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COMPLETE BLOOD COUNT AS A DIAGNOSTIC MARKER IN ORAL LESIONS

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ABSTRACT

Complete Blood Count (CBC) is defined as a blood test requested by a doctor or other medical professional which gives an information regarding the cells in the human blood such as red blood cells, platelets and white blood cells

KEYWORDS: *Complete Blood Count (CBC)*

INTRODUCTION

Complete Blood Count (CBC) is defined as a blood test requested by a doctor or other medical professional which gives an information regarding the cells in the human blood such as red blood cells, platelets and white blood cells. [(1)] It is one of the most common diagnostic tests performed in healthcare. [(3)] It is sometimes referred to as a full blood count (FBC) or a full blood exam (FBE). [(2)] It's a highly automated, low-cost test that looks at the cellular components of a patient's peripheral blood to see if they're anemic or infected. [(3)]

The parameters include Hemoglobin (Hb), indices about red blood cells like Red Blood Cell Count (RBC), Mean Cell Volume (MCV), Mean Corpuscular Hemoglobin (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC), Red cell Distribution Width (RDW), white blood cell parameters like total White Blood Cell Count (WBC) and differential count of neutrophils, basophils, eosinophils, monocytes, and lymphocyte. [(2)] Physicians who fully comprehend the cbc's effectiveness and restrictions, indications, on the other hand, will find it to be a useful tool for establishing challenging diagnoses, monitoring treatment programs, and eliminating more expensive or unneeded testing. [(3)]Anaemia which is the reduced number of RBC's and haemoglobin, is a sign of an underlying condition that must be examined, not a diagnosis. The increase in white blood cell count was thought to be mostly reliant on the body's resistance to infection.[(5)]Infections and WBC malignancies, such as leukaemia, are the most prevalent causes of an elevated number of WBCs. The failure of the bone marrow to manufacture WBCs or an enhanced clearance of WBCs from the blood by a dysfunctional liver or an overactive spleen causes a reduction in WBCs. Toxins or the replacement of normal bone marrow cells by malignant cells can induce bone marrow failure. The majority of the rise in WBCs in the early stages of an infection is due to an increase in neutrophils and the percentage of neutrophils was thought to represent the degree of infection or toxin absorption. Neutropenia can develop as a result of long-term infections that deplete bone marrow reserves, causing output to fall short of need. [(5)(6)(9)] Lymphocytes proliferate as the illness progresses and T lymphocytes, are especially adept at combating viral infections, and their depletion increases vulnerability to viral infections.

Macrophages are very efficient at ingesting bacteria, and a lack of them causes recurring bacterial infections. Eosinophils are triggered by worm infections, whereas basophils are triggered by allergic diseases. [(6)] Thrombocytopenia can be caused by both bacterial and viral illnesses. [(7)] Thrombocytosis is a typical warning sign for a variety of cancers. [(8)]There

was a variation in the complete cell count of individuals with premalignant disorders like Oral submucous fibrosis, oral lichen planus, leukoplakia etc. [4] Our review aims to determine variations in complete blood count levels in different oral lesions.

VARIATIONS IN THE COMPLETE BLOOD COUNT IN ORAL LESIONS

Table 1

Condition	R B C	Hb	MCV	MCH	MCHC	PCV	WBC	Neutro-phil	Baso- phil	Eosino-phil	Mono- cyte	Lympho- cyte	Platelet
ULCERATIVE, VESICULAR AND BULLOUS LESIONS													
Herpes Labialis							↑	↓				↑	
Varicella Zoster Infection		↑					↑				↑		↑
Cytomegal Ovirus	↓	↓						↓			↑	↑	↓
Coxsackie Virus (Hand Foot Mouth Disease)							↑						
Erythema Multiforme	↓	↓					↑	↓					
Steven Johnson Syndrome	↓	↓						↓		↑		↑	
Recurrent Aphthous Stomatitis							↑	↑					
Behcet's Disease							↑	↑					
Pemphigus Vulgaris	↓	↓					↑			↑	↑	↓	
Bullous Pemphi- Goid	↓	↓					↑	↑		↑			
RED AND WHITE LESIONS													
Oral Candidiasis		↓					↑						
Oral Leuko- Plakia							↑			↑		↑	
Oral Erythro- Plakia							↑					↑	
Oral Submucous Fibrosis		↓					↑					↑	
Oral Lichen Planus		↓					↑					↑	
Lichenoid Reaction										↑			
INFECTIOUS DISEASES													
Bacterial Infections													
Syphilis	↓	↓		↓	↓	↓	↓	↓			↑	↑	
Actino- Mycosis							↑	↑					
Tuberculosis	↓	↓					↑						↓
Fungal Infections													
Blasto- Mycosis							↑	↑				↓	
Paracoccidi Odo- Mycosis							↑			↑			
Mucor- Mycosis							↑	↑					
Viral Infection													
Viral Hepatitis		↓				↑	↑				↑	↑	↓
Acquired Immuno- Deficiencysyndrome	↓	↓				↓	↓					↓	↓
CARCINOMA OF THE ORAL CAVITY													
Oral Squamous Cell Carcinoma	↓	↓					↑	↑				↓	
PIGMENTED LESIONS													
Malignant Melanoma							↑	↑			↑	↓	

DISCUSSION

From the above study it is seen that most of the oral lesions show an increase in the white blood cell count. In 2014, Shishodiya et al. stated that WBC count is highly variable since it responds to a variety of chronic triggers, and it can even vary with infections, stress, and smoking. [43] WBC counts vary widely in the general population and can be impacted by a variety of variables such as age,gender, race or ethnicity, smoking history, and chronic inflammation (Nieto et al., 1992; Cheng et al., 2004). [10] According to recent study findings, white blood cells (WBC) have been identified as a biomarker of inflammation and the incidence of any early age-related macular degeneration in the complete blood count (CBC) inquiry (AMD). [48][19] The severity of the infection may be reflected in WBC counts. [15] Because of their non-specificity, WBCs have the ability to detect the risk of malignancy. [4] Tumour stromal tissue has a large number of WBCs and inflammatory cells, and their cytokine generation appears to be related to tumour severity. [49] Tsai et al found that the peripheral total white blood cell (WBC) count, monocyte and neutrophil counts, and neutrophil lymphocyte ratio increased with stage T4 and poor tumour differentiation in their study on squamous cell carcinoma.[50] WBC counts might potentially be utilised to determine a patient's prognosis. WBC levels that were abnormally high frequently suggested a bad prognosis. [15]

Neutrophils play a role in the inflammatory cascade disease pathophysiology. Patients with higher neutrophil to leukocyte ratios show that this condition has an underlying inflammatory mechanism.[19] Increased neutrophil counts and/or decreased lymphocyte counts may inhibit lymphokine- activated killer cells. These are some of the proposed mechanisms underlying cancer patients' shorter survival. [53]

Recent research suggests that the eosinophil is a parasite killer cell that can phagocytize antigen- antibody complexes. [44] Eosinophils have been shown in vitro to kill parasitic organisms by binding to target membranes via Fc or C3 receptors. [45][46] Eosinophils are IgG-sensitized normal human tissues' killer cells. [48] Eosinophilia is most likely connected with pruritus and scratching, both of which transfer the patient's own plasma proteins into his/her skin. [21]

Monocytosis is most likely a result of the monocyte's job as a scavenger of particulate matter and pathogens. [21] Cytokine that acts as a monocyte growth factor seems to be released resulting in peripheral monocytosis. [12][13]The positive relationship seen in the lymphocyte count in these studies might simply be attributable to the greater neutropenia associated with specific diseases. [10] The increased lymphocytes cause a spike in the production of cytokines, which affects the therapy course. Cytokines can have an impact on both the pathophysiology and the prognosis of a therapy. [31]) Lymphocytopenia may signify a widespread immunological deficit. [28]

Platelets may play an essential role in inflammatory processes, according to some research. [19] Dissemination by intravascular coagulopathies, impairment of thrombocytopaenia by virus-induced amegakaryocyte mutation, direct interaction between the virus and platelets in blood circulation (e.g., phagocytosis or platelet aggregation, release, and thrombocytosis), an antigen-antibody complex that impairs platelet function, and antiplatelet antibodies that directly antagonise platelet- specific antibodies are some of the hypothesised mechanisms in thrombocytopenia. [39]

As anaemia is typically connected with the inflammatory process of chronic conditions such as cancer, the anaemia reported here may have been attributable to the disease itself. [51][52] The existence of additional chronic comorbidities is most likely to be responsible for this finding of disease-related anaemia. [29] Excessive production of pro-inflammatory cytokines,such as IL-6, TNF-a and IFN-c, contributes to anaemia through reduced production of erythropoietin, suppressed response of bone marrow to erythropoietin, and altered iron metabolism, which may in turn impair erythropoiesis. [54] Anaemia is related with a worse prognosis and higher mortality in patients with head and neck cancer, and it is frequently overlooked before to and throughout cancer therapy. As a result, the presence of anaemia at the time of oral cancer diagnosis may put these individuals at a higher risk of poor response to antineoplastic therapy. [29]

The combined reduction of few haematological parameters in certain conditions may be due to immune-mediated death of infected cells or stromal dysfunction in the bone marrow. [14] Suppressive effect on the bone marrow and may result in pancytopenia. [31]

HERPES LABIALIS

Differences in the most abundant types of WBC might be related to susceptibility to a common viral infection. The observed association of higher lymphocytes and occurrence of herpes labialis in the present study stands in apparent contrast to the accepted role of adaptive immunity in controlling HSV-1 infection. Elevated lymphocytes could be a marker for another factor associated with herpes labialis risk, or may indicate a long-term increase that results from an earlier infection. The positive association with lymphocyte count observed in these analyses could also simply be due to the relative neutropenia associated with herpes labialis; however, no apparent confounding or effect modification between lymphocyte and granulocytes was observed. Finally, these findings may indicate a need for an intact or activated lymphocyte population in the symptomatic expression of HSV-1 infection, even within the normal range of WBC counts. [10]

VARICELLA ZOSTER INFECTION

A certain cytokine, acting as a monocyte growth factor, would thus appear to be secreted from VZV- reactivated monocytes, consequently giving rise to peripheral monocytosis in VZV infected individuals. (12) VZV infection had a beneficial effect on bone marrow function particularly platelet production. [13]

CYTOMEGALO VIRUS

The various theories of CMV infection-induced thrombocytopenia were described by Crapnell et al., as CMV-induced direct cytotoxicity to hematopoietic cells with immune-mediated destruction of infected cells or impairment of bone marrow stromal function [14].

COXSACKIE VIRUS (HAND FOOT MOUTH DISEASE)

WBC counts increased with the severity of the illness. [15]

BECHET'S DISEASE

studies shows that the Neutrophils are higher in patients with active BD compared to controls and BD patients in remission, these high levels suggests that neutrophils play a role in the inflammatory cascade of BD and disease pathophysiology, Wbc increase accounts for a infection present in the body. [20]

TUBERCULOSIS:

The mean serum haemoglobin level in was found to be less thus reflecting anaemia, this is largely be due to chronic inflammation. Godwin et al. (2010) mention that the alterations in the red blood cell function especially in the immune-compromised state of the patients. WBC count in patients was increased because WBCs increase during infection, due to the increased polymorphonuclear leukocytes and macrophages as a part of the body's immune defence mechanism to combat the invading bacterial population. [34]

SYPHILIS

The study shows alteration in WBC, neutrophil, RBC, haemoglobin, PCV, MCH, and MCHC and elevation in lymphocyte and monocyte of the syphilis subject compared to the control. It could be as result of suppressed bone marrow activity. [32]

HIV

Haematological abnormalities found in the current study were anaemia, leukopenia, neutropenia, lymphopenia, and thrombocytopenia. In the present study, prevalence of anaemia and thrombocytopenia decreased and the prevalence of Leukopenia, Neutropenia, and Lymphopenia was an increase after initiation of HAART. [41]

CONCLUSION

A complete blood cell count with differential ispart of routine clinical practice. These haematological parameters are easy to monitor and are cost efficient. It also determines disease prognosis and hence can be used as a cheap biomarker of inflammation.

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