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Assessment of periodontal status of sickle cell anemic patients of Rajnandgaon District, Chhattisgarh, India.

Dental Science

KEYWORDS: Polymorpho nuclear leukocytes (PMN), Community Periodontal Index (CPI),Loss of Attachment (LOA), Sickle cell disease(SCD),Sickle cell disease(SCD),Sickle Cell Hemoglobin(HbS) ,Sickle Cell Anemia(SCA),Sickle Cell Trait(SCT),Red Blood Cells (RBC).

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ABSTRACT

Microorganisms present in dental plaque are the main cause of periodontal disease which is affected by host microbial interactions, predominantly polymorpho nuclear leukocytes (PMNs) are decreased in number and function. Sickle cell anemia is one such condition which is associated with decreased resistance to infections, neutrophil abnormalities and microgiopathies. Hence, the aim of the study was to assess the periodontal status of Sickle cell anemic patients residing at Rajnandgaon district of Chhattisgarh state, India.A Cross sectional comparative study was conducted among sickle cell anemic patients attending Government district hospitals of Rajnandgaon, Chhattisgarh, India. A total of 304 sickle cell anemic patients aged 15 to 45 years were included in the study. They were compared with 304 non-sickle subjects of similar age group derived from normal population from the same area. Community Periodontal Index (CPI) and Loss of Attachment (LOA) were used to record the periodontal status.Among 304 (100%) sickle cell anemic subjects, 178 were males and 126 females. Majority of study subjects (33%) among sickle cell anemic patients had CPI score 2, and among non-sickle (34%) had CPI score 1. Pocket depth [CPI score 3 & 4] were statistically significant among sickle and non-sickle cell anemic patients.

Significant relationship between sickle cell disease and periodontal disease has been demonstrated in our study so appropriate dental care should be given to sickle cell anemic patient to improve oral health and quality of life.

INTRODUCTION

Sickle cell disease (SCD) is a broad term used to include a number of hereditary, autosomal recessive disorders and hematological conditions in which sickle cell hemoglobin (HbS) is present, which includes sickle cell anemia (SCA) and sickle cell trait (SCT).[1]

Sickle cell anemia is hemolytic anemia characterized by abnormally shaped (sickled) red blood cells (RBCs), which are removed from the circulation and destroyed at increased rates, leading to anemia. The underlying abnormality in the RBC of SCA is the presence of abnormal HbS, which, when deoxygenated, becomes relatively insoluble and forms aggregates with other hemoglobin molecules within the RBC. These aggregates develop into long chains, which distort the RBC into a sickle shape and impair flow through vessels.[2,3]

The common clinical manifestations of sickle cell disease are vaso-occlusive crises, avascular necrosis, and osteomyelitis.[4] Hemoglobin S polymerization can lead to hemolysis, inflammation, cell adhesion, ischemia-reperfusion injury, infarction, endothelial dysfunction, increased superoxide production, and characteristic vaso-occlusive crises resulting from acute vascular obstruction and vascular dysfunction.[5]

Although oral problems were described in the literature, these are less common than other medical problems. Oral problems such as unilateral infarct of the mandible,pulpal necrosis, osteonecrosis, facial swelling, diastema, hypodontia, gingival enlargement, palatal pallor, increased risk for caries, osteomyelitis of the mandible, unilateral anesthesia, mid-facial overgrowth, and oro-facial pain, were reported.

Microorganisms present in dental plaque are the main cause of periodontal disease which is affected by host microbial interactions, predominantly PMNs are decreased in number and function. Sickle cell anemia is one such condition which is associated with decreased resistance to infections, neutrophil abnormalities and microgiopathies.

Sickle cell is the most common genetic disorder of the blood and is most frequently observed in the persons of African, Mediterranean, middle Eastern, Indian, Caribbean and Central American ancestry.

About 17% of population is affected with Sickle cell anemia in Chhattisgarh state of India. Hence this study was taken up to know the affect of periodontal health among the sickle cell anemic patients at Rajnandgaon district, Chhattisgarh.

MATERIALS AND METHODS:

A descriptive cross-sectional study was conducted to assess the periodontal status among sickle cell anemic patients of Rajnandgaon district, Chhattisgarh. Prior to the start of the study, the study proposal was submitted for approval and clearance was taken from the Ethical review board. Permission to conduct the study was obtained from the chief medical officer and also from medical superintendent of related hospitals. This survey was carried out using a self–designed format, which consisted of two parts- First part consisted of demographic information like name, address, age, occupation, address, informed consent. Second part comprises of Community Periodontal Index (CPI) and Loss of Attachment Index

(LOA) score. Pilot study: A pilot study was carried out in order to check the feasibility and validity of the study and also to assess the acceptability of the questionnaire. Pilot study assessment was utilized for sample determination, proper planning and execution of the main study protocol. By standardizing all the material and methods, the study was conducted considering a total of 93 sickle cell anemic subjects who fulfilled the selection criteria. Periodontal status was assessed by CPI and LOA. Based on the observations of pilot study certain modifications were done for the main study. These 93 subjects who participated in the pilot study were not included in the main study.

Validity and reliability: Prior to the study intra examiner validation has been carried out. The method of examination and scoring was standardized. Intra-examiner reliability was 90%. The examination was carried out by a single examiner and data were recorded by an alert and co-operative recording clerk. The examination was carried out for a period of 5 months in the year 2012 and 2013.

Study setting: Rajnandgaon district is divided into five zones. They were north zone, south zone, east zone, west zone and central zone. Using simple random sampling technique (lottery method) one hospital was selected from each zone. Sickle cell anemic patients were included as a case while patients free from sickle cell anemia were included as a control. Subjects who gave written consent were included in the study and medically compromised patients were excluded from the study.

Statistical analysis: The collected data was tabulated using Excel 2007 and analysis performed using SPSS 16.0 version. Chi-square test and was used to test the significance. Level of significance was set at $P \leq 0.05$.

RESULTS

It was observed that majority of the participants in the study were in the age group of 25-34 years (sickle cell anemic 157 and Non- sickle cell anemic was 182). Majority of the participants were male. (Sickle cell anemic 178 and non sickle cell anemic were 179).

In the sickle cell subjects and non sickle cell subjects, 1824 sextant were recorded for the CPI score. Majority 606 (33.2%) of the sextant had score 2 (calculus) among sickle cell subjects while 597 (32.6%) of the sextant had score 1 (bleeding) among non sickle cell subjects . On comparing Loss of Attachment Scores it was found that in the Sickle group majority 1625 (89%) of the sextant had the score 0 (0-3mm). In the non Sickle cell anemic participants it was found that majority 1637 (89.7%) of the sextant had the score 0 (0-3mm).

There is no evidence of showing sickle cell participants having more CPI score than non sickling participant , as p-value found to be insignificant for HEALTHY, BLEEDING &CALCULUS. Findings shows that Community Periodontal Index (CPI) has a significant association for pocket [CPI score 3 &4] for sickling & non sickling participants. There is no evidence of showing sickle cell participants having more LOA score than non sickling participant, as p-value found to be insignificant.

DISCUSSION

In India, hemoglobinopathies, especially sickle hemoglobin are the commonest genetic disorders in the tribal belt of Central and Southern India. Undivided Madhya Pradesh (Madhya Pradesh and Chhattisgarh) harbors the largest tribal population in India, which is about one fourth of the total tribal population of the country. These tribal groups are characterized by their unique socio-cultural and religious practices and follow strict endogamous practice. These tribal populations are stated to be aboriginal population of India. Sickle hemoglobin was first discovered from a tribal population of Nilgiri Hills of South India in 1952. Later, it was reported from the tribal population of Central India i.e. Madhya Pradesh and Chhattisgarh and its surrounding areas falling in the states of Rajasthan, Gujarat, Maharashtra, Andhra Pradesh and Orissa. This led to an impression/ belief that sickle hemoglobin is confined to tribal populations/ belt. Later, in some tribal groups like Bhils of Jhabua district, tribal groups of Bastar and Pradhans of district Mandla, Halbas of districts of Rajnandgaon and Durg , the prevalence rate of sickle hemoglobin have been very high i.e. over 30 percent.

About 50% of world population of SCD cases is found in India. Estimates indicate that the trait is predominant among the tribal population of central India. The prevalence rate of this trait has been reported in Madhya Pradesh ranging from 10-30% among different castes and tribal groups. About 17% of population is affected with Sickle cell anemia in Chhattisgarh.

Sickle cell anemia can lead to many systemic complications especially in areas that are most compromised by hypoxia and infarction .The most frequent complications are joint pain, Haemolytic anaemia with jaundice, skin and mucosal pallor, leg ulcers, spleen and liver sequestration and infarction, haematuria, pulmonary dysfunction, osteomyelitis and stroke with headaches, convulsions and hemiplegia. Repeated splenic infarctions result in spleen hypo function with abnormalities in opsonisation, alternative complementary paths, antibody production, leukocyte function, and cell immunity. Although the oral manifestations are not exclusive to this disease, they may suggest a diagnosis of sickle cell disease.Mucosal pallor and yellowed discoloration of the gingiva result from the deposition of blood pigments secondary to hyper bilirubinemia caused by large-scale destruction of erythrocytes.

Periodontal diseases and Sickle cell Anemia in African Americans, periodontal disease was significantly greater. They concluded that there is higher percentage of periodontal disease involvement among African Americans with Sickle cell anemia which supported our result.Crawford has that suggested that SCD is not associated with increased levels of gingivitis and periodontitis in patients with SCD, they did not find any significant difference in alveolar bone loss pattern between patients and controls. This result was in concordance with our study.

In the present study the prevalence of subjects with healthy periodontium (score 0) decreased with age. A similar trend was seen for bleeding on probing (score 1), whilst calculus deposit (score 2) was the main problem in all the age group in sickle cell anemic patients. Arowojolu MO stated that no clinical periodontal disease was associated with sickle cell disease. This result was contradictory from our study. Higher statistically significant values of periodontal probing depths were observed in Sickle cell anemic patients as compared to non sickle cell anemic patients. However contradictory result was found in the study done by E. Guzeldemir et al which stated that there was no significant differences existed regarding the periodontal disease between patients with sickle cell disease and healthy individual.

CONCLUSION

Although oral health is not a priority for patients with SCD, it is supported by increased plaque accumulation. Because of the chronic anemic state of the patients with SCD, they should be encouraged to pay strict attention to oral hygiene instructions and practice. Also, early diagnosis of periodontal disease in sickle cell anemia will show productive & preventive benefits regarding Sickle cell crisis. One of the main goals of dentist should be to instill a positive attitude in the patient and parents toward maintaining good dental health and quality of life.

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