

A STUDY ON DANTAMULAGATA ROGA W.S.R.TO PERIODONTAL DISEASES AS ORAL MANIFESTATIONS IN MADHUMEHA (DIABETES MELLITUS)

Ekta¹, Sharad Bhatnagar², Kuldeep Chaudhary³, Mahendra Prajapati⁴, Kamalesh Kumar Sharma⁵

¹M.D.Swasthvritta, R.O.(Ayu) RARI, Guwahati, Assam, India

²B.D.S., M.O., Deptt. Of Shalakyta Tantra, NIA, Jaipur, Rajasthan, India

³M.D. Kaumarbhritya, R.O.(Ayu) RARI, Guwahati, Assam, India

⁴M.D. Kriya Sharir, Associate Professor, Department of Kriya Sharir, NIA, Jaipur, Rajasthan, India

⁵Ph.D Ayu, Professor & HOD Swasthvritta Evam Yoga, NIA, Jaipur, Rajasthan, India

Email: dr.ektadogra@gmail.com

ABSTRACT

Diabetes and Periodontal diseases both are chronic disorders. Diabetes is considered as an important risk factor for severe periodontal diseases. The purpose of this survey study was to observe the prevalence of *Dantamulagata roga* (Periodontal Diseases) in Diabetic patients at N.I.A. Jaipur. It was a cross sectional study. The sample size was 405 known diabetic patients. Diabetic patients were screened on the basis of inclusion and exclusion criteria. They were assessed on the basis of symptoms of *dantamulagata roga* given in Ayurveda text, for their grading simplified oral hygiene index by Greene and Vermilion, Gingival Index Leo and Silness and periodontal Index by Russell al scales were used. The duration of study was 2 years and 78 days. It was seen that 69.8 % of diabetic patients had moderate gingivitis and 17.5% had severe gingivitis. Diabetic patients are prone to *krimidanta roga*, *daurgandhya* and *pida*.

Keywords: Gingivitis, Periodontal Diseases, Periodontitis, Diabetes mellitus, Cross-sectional study

INTRODUCTION

Oral health is a good indicator for overall wellbeing and quality of life. In modern science mouth is considered as window into the health because signs of nutritional deficiencies or general infections, systemic diseases may first become apparent due to mouth lesion or other oral problems. Many references are also described in Ayurveda where oral manifestations are mentioned as prodromal and main symptoms such as prameha in which increase in plaque formation explicates as prodromal symptom. In contemporary science

plaque formation is the key factor for periodontal diseases and its formation is influenced by diet, age, salivary factors, oral hygiene, systemic diseases and host factors. There are evidences demonstrating Diabetes mellitus as a risk factor for the impairment of periodontal health. The inflamed periodontal tissue may serve as a chronic source of bacteria, bacterial products and many inflammatory mediators such as TNF- α , IL6, and IL1 that have been shown to have important effects on lipid and glucose metabolism.¹

There is strong evidence that the prevalence, severity and progression of PD are significantly higher in people with Diabetes mellitus.^{2,3} Keeping these points in mind this survey study was conducted on Madhumeha (Diabetes mellitus) patients.

Aim and Objectives:

To study the prevalence of *Dantamulgata roga* (Periodontal Diseases) in Diabetic patients attending O.P.D. and I.P.D. at N.I.A. and S.S.B.H. Jaipur

Institutional Ethics Committee Clearance: Proposed study was approved by IEC, Oder No. IEC/ACA/2016/44 dated 29-08-2016

Patients and Methods:

Sources of data: The data were collected from O.P.D./I.P.D. of N.I.A. and S.S.B.H. , Jaipur city, Rajasthan.

Research design: Single observation study

Method of data collection:

Sampling procedure: The samples were registered from the OPD/IPD of NIA Jaipur city. A proforma was filled by scholar after interview and examination of the patients .The description of the study design is given below:

Section A: Questionnaire to assess the demographic profile.

Section B: Questionnaire about the sign and symptoms of Dantamulgata roga according to Ayurveda

Section C: Questionnaire to assess the periodontal diseases according to modern science. Some scales were selected for this purpose.

Sample size: The sample size for this study was 405 diabetic patients.

Selection of cases: For the selection of patients screening was done. Total 2000 patients attending the OPD and IPD of NIA were screened to get 405 pa-

tients. They were screened on the basis of inclusion and exclusion criteria.

Inclusion criteria

1. Patient willing to give informed consent
2. Patients of either sex with age between 18 to 70 years.
3. Patients with Type 2 Diabetes mellitus.

Exclusion criteria

1. Patients having Type 1 Diabetes mellitus
2. Pregnancy induced diabetes

Criteria for assessment:

- Following symptoms were assessed in 405 volunteers and scales:
- The symptoms were taken from datntamulgata roga explained under different ayurved text and for their grading scales were selected from book essentials of clinical periodontology & periodontics.

CRITERIA FOR ASSESSMENT/ SCORING PATTERN

- **Simplified Oral Hygiene Index by Greene and Vermillion (1964)**

Debris Index – Simplified (DI-S) - Debris Index Simplified

Debris Index – Simplified (DI-C) - Calculus Index Simplified

OHI-S = DI-S+ CI-S

- **Gingival index leo and silness (1963)⁴**
- **Periodontal Index by Russell al (1956)⁵**

All teeth present are examined. All of the gingival tissues surrounding each tooth are assessed for gingival inflammation and periodontal involvement.

PI score = Sum of individual scores/ Number of teeth present

Table 1: Prevalence of dantagata roga in diabetic patients

Diagnosis	No. (405)	%
<i>Shitaad</i>		
<i>Daurgandhya</i>	130	32.1
<i>Krishan</i>	73	18.0
<i>Prakleda</i>	70	17.3
<i>Mridu</i>	67	16.5
<i>Dantapuputta</i>		

<i>Dantyostrishu shotha</i>	56	13.8
Pida	180	44.4
Dantavaishtaka		
<i>Srawyanti puya and rudhira</i>	22	5.4
<i>Chaladhanta</i>	29	7.2
Shaushira		
<i>Shwayathu danta mula</i>	31	7.7
<i>Rujawan</i>	32	7.9
<i>Lalasrawi</i>	29	7.2
<i>Mahasaushir</i>	0	0.0
<i>Kandu yukta shotha</i>	15	3.7
Mahasaushir		
<i>Danta chalanti</i>	18	4.4
<i>Talu vadhiryate</i>	0	0.0
<i>Danta Mansa Pachana</i>	2	0.5
<i>Mukha pida</i>	6	1.5
Vaidharbha		
<i>Ghrishteshu dantamuleshu sarambh</i>	28	6.9
<i>Chala danta</i>	14	3.5
Vardhana		
<i>Tivra vedna</i>	19	4.7
<i>Vardhana ke pashchat swayam shant ho jatah</i>	0	0.0
Adhimansa		
<i>Hanu sandhi ke paas / Anta me shotha</i>	9	2.2
<i>Tivra vedhna</i>	8	2.0
<i>Lalasrawa</i>	13	3.2
Paridhar		
<i>Danta mansa shiryante</i>	10	2.5
<i>Ashthivati chapyasrika</i>	11	2.7
Upakusha		
<i>Vaishteshu daah</i>	11	2.7
<i>Paaka</i>	10	2.5
<i>Danta chala</i>	13	3.2
<i>Shonita prasaravana</i>	17	4.2
<i>Manda vedna</i>	10	2.5
<i>Aadhmana</i>	9	2.2
<i>puti mukha</i>	10	2.5
Others		
<i>Danta Nadi</i>	37	9.1
<i>Danta Vidradhi</i>	15	3.7
Krimidanta	252	62.2
<i>Chala danta</i>	27	6.7

DISCUSSION

Incidence of age: Survey study shows that About one third of subjects were between 41-50 years (29.9%)

followed by >60 (29.1%), 30-40 (24.2%) and 51-60 (16.8%) years. According to modern medicine periodontal diseases is more prevalent in adult age group.

This fact can be supported by the WHO Global Oral Health Data Bank which indicates that symptoms of periodontal disease are highly prevalent among adults in all regions. In a systemic review done by Harlan J Shiau, Mark A. Reynolds, it was seen that sex exhibited a significant association with prevalence. After data analysis they found that there was 9% difference between males and females (37.4% versus 28.1%, respectively).⁶ This supports the observation of present survey study in which maximum of patients were male. The reasons for these sex differences are not clear, but they are thought to be related to the ignorance of oral hygiene, which is usually observed among males.^{7,8} This support the observation of present clinical trial in which more than half of patients in both Group A (63.6%) and Group B (51.2%) were males and 53.8 % were male in survey study.

Incidence of religion: Majority of patients in survey (72.8%) subjects were Hindu. This signifies the demographical dominance of the community in the region of Jaipur.

Incidence of marital status: All the patients of survey study (99.3%) were married. The one reason for this is patients belonged to more than 30 years of age. Second reason for the prevalence of this condition in married couple because they may have similar social habits, similar oral health perceptions, and similar patterns of periodontal disease.⁹

Incidence of socioeconomic status: The majority of cases registered in survey study i.e. (64.9%) belonged to middle class. In most epidemiological studies carried out globally, significant relationship was between socioeconomic status and periodontal diseases have been observed i.e. low income and low education contributes to poor periodontal disease status.¹⁰

Incidence of education status: The educational status incidence was highest in secondary, illiterate and followed by primary with number of patients 115 patients (28.4%), 95 patients (23.5%) and 92 patients (22.7%) respectively. This fact can be supported by the study conducted by Department of Health Education and Welfare, according to this study periodontal disease has a reciprocal relationship with educational level. The higher the educational level, the lower the periodontal diseases. Several studies involving different

racial populations have found some difference in the expression of periodontal disease¹¹

Madhumeha and dantamulgata roga

Madhumeha and dantamulgata dosha are interlinked. In purva rupa of prameha danta mala vriddhi is given in sushruta samhita. Other than this nothing is mentioned regarding danta and dantamulgata roga while describing prameha and madhumeha. The possible reason behind that the drugs used for prameha and madumeha have katu, tikta and kashaya rasa. These rasa have the properties opposite to the kapha dosha. Various procedures are in practice in order to maintain oral hygiene i.e. danta dhawana, jihwanirlekhana, gandusha, kawala, and aachmana etc. Due to these reasons it is possible dantamulgata roga were less prevalent or absent in patients of prameha and madhumeha.

Relation between dantamulgata roga and madhumeha:

Nidana: Aaharaja nidana has similarity in dantamulgata roga and prameha roga. Dadhi, dugdha, animal flesh (anoop mansa), ikshu and fanita are involved in both pathologies.

Dosha: kapha dosha

Dushya: Rakta, mansa,

Updrava: *Alji* and vidradhi are given in updrava of prameha. Vidradhi is one of the dantamulgata roga. Specific site of vidradhi is not mention in samhita while describing updrava of prameha.

Kapha is the main dushya of Prameha: According to sushruta samhita amashya is the main site of kapha. From this kapha other kapha get nourished due to its udaka karma. In prameha Due to the similarity in the nidana, dosha and dushya; kapha (amashyagata) and rasa dhatu get vitiated in prameha.¹² This may attribute to talu, jihva and kantha shosha, and trishna. According to modern science these symptoms may occur due to presence of high levels of glucose in blood increases plasma osmotic pressure, which results in tissue dehydration all over the body including mouth. Decreased secretion of saliva adds to the problem of xerostomia.¹³

Multiple epidemiologic studies have suggested that xerostomia is frequent among DM patients. In addition, there are studies that have showed that DM pa-

tients presented lower salivary flow rates than non-DM population.¹⁴ These salivary disorders could be associated with a poor quality of life and could increase the susceptibility to caries and oral infections in DM patients, particularly when there has been dehydration and inadequate blood glucose control¹⁵. DM is probably the most frequent metabolic disease with salivary implications, due to its high frequency. Role of saliva in the host defense¹⁶:

1. It act as vehicle for swallowing bacteria
2. It inhibit the attachment of bacteria
3. It performs bactericidal function by the peroxidase system and lysozyme.

Due to presence of xerostomia these functions of saliva get hampered and may lead to various infections and other pathologies. Danta mala vriddhi occurs in prameha it is described in sushruta samhita. This mala can be correlated with plaque. Dental plaque is the mass of bacteria that grows on surfaces within the mouth; often present on the teeth. These bacteria are also common causes of gingivitis.¹⁷ Ropana is one of the functions of kapha.¹⁸ In prameha kapha is vitiated so it is unable to perform its normal function. This may be the cause of recurrent infection in diabetics. This can be supported with this evident diabetics have an altered response to wound healing and an abnormal immune response. Fibroblast function is impaired due to the high levels of glucose, and collagen availability is decreased by higher levels of the proteins that degrade collagen.¹⁹ The decreased fibroblast function and collagen availability alter the healing response in diabetics.

Prameha pidika: Alagi and vidradhi are explained as upadhrava but site is not mentioned. These prameha pidika can be correlated with periapical abscess. Diabetes is susceptible to oral sensory, periodontal and salivary disorders, which could increase their risk of developing new and recurrent dental caries. These caries can in turn lead to periapical pathologies like periapical abscess, which is an acute condition presenting as a round to oval pus filled swelling in the alveolar mucosa. It is an extremely painful condition and can lead to cellulitis.²⁰ On this basis it can be concluded that dantamulagata and madhumeha pathologies are interlinked.

Diabetes and Periodontal Disease

Diabetes mellitus and periodontal disease are two common chronic diseases. According to several research studies, both diseases are biologically interconnected.²¹ Periodontal disease is a result of microvascular complication of diabetes mellitus. Periodontal disease has been labeled as the “Sixth Complication” of diabetes.²² There is evidence showing that diabetes is a risk factor for gingivitis and periodontitis.^{23,24} Periodontal disease is clearly a clinical manifestation associated with several systemic diseases including diabetes.²⁵

Gram negative anaerobic bacteria in periodontal pockets and gingival sulcus, stimulate the immune system and consequently release inflammatory mediators. These mediators get into the bloodstream and increase inflammation present in diabetes and interfere with blood glucose levels’ regulation, leading to development and aggravation of diabetic complications.^{26,27}

Karjalainen and Knuutila had suggested that hyperglycemia impairs overall cell function, as insulin is required for glucose to enter cells to provide a source of energy. It also decreases PMN cell chemotaxis, phagocytosis and intracellular killing of bacteria. The ability of glycosylated hemoglobin to carry oxygen would be impaired, thereby decreasing tissue oxygenation. Hyperglycemia induces blood flow abnormalities including increased blood viscosity, reduced erythrocyte deformability, and increased platelet aggregation, which further enhance tissue hypoxia. All these factors result in increased periodontal destruction.²⁸ A direct causal relationship in DM acts as a modifier of PD. The advanced glycation end products (AGEs) formed as a result of hyperglycaemia / hyperlipidemia can act in two ways – by binding to receptors, which can transform macrophages to produce proinflammatory cytokines such as interleukin-1 (IL-1), IL-6, and tumour necrosis factor- α (TNF- α). Formation of AGEs results in collagen accumulation in the periodontal capillary basement membrane, causing membrane thickening.²⁹ This increases the thickness of the vessel walls and decreases tissue perfusion and oxygenation. These morphological changes could be responsible for the increased susceptibility to infec-

tions, vascular changes, and impaired healing, commonly associated with diabetics. The increase in pro inflammatory cytokines in the periodontal tissues could also explain the increased tissue destruction. Diabetes mellitus and periodontal diseases are closely linked chronic diseases with similarities in pathobiology. Inflammation is the key point association.³⁰

The studies conducted by Shetty *et al*³¹ Alastair *et al*³², bee *et al*³³ and Walters *et al*³⁴, Alastair *et al*³⁵ in a comparison of neutrophil functions in diabetic and healthy subjects revealed defects in neutrophil functions in diabetic individuals as measured by chemotaxis, phagocytosis, microbicide function, and super oxide release. This fact was concluded that impaired neutrophil chemotaxis, defective phagocytosis of *Porphyromonas gingivalis* (an important periodontal pathogen) by neutrophils, and the intracellular killing capacity of neutrophils was reduced in diabetic patients and the super oxide released by diabetic neutrophils was drastically increased. Hence, these mechanisms could make a diabetic patient more susceptible to periodontal diseases.

Periodontal disease results from an immune response of an individual to chronic infection of gram-negative bacteria, which leads to the destruction of the periodontal tissues, including the gingiva, periodontal ligament and alveolar bone. Risk factors for periodontal disease include the presence of specific subgingival microorganisms, smoking and diabetes mellitus.³⁶

CONCLUSION

In present survey 405 diabetic patients were assessed. It was found that 354 patients were suffering from dantamulgata roga and rest of patients also had symptoms of oral manifestations like halitosis, pain in gums etc. it shows the association of dantamulgata roga and madhumeha.

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