

THE ROLES OF COMPLETE BLOOD COUNT IN THE DIAGNOSIS OF TONSILLITIS

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ABSTRACT:

The definition of severe recurrent throat infections is arbitrary, but recent criteria have defined severe tonsillitis as: five or more episodes of true tonsillitis a year; symptoms for at least 1 year; and episodes that are disabling and prevent normal functioning. This study was designed to evaluate the hematological parameters in patients with acute tonsillitis.

An observational study done over one year from September 2019 to September 2020. Study sample included admitted patients (n= 135) with clinical diagnosis of tonsillitis. All cases were interviewed for obtaining demographical data, and blood samples had been drawn from all participants for estimation of CBC parameters and after tonsillectomy. Prior to tonsillectomy, a two milliliters of venous blood collected into EDTA tubes and analyzed.

One hundred and thirty-five cases were enrolled, acute tonsillitis (n= 76), and chronic tonsillitis (n= 59). All variables were insignificantly different between acute and chronic tonsillitis, however, previous attack have highly statistical significant difference ($P < 0.0001$). In addition, smoking habits was significantly difference between two categories ($P = 0.024$). In brief a significant difference between two groups were found for WBC, LYM, NEU, PLT, and Hb on both univariate and multivariate analysis. A complete blood count showed statistically significant changes in the presence of tonsillitis.

The use of the complete blood count parameters including WBC, LYM, NEU, HB and PLT are sensitive for diagnosis of tonsillitis and can be used as an aid in difficult diagnoses to reduce the rate of negative tonsillectomies.

Keywords: tonsillitis, lymphocyte, neutrophil, platelet

INTRODUCTION:

Anatomically speaking, tonsils are a member of the upper respiratory system as secondary lymph organ located in the back on both sides of the throat [1]. The tonsils were organized in the pharynx as a ring known as the Waldeyer's ring, it's the first defense against various bacterial and viral infections, and which participate in the formation of antibodies, particularly IgA [1], when any process of stimulation of lymphocytes by repeated stimulation antigens [3]. The pathogens beyond tonsillitis are Group A beta-hemolytic *Streptococci* and *Staphylococcus aureus* [4]. The definition of severe tonsillitis as: five or more episodes of true tonsillitis a year; symptoms for at least 1 year; and episodes that are disabling and prevent normal functioning [5]. Diagnosis of acute tonsillitis is primarily clinical, with the main interest being in whether the illness is viral or bacterial [6]. The incidence of tonsillitis in general practice in the UK of 100 per 1000 population per year [7], and acute tonsillitis is more common in childhood [6]. Recurrent severe tonsillitis results in considerable morbidity [9], including time lost from school or work. The most common complication of acute tonsillitis is peritonsillar abscess, and other as rheumatic fever and acute glomerulonephritis [6].

Recently, molecular studies assumed that (pharyngo-)tonsillitis caused by group A β -hemolytic streptococci (GABHS) or *Streptococcus pyogenes* is responsible for about 5 % of acute medical consultations [8]. As a result, acute tonsillitis is mainly caused by viruses, such as double-stranded DNA viruses (human adenoviruses, Epstein Barr Virus), single-stranded DNA viruses (Human Boca Virus), single-stranded RNA viruses (influenza and para-influenza viruses; rhino-viruses; entero-viruses including Coxsackie viruses; corona viruses; respiratory syncytial virus (RSV); human meta-pneumo-virus), retroviruses [human immunodeficiency viruses (HIV)] [8, 9]. Antibiotic therapy and surgical tonsillectomy are the main stay of management of tonsillitis, however, many studies reported resolve by self-limiting [8].

Therefore, the present study aimed to measuring the level of hematological parameters in patients with acute and chronic tonsillitis. As CBC is widely available cheap and fast test to be performed routinely, a detailed evaluation for the parameters of this investigation is paramount.

METHODS:

An observational study done over one year from September 2019 to September 2020. Study sample included admitted patients (n= 135) with clinical diagnosis of tonsillitis. All cases were interviewed for obtaining demographical data, and blood samples had been drawn from all participants for estimation of CBC parameters and after tonsillectomy. Prior to tonsillectomy, a two milliliters of venous blood collected into EDTA tubes and analyzed. The ranges of the reference intervals were as follows:

- Leukocyte counts (WBC) 3.70-10.1×10³/μL,
- Neutrophil (NEU): 1.63-6.96x10³/μL (39.3-73.7%),
- Lymphocyte (LYM): 1.09-2.99x10³/μL (18.0-48.3%)
- HB : 11.5%-14.5%,
- Platelet (PLT): 155-366×10³/μL

Statistical Package for the Social Sciences(SPSS) V24 (IBM Corporation, Armonk, NY, USA)were used in statistical analysis. Data presented as tables (counts,percentage, and means). The significant results further undergone univariate and multivariate analysis. P-value considered significant if it was less than 0.05.

RESULTS:

One hundred and thirty-fivecases wereenrolled, acute tonsillitis (n= 76), and chronic tonsillitis (n=59). Table (1) showed the demographic distribution in this study. All variables were insignificantly different between acute and chronic tonsillitis, however, previous attack have highly statistical significant difference (P<0.0001). In addition, smoking habits was significantly difference between two categories (P= 0.024).

In brief a significant difference between two groups were found for WBC, LYM, NEU, PLT, and Hbon both univariate and multivariate analysis, Table (2).

Table 1. Demographic of the study.

Variables		Acute tonsillitis (n=76)	Chronic tonsillitis (n=59)	P value
		No. / mean±SD		
Age		23.2±7.2	20.3±5.1	0.056
Gender	Male	48	33	0.5
	Female	28	26	
BMI	Normal	51	29	0.054
	High	25	30	
Residen cy	Urban	35	26	0.955
	Rural	41	33	
Socio- economy c	Good	21	19	0.698
	Poor	55	40	
Educati on	Good	24	18	0.957
	Fair	52	41	
Income	High	12	10	0.957

	Low	64	49	
Co-morbid	Yes	8	10	0.4
	No	68	49	
Previous attacks	Yes	2	50	<0.0001
	No	74	9	
Family history	Yes	17	20	0.195
	No	59	39	
Smoking	Yes	23	30	0.024
	No	53	29	

Table 2: Distribution of CBC parameters.

Test	Acute tonsillitis	Chronic tonsillitis	P value	
	Mean ±SD		Univariate	Multivariate
WBC(10³/μL)	15.44±4.84	14.29±3.77	0.05	0.01
LYM(10³/μL)	3.88±1.46	2.33±0.98	0.05	0.01
NEU(10³/μL)	12.22±5.56	12.45±4.87	0.05	0.01
Hb (%)	12.55±2.86	13.23±2.75	0.05	0.01
PLT(10³/μL)	298.35±89.46	306.76±100.33	0.05	0.001

DISCUSSION:

Medical history of patients, clinical symptoms and laboratory tests for diagnosis the isolates of *S.pyogenes* and *S.aureus* are diagnosed acute and chronic tonsillitis clinically. The spread of these bacteria is a serious risk to the lives of those affected by complications, as reported by the World Health Organization on acute respiratory infections in children [10].

Age of population was insignificantly difference between two arms. Male gender is mostly affected than female. BMI, residency, socio-economic, education, income, co-morbid, and family history are uninfluenced between two groups. However, previous attack have highly statistical significant difference (P<0.0001), in addition to smoking habits (P= 0.024). These are agreed with [4, 11, 12].

WBC counts are significantly different in two groups. A decreased LYM counts are significantly associated with clinical diagnosis of tonsillitis. Neutrophil counts are elevated in cases of acute and chronic tonsillitis are significantly different from two arms. Hb levels are significantly changed from two arms. Although platelet counts are higher in chronic, with a significant difference from acute. These are disagree with [13, 14, 15, 16]. AbdALaziz et al., [16] indicated an increase in the total number of white blood cells in people with acute and chronic tonsillitis compared with the control group and this observed is an agreement with [17]. Also there was a

significant increase in the number of neutrophils may be due to the fact that neutrophils are the first line of defense of the body which is the first self-defense elements against bacterial invasion and the main purpose is to distinguish and Absorbing and killing invading organisms such as bacteria. and the infection of the tonsils lymphatic tissue with bacteria lead to migration of monocyte from the blood stream to inflamed site and it may lead to increase in the number of monocyte [18, 19]. The penetration of invading organisms such as bacteria into the body led to changes in the ratio of total and differential levels of white blood cells as a result of the immune defense against invasive organisms [20].

CONCLUSION :

The use of the complete blood count parameters including WBC, LYM, NEU, HB and PLT are sensitive for diagnosis of tonsillitis and can be used as an aid in difficult diagnoses to reduce the rate of negative tonsillectomies. Male, obese, poor socio-economic, low educated, positive family history, and low income have negative predication value on tonsillitis. Smoking and frequent attacks have positive predictive effect on tonsillitis.

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Conflict

None

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