11): 942–951.
[5] Buch AC, Patel SS, Chandanwale SS, Kumar H, Patel KM, Sunita A. Study of oral exfoliative cytology in tobacco chewers of western India. *Int J Pharma Bio Sci.*2014; 4: 138–43.
[6] Rajesh S, Reddy SB, Shriniwas K. Cytomorphometric analysis of obtained squamesobtained from normal oral mucosa and lesions of oral submucous fibrosis. *J Indian Acad Oral Med Radiol.*2012; 24: 200–5.
[7] Goregen M, Akgul HM, Gundogdu C. The cytomorphological analysis of buccal mucosa cells in smokers. *Turk J Med Sci.*2011; 41: 205–10.
[8] Einstein TB, Sivapathasundharm B. Cytomorphometric analyses of the buccal mucosa of tobacco users. *Indian J Dent Res.*2005; 16: 42–46.
[9] World Health Organization. (2020, September 22). "TB is the 13th leading cause of death. " Retrieved from.
[10] Jawetz, Melinck, Idelberg's. (2004). Mycobacterium. Medical Microbiology.23rd edition New Yourk: MC Growhill. P 319 – 329.
[11] Maurya V, Vijayan VK, Shah A. Smoking and tuberculosis: an association overlooked. Int J Tuberc Lung Dis2002; 6: 942–
[12] Plant AJ, Watkins RE, Gushulak B, *et al.* Predictors of tuberculin reactivity among prospective Vietnamese immigrants: the effect of smoking. Epidemiol Infect2002; 128: 37–45
[13] Phillips DE, Hill L, Weller P, *et al.* Tobacco smoke and the upper airway. Clin Otolaryngol2003; 28: 492–6.
[14] Sopori M. Effects of cigarette smoke on the immune system. Nat Rev Immunol2002; 2: 372–7.