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Research Article

Association between Neutrophil/Lymphocyte Level and Severity of Periodontitis among Saudi Adults Wearing Acceptable/ Inacceptable PFM Fixed Prosthesis

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Abstract

Chronic periodontitis, the commonest type of periodontal disease, is defined by the American Academy of Periodontology as "an infectious disease resulting in inflammation within the tissues supporting the teeth with progressive loss of attachment and bone". This process leads to pocket formation around the tooth and/or gum recession [1]. This definition is based on a model of infection and host response, which despite the extent of current knowledge on periodontal diseases; it is still inadequate for a diagnosis leading to a full classification grounded in the etiology of the disease [2]. In chronic periodontitis, the bacterial biofilm is assumed to be the etiological agent, implying that this disease is polymicrobial. In the community of bacteria beneath the gums, the gram-negative bacteria are recognized as periodontal pathogens [3] and studies that take into account variables linked to the genetics of both patients and these potential pathogens are likely to give a better insight into the etiology of periodontal disease [4].

The inacceptable fixed prosthesis if neglected for a period of time will cause at the start gingivitis, which in turn will increase in severity leading to periodontitis. Also, acceptable fixed prosthesis needs special hygiene measures, if not used the result will be the same.

The acceptability of fixed prosthesis has many criterions as: the place of the finishing line, the marginal adaptability, the external contour to mimic natural tooth, and the relation between pontic and ridge.

The aim of this study is to investigate the association between neutrophil/lymphocyte level and the severity of periodontitis. Data were collected from 100 systemically free patients having normal gingiva up to periodontitis, due to acceptable/ inacceptable fixed prosthesis which was done within 5 years.

Medical history, dental history, and periodontal parameters [bleeding on probing, probing depth, clinical attachment loss] were recorded.

Blood samples were collected to measure the neutrophil/lymphocyte level. The correlation between neutrophil / lymphocyte, the means of clinical attachment loss and bleeding on probing was significant. There was significant difference in the mean neutrophil/ lymphocyte level for individuals with different severity of periodontitis among males and females healthy patient.

Association between neutrophil/lymphocyte level and periodontal status was found. Further longitudinal studies with larger sample size are needed to investigate this association, and the effect of periodontal treatment on neutrophil level?

Keywords: *Periodontitis; Lymphocyte; Neutrophil; Gingival*

Introduction

There have been signs that periodontitis may contribute to chronic systemic disease. Thus, some results have revealed an association between periodontitis and atherosclerotic vascular disease (5–8). The explanation offered for this connection is that periodontal pathogens could circulate in the blood stream and promote damage to blood vessel-endothelium.

It is plausible that such damage occurs not only in the endothelia of the heart and brain, but also in kidney causing glomerulonephritis [9-11].

"While the eyes may be the window to the soul, our mouth is a window to our body's health" [12]. The state of your oral health can offer lots of clues about your overall health. Oral health may be defined as a standard of health of the oral and related tissues which enables an individual to eat, speak and socialize without active disease, discomfort or embarrassment and which contributes to general wellbeing [13,14].

Fixed prosthodontics is considered the sensitive art for oral health, as fixed prosthesis will restore function and esthetic of the patient, if it is done by profession and the hygiene measures are considered. Meanwhile, if it is inacceptable or the hygiene measures for acceptable prosthesis were neglected, it will be the sort of many diseases starting with gingival and periodontal diseases.

The acceptability of fixed prosthesis has many criterions as: the place of the finishing line, the marginal adaptability, the external contour to mimic natural tooth, and the relation between pontic and ridge.

Oral disease qualifies as major public health problems owing to their higher prevalence and significant social impact [15]. Oral health is considered as fundamental to general health and wellbeing. Oral health knowledge is considered to be an essential prerequisite for health related behaviour [16].

Health promotions in developing country like Nepal, where the geo-socio-political and economic factors offer meager and inadequate health care resources to its rapidly growing population, make this an uphill task [17]. Moreover, the low literacy rates (39.6 %) further weakens the effort [18]. Beside the previous correct/incorrect oral treatment, there are numbers of features namely diet, smoking, alcohol, hygiene, stress & exercise are linked to a wide range of important diseases forming the fundamental basis of common risk factor approach (WHO 2000) to prevent a range of conditions including oral diseases [19]. Among these, hygiene is the single most significant factor when it comes to the prevention of oral diseases, especially in the presence of fixed prosthesis. It is the primary concern of oral health educators to impart a positive oral health knowledge which derived from information to be translated into an action. Behavior is the outcome when that action is sustained. However, only a weak relation exists between knowledge and behaviour [20,21]. A neutrophil is a type of mature (developed) white blood cell that is present in the blood. White blood cells help protect the body against diseases and fight infections. Neutrophils are essential in protecting the body against diseases and infections by removing and destroying some types of bacteria, wastes, foreign substances, and other cells. Neutrophils accomplish this by eating these substances. They are the main type of white blood cell that protects the body in this way. Lymphocytes are small white blood cells that play a role in the body's immune response (that is, in the bodies fight against germs and diseases).

There are two main types of lymphocytes, known as B cells and T cells (also known as B lymphocytes and T lymphocytes). The B cells produce antibodies that attack foreign molecules (germs and the toxins they produce). The T cells are more complicated, but they can attack the body's own cells when they are diseased (for example, when the cells have been invaded by cancer or viruses). Substances secreted by lymphocytes (called lymphokines) contribute to inflammation. Wherever there is chronic inflammation in the body, lymphocytes are present.

Aim of the study

The aim of this study was to assess a suggested association between type of periodontal disease and neutrophil/lymphocyte level among adult males & females' healthy patients having acceptable/ inacceptable PFM fixed prosthesis causing difficulty of correct oral hygiene and irritation for oral soft tissue in the same time, in Kingdom of Saudi Arabia.

Materials and Methods

Study Design

The study was designed as patients based descriptive study utilizing different independent variables.

Study Population

Data were collected from 100 systemically free patients having PFM fixed prosthesis (age 20-60 years) with normal gingiva (control group), gingivitis, chronic periodontitis and aggressive periodontitis. Patients were advised of their role in this study and asked to provide informed consent. Age and gender were recorded for all participants. Extensive medical and dental histories were recorded for each patient. Patients with any systemic disorder that may affect the periodontal tissue (such as diabetes, pregnancy and immunological disorders), anaemic patient, and smokers were excluded from the study.

Clinical Examination

Full mouth examinations (excluding third molars) were conducted for all patients. Six sites were examined for each tooth at the inflamed gingiva (mesiobuccal, midbuccal, distobuccal, mesiolingual, midlingual, and distolingual).

Methods: Variables used to diagnose periodontitis were: (i) probing pocket depth (PPD), (ii) attachment loss (AL), (iii) bleeding on probing (BOP), (iv) plaque index (PI), and (v) extent and severity index and questioner about oral health.

Criteria for plaque index:

0 no plaque in gingival area
1 film of plaque adhering of free gingival margin & adjacent area of tooth
2 moderate accumulation of soft deposits within gingival pocket
3 abundance of soft matter within gingival pocket & or gingival margin

Criteria for the gingival index:

0 normal gingival
1 mild inflammation
2 moderate inflammation - redness, edema and glazing bleeding on probing
3 sever inflammation - marked redness and edema ulceration, tendency to spontaneous bleeding

Community periodontal index of treatment needs (CPITN):

0 deep pocket (>6 mm) black area of probe
1 shallow pocket
2 supra or sub gingival calculus
3 bleeding observe after gentle probing
4 healthy sextant

Criteria for treatment needs of CPTIN:

0 No treatment need (score 0)
1 Oral hygiene instructions (score 1)
2 1 + professional scaling (score 1 & 2)
3 1 + 2 + complex treatment (score 4)

Blood Analysis

Under aseptic conditions, the blood was taken into vacuum tubes and transported to a laboratory for CBC analysis processing within 4 hours after venipuncture, and neutrophil/lymphocyte concentration was measured.

Method of statistical analysis

The collected data were analyzed using (SPSS). The mean & standard deviation were calculated.

Results

Total of 100 healthy adult patients having fixed prosthesis acceptable or inacceptable are selected. They are divided into: 25 aggressive periodontitis, 25 chronic periodontitis, 25 gingivitis & 25 normal patients (control group). The control group patients have acceptable fixed prosthesis and trained for the oral hygiene measures. We want to compare between the level of lymphocyte & neutrophil with the changing in the severity of periodontitis, started with normal and then gingivitis, chronic periodontitis & aggressive periodontitis.

The level of neutrophil & lymphocyte with normal group is within the normal range 32.13%, but when we take gingivitis the level of neutrophil reduce 10.07% & lymphocyte level still stable within the normal range 41.07%, the next category of periodontitis (chronic) the neutrophil level decreased more than gingivitis category & lymphocyte level increased 42.28%, the last but not least neutrophil level is -0.67% with aggressive periodontitis & lymphocyte level 44.80% (as in tables).

Neutrophil						
	Female		Male		Total sample	
	Mean	SD	Mean	SD	Mean	SD
Normal	33.59%	0.396995	31.16%	0.386661	32.13%	0.382703
Gingivitis	1.28%	0.4698	19.59%	0.48531	10.07%	0.47647
Chronic periodontitis	6.73%	0.39291	24.12%	0.46829	1.24%	0.46672
Aggressive periodontitis	23.15%	0.296784556	16.99%	0.452616745	-0.67%	0.434762552

Lymphocyte						
	Female		Male		Total sample	
	Mean	SD	mean	SD	Mean	SD
Normal	46.06%	0.08329	43.01%	0.05989	44.23%	0.08329
Gingivitis	42.73%	0.09304	39.28%	0.0949	41.07%	0.09304
Chronic periodontitis	45.21%	0.097959	38.55%	0.090814	42.28%	0.097959
Aggressive periodontitis	48.45%	0.085146932	41.93%	0.085796206	44.80%	0.085146932

Neutrophils and Neutrophil Count: This is the main defender of the body against infection and antigens. High levels may indicate an active infection.

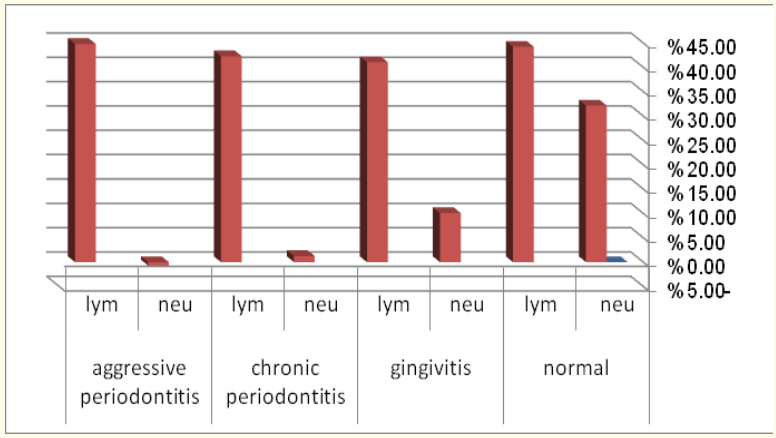
Normal Adult Range: 48 - 73 %

Optimal Adult Reading: 60.5

Lymphocytes and Lymphocyte Count: Elevated levels may indicate an active viral infection such as measles, rubella, chickenpox, or infectious mononucleosis.

Normal Adult Range: 18 - 48 %

Optimal Adult Reading: 33



Discussion

The current study investigates the correlation between neutrophil / lymphocyte level and the severity of periodontitis in systemically adult healthy patients having acceptable / inacceptable fixed prosthesis.

As a dentist, why is it important to understand white blood cells?
While it is recognized that periodontal diseases and other oral infections are caused by bacteria, in actuality it is the patient's own immune system and his hygiene measures.

Fixed prosthesis is a sensitive procedure which needs a professional skill to be acceptable for patient's oral health and also needs special hygiene measures to protect the oral cavity from bacterial invasion. There are many criterions for fixed appliances to be acceptable as: the position of the finishing line in relation to the gingival margin, the adaptability of the prosthesis to the finishing line, the external contour of the prosthesis to mimic the natural teeth, and the relation between pontic and the gingiva over the ridge. On the other hand it's very important to educate patients for better oral hygiene measures.

Neutrophils, the key white blood cells of the innate immune system, are responsible for detecting and eliminating the microbial invaders that make their way into the body.

These cells which are loaded with extremely toxic enzymes called proteases are also responsible for the damage caused during the prolonged inflammatory phase which occurs when they become hyperactive or chronically activated by bacterial stimulus or immune regulators.

Recent dental research has focused on translating our knowledge about these cells into diagnostic and treatment advances. In this brief study we will highlight on the effects of oral hygiene measures for fixed prosthesis and inacceptable prosthetic appliances over the gingival and periodontal health. The key immune cells will be affected due to periodontal health affection and so, the periodontal researches must be focused on using this knowledge to develop novel diagnostic tools and novel treatment approaches for periodontal diseases.

The level of neutrophil & lymphocyte with normal group is within the normal range. The level of neutrophil decreases from normal category until last category of study aggressive periodontitis, but the lymphocyte increases.

Conclusion and Recommendation

Association between neutrophil, lymphocyte levels and periodontal status was found.

Fixed prosthetic appliances must be done with great skill and the patient must be instructed about oral hygiene measures for this appliance.

Further longitudinal studies with larger sample size are needed to investigate the association between neutrophil levels and different types of periodontitis, and the effect of periodontal treatment on neutrophil/lymphocyte level.

Recognize the benefit of check up by CBC analysis, for patients before they start their dental treatment.

Figures showing different inacceptable fixed prosthetics.

Bibilography

1. American Academy of Periodontology. "International workshop for a classification of periodontal disease and conditions". Annals of Periodontology 4 (1999): 1-112.

2. Armitage GC. "Classifying periodontal disease - a long-standing dilemma". *Periodontology 2000* 30 (2002): 9-32.

3. Nishihara T and Koseki T. "Microbial etiology of periodontitis". *Periodontology 2000* 36 (2004): 14-36.

4. Kinane D and Bouchard P. "Periodontal diseases and health: consensus report of the sixth European workshop on Periodontology". *Journal of Clinical Periodontology* 35. Suppl 8 (2008): 333-337.

5. Jansson L., *et al.* "Relationship between oral health and mortality in cardiovascular diseases". Journal of Clinical Periodontology 28 (2001): 762-768.

6. Josiphura K and Ritchie CS. "Strength of evidence relating periodontal disease and cardiovascular disease". *Inside Dentistry* 2 (2006): 1-9.

7. Sim SJ., *et al.* "Periodontitis and the risk for non-fatal stroke in Korean adults". *Journal of Periodontology* 79 (2008): 1652-1658.

8. Tuominen R., "Oral health indicators poorly predict coronary heart disease deaths". *Journal of Dental Research* 82 (2003): 713-718.

9. Kshirsagar AV., *et al.* "Periodontal disease is associated with renal insufficiency in the atherosclerosis risk in communities (ARIC) study". *American Journal of Kidney Diseases* 45 (2005): 650-657.

10. Scannapleco FA and Panesar M. "Periodontitis and chronic kidney disease". *Journal of Periodontology* 79 (2008): 1617-1619.

11. Fisher MA and Taylor GW. "A prediction model for chronic kidney disease includes periodontal disease". *Journal of Periodontology* 80 (2009): 16-23.

12. http://www.wm.edu/offices/hr/benefits/ccommonnhealth/oralhealth/index.php.

13. Department of health. An oral health strategy for England, London: department of health (1994).

14. The World Oral Health Report 2003. "Continuous improvement in the oral health in the 21st century- the approach of the WHO Global Oral Health Programme.

15. Stalla Y., *et al.* "Health-promoting schools: an opportunity for oral health promotion. 85 (2005): 677.

16. Al-Ansari J., *et al.* "Oral health knowledge and behaviour among male health sciences college students in Kuwait". *BMC Oral Health* 3 (2003): 2.

17. Yee R and Mishra R. "Nepal National Oral Health Pathfinder Survey 2004. Kathmandu, Nepal: Oral Health Focal Point; Ministry of Health; HMG Nepal, 2004; final report iii- vi, viii- xi.

18. Total Literacy Rate. "Census of Nepal". (2001).

19. Sheiham A and Watt R. "The common risk factor approach: a rational basis for promoting oral health". *Community Dental Oral Epidemiology* 28 (2000): 399-406.

20. Freeman R., *et al.* "The relationship between health related knowledge, attitudes and dental health behaviour in 14-16 year old adolescents". *Community Dental Health* 10 (1993): 397-404.

21. Kay EJ and Locker D. "A systematic review of the effectiveness of health promotion aimed at improving oral health". *Community Dentistry and Oral Epidemiology* 26 (1998): 132-144.

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