

Influence of Type II *Diabetes mellitus* on *Denture stomatitis*

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(Received: May 23, 2011; Accepted: June 30, 2011)

ABSTRACT

The results of this study show a positive correlation between type II *Diabetes mellitus* and *Denture stomatitis*. Patients with type II diabetes mellitus are found to be more susceptible to denture stomatitis than non-diabetics.

Key words: NIDDM, stomatitis, dentures, hyperglycemia, ANC
(Absolute Neutrophil count), ESR(Erythrocyte sedimentation rate).

INTRODUCTION

Uncontrolled diabetes predisposes to a variety of superficial and systemic infections, and oral candidiasis in particular is thought to be more prevalent among diabetic individuals. Individuals suffering from diabetes mellitus are more prone to infections as the increased blood glucose level reduces innate immunity of an individual. It has been assumed that non-insulin dependant type II diabetes could increase the chances of oral candidiasis due to decreased immunity (Bartholomew G.A et al, Iacoptnoam et al). The course of infection is also more complicated in the patient group with type II diabetes mellitus. (Tekeli .A. et al).

Denture stomatitis is an inflammatory oral lesion seen in patients who wear complete or partial dentures. Denture stomatitis has multifactorial etiology. *Candida albicans* is a commensal that normally inhabit the oral cavity. *Candida albicans* becomes pathogenic when the innate immunity of the patient is reduced as seen in the case of diabetes mellitus. Nowadays, denture stomatitis is defined as a mild chronic erythematous candidiasis, as erythema limited to the area beneath an upper

denture, with the presence of the denture as the only common etiological factor to these situations.

MATERIAL AND METHODS

The present study was carried out in denture wearers, who wear either complete or partial or fixed dentures with symptoms of denture stomatitis. Denture wearers with symptoms of denture stomatitis formed subjects for this study. Patients with other oral diseases such as mouth ulcer or other complications were carefully excluded from the study. Immunocompromised patients, patients with HIV infection, Hepatitis B are excluded from the study.

Glucose was estimated by Glucose Oxidase (GOD) and Peroxidase (POD) method (Trinder.P, 1969). Identification of various types of white blood cells present in the given blood sample by differential staining method. Absolute Neutrophil Count (ANC) Al-Gwaiz LA, Babay.H ,2007) is a measure of the number of neutrophil granulocytes (also known as polymorphonuclear cells, PMNs, polys, granulocytes, segmented neutrophils or segs) present in the blood. The ANC is calculated from

measurements of the total number of white blood cells (WBC), usually based on the combined percentage of mature neutrophils (sometimes called “segs,” or segmented cells) and bands, which are immature neutrophils. Erythrocyte Sedimentation Rate (ESR) was determined by Westergren method.

RESULTS AND DISCUSSION

A total of 40 test samples were collected and compared with similar age, sex and socio-

economic status matched controls. Patients with mild to severe denture stomatitis formed the test group. .

The Absolute Neutrophil Count is slightly higher in the test than the control. The ESR values were found to be highly significant when compared with the controls (p value < 0.01). The levels of blood glucose in Test samples were found to be very highly significant when compared with the controls. (P <0.001). The very high significant increase in the

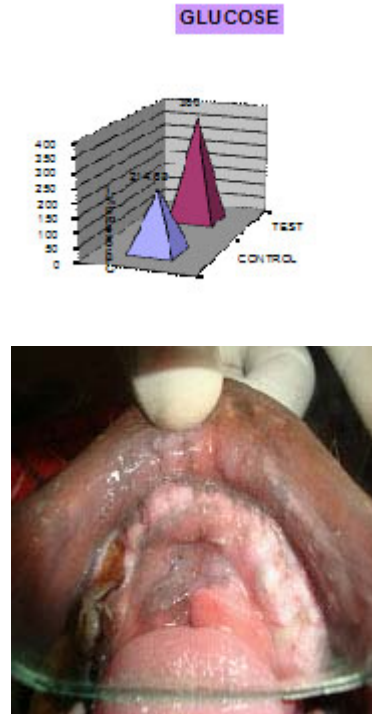
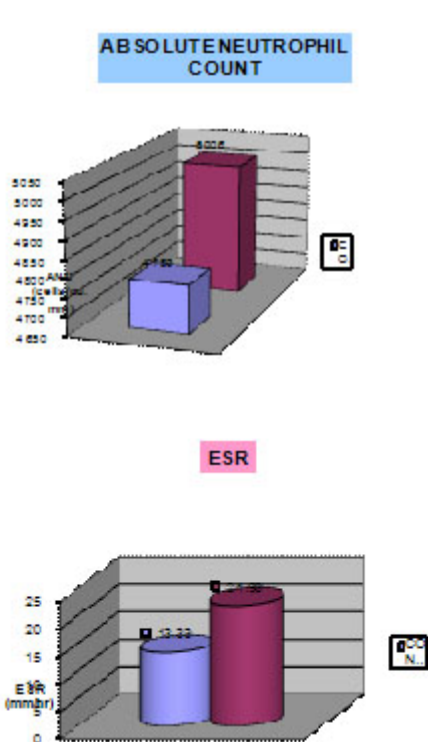
Table 1: Levels of absolute neutrol count,erythrocyte sedimentation rate and glucose in control and in test group

Particulars	Control	Test
Absolute Neutrophil Count (Cells/cu.mm)	4779.73 ± 1204.25	5006 ± 919.03
ESR (mm/hr)	13.33 ± 4.88	21.93 ±11.99*
Glucose (mg/dl)	114.47 ±36.33	182.20 ±86.83 **

Values are expressed as mean ± SD.Figures in parentheses indicate number of samples.

* - Statistically significant

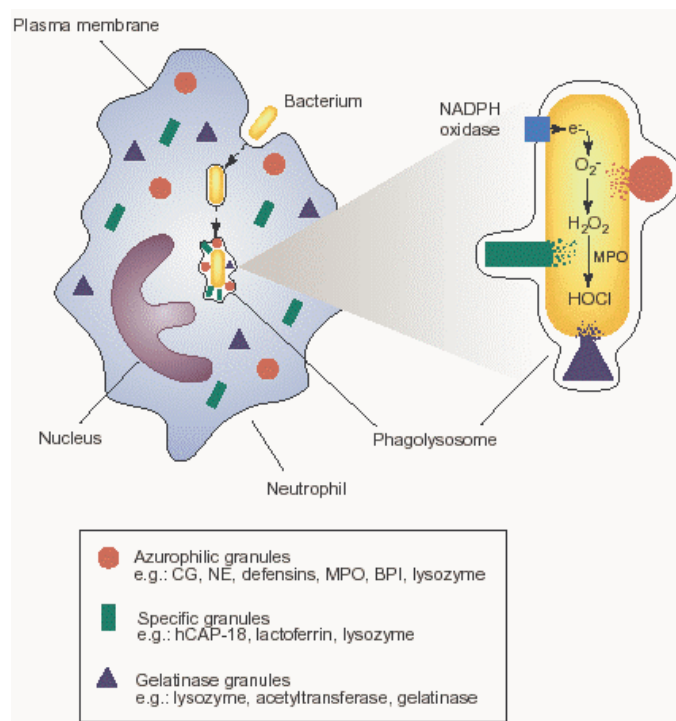
** - Statistically very significant



(Oral Candidiasis seen in a patient with stomatitis)

blood glucose levels was noticed in this study. This hyperglycemic condition was found to be associated with type II diabetes mellitus. Hyperglycemia resulting from type II diabetes mellitus is identified as a potential risk factor for Denture stomatitis. Hyperglycemia leads to the formation of Advanced glycation end products (AGEs) in the blood. The combined effect of reduced granulocyte function and increased susceptibility to *Candida* infection increases the potential risk of denture stomatitis in denture wearers with Type II diabetes mellitus. Various studies show that under hyperglycemic condition, associated with type II diabetes mellitus, glucose forms reversible glycation products with tissue proteins. Adherence of *Candida* to BEC is increased in hyperglycemic condition (Brownlee *et al.*). These Glycation end products attached to the host cell receptors increases the attachment of *Candida albicans* to the host's epithelial cells and increases the risk of infection (Sandin). *Candida* colonization in the oral cavity was found to be more frequent in patients who wear dental prosthesis (Baena –Monrov *et al.*). Non-insulin dependant type II diabetes could increase the chances of oral candidiasis due to decreased immunity

(Bartholomew G.A *et al.*, Iacoptnoam *et al.*). The course of infection is also more complicated in the patient group with type II diabetes mellitus. (Tekeli .A. *et al.*). The correlation between *Candida* induced denture stomatitis and type II diabetes mellitus is related to reduced immune resistance to *Candida* infection due to poor glycemic control (Ljubomir *et al.*). Hyperglycemia leads to alterations in the functions of the immune cells of the body. Especially, the functions of the polymorphonuclear (PMN) cells are impaired (Alexiewicz JM *et al.*). Hyperglycemia is associated with type II diabetes mellitus (Daniluk *et al.*). The presence of hyperglycemia and denture stomatitis indicates a strong positive correlation between type II diabetes mellitus and denture stomatitis in patients who wear dentures. People with type II diabetes mellitus stand a higher risk of developing denture stomatitis than the non-diabetics. Type II diabetes mellitus, also known as Non Insulin Dependant Diabetes Mellitus is identified as a major risk factor for Denture stomatitis (Drocka-Bobkowska *et al.*). Increased concentration of glucose in saliva is also found to be an important factor for oral candidiasis (Darwazeh *et al.*).



Mechanism of Phagocytosis

The Absolute Neutrophil Count is slightly higher in the test than the control. This may be attributed due to infection. Neutrophil, a type of Polymorpho Nuclear cell, which acts as a first line of defence against the entry of microorganisms inside the body, loses its normal functional ability under hyperglycaemic condition, seen in type II Diabetes Mellitus (Eisaku Ueta *et al.*). Neutrophils from diabetic patients show reduced adherence to the microbial cells (Bagdade *et al*, Anderson). Also other key functions of neutrophils such as chemotaxis, phagocytosis, oxidative burst and bactericidal activity are greatly reduced (Rayfield *et al*, Marhoffer *et al*, Repine JE *et al*). Polyols produced from glucose disrupts osmotic balance across the neutrophil cells and plasma and this also

influences the normal functions of neutrophils (Wilson *et al*).

The significant increase in the levels of ESR may be attributed to infection. Increase in levels of ESR is of greater clinical significance, as it indicted the existence of tissue inflammation or degeneration. The increase in ESR levels helps in assessing the prognosis. Chronic infection like denture related mucosal lesion is responsible for the elevation of ESR levels.

Age, immune status of the individual, oral hygiene, presence of any systemic disease like diabetes mellitus etc., influence the development of denture stomatitis.

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