

Frequency And Associated Risk Factors of Dental Calculus Among Patients Aged Between 18 To 65 Years Reporting to Hayatabad Medical Complex and Khyber Teaching Hospital, Peshawar

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Abstract

Aims: Health is a condition of all bodily, mental, and social wellness and not only the lack of disease or illness. Oral health represents more than first-class teeth; it is connected to general health and essential for wellness. Often most of the oral hygiene conditions are mistreated by the patients until there are any major symptoms like bad oral hygiene; one among them is dental calculus. Dental calculus characterizes the calcified microbial plaque and is covered by non-calcified viable microbial plaque if not removed plaque will change into calculus after around 2 weeks. It affects patients with deprived oral hygiene, but with a higher frequency in males and in older ages.

Material and Method: A hospital based descriptive cross-sectional study to determine the frequency and associated risk factors of dental calculus among patients aged between 18 to 65 years reporting to Hayatabad medical complex and Khyber teaching hospital Peshawar, Pakistan. The duration of the study was from February 2019 to June 2019. Our data collection was through questionnaire and convenience sampling technique was applied.

Results: Among 361 patients, 295(81.72%) patients were affected with dental calculus, while the rest 66(18.28%) patients were not affected. Dental calculus was more common in males than females in our study. It was very common in old ages. There were 361 patients included in our study in which 90(24.93%) patients reported with subgingival calculus and 205(56.78%) patients were with supragingival calculus. Associated risk factors were cigarette smoking, patients having no knowledge about tooth brushing method like horizontal and vertical tooth brushing, Not using interdental brushing as a secondary method for plaque control, tooth brush with hard bristles, dental visits which were not common in the society and bleeding gums while brushing found in our study.

Conclusion: More than half of the patients were affected with dental calculus. Dental calculus was more common in males than females in our study. Associated risk factors were cigarette smoking, patients having no knowledge about tooth brushing method like horizontal and vertical tooth brushing, not using interdental brushing as a secondary method for plaque control, toothbrush with hard bristles, dental visits which were not common in the society and bleeding gums while brushing found in our study.

Keywords: Dental calculus, plaque, Analytical cross-sectional study

Introduction

Oral health is an essential part of general health and healthy life to be known to maintained during lifetime.¹ The oral health status of a community is generally determined by the presence or lack of dental decay and gums disease as well as the level of oral hygiene found in the

people.² This is because the fact that dental decay and gums disease are the most common oral disease of community health status acknowledged among the general population.³

Dental calculus has been considered as a main factor in the progression of dental decay and gums diseases and the decrease in its growth encourages oral health status. Two times daily tooth cleaning with toothpaste having fluoride and flossing eliminates biofilm from teeth and helps in the prevention and control of dental decay and gums diseases. In addition to such regular oral carefulness, regular appointments to the dentist promote oral well-being.⁵

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Dental plaque hardens into calculus. The word calculus comes from the Greek "Calcis," which refers to a variety of stones. This eliminated a number of terms from use recently, such as "calculate" (use stones for mathematical reasons) and "calculus."⁶

Dental calculus characterizes the calcified microbial plaque and is covered by non-calcified viable microbial plaque if not removed plaque will change into calculus after around 2 weeks. The evidence is rising in the literature that dental calculus makes an ideal rough surface for plaque adherence and consequent calcification. Therefore, dental calculus is the leading secondary etiological factor that cause periodontal diseases.⁷

In all over the world the adult population is mainly affected from dental calculus. Dental calculus is a mineralized dental plaque, composed mainly of calcium phosphate mineral salts added between and within leftovers of previously sustainable microbes. A viable dental plaque shields calcified calculus depositions. Levels of calculus and site of creation are community related and are affected by oral hygiene lifestyles, entrance to specialized carefulness, nutrition, age, traditional origin time since previous dental brushing, systemic disease, and the use of recommended medicines.⁸

So, the main aims of the predictable source associated treatment are the elimination of these microbial colonies along with the calculus deposits, in order to preserve a biologically suitable root surface.⁷ Dental calculus buildups on teeth due to unprocessed ingredients from saliva and gingival crevicular fluid. The pathogenic cells in dental plaque are destroyed by this kind of accumulation, however, the rough, porous surface provides an ideal environment for plaque advancement,⁶

Dental calculus progresses when non-calcified dental plaque exceedingly rich in oral microbes becomes calcified with calcium phosphate mineral salts. These calcified biofilms form together supra-gingivally and sub-gingivally. Non-calcified dental biofilm traps particles from the oral cavity, containing large amounts of oral microbes, human proteins, germs, and food debris, and reserves their genetic material.⁹

The main objective of this study was to find out the frequency and associated risk factors of dental calculus among patients aged between 18 to 65 years reporting to Hayatabad medical complex and Khyber teaching Hospital, Peshawar as there is limited research available on Dental calculus in Pakistan, Khyber Pakhtunkhwa so that the current study will provide some facts and figures on Dental calculus, and Its Etiologic Factors, which will be helpful to prevent this problem in the population of Pakistan in the future.

Methodology:

This was cross-sectional analytical research that employed non-probability sampling. The present study

comprised all patients who visited the dental departments of the Hayatabad Medical Complex and the Khyber Teaching Hospital in Peshawar and were between the ages of 18 and 65. The current study ran from February 2023 to June 2023, a period of five months. To gather information about the etiologic aspects of the condition, examination tools (such as a mouth mirror and probe) and questionnaires were used.

Results:

In current study 361 patients were examined to find the exact frequency of dental calculus. Among them 295 (81.72%) patients were affected with dental calculus, while 66 (18.28%) patients had no signs of dental calculus represented by Figure.3.1.

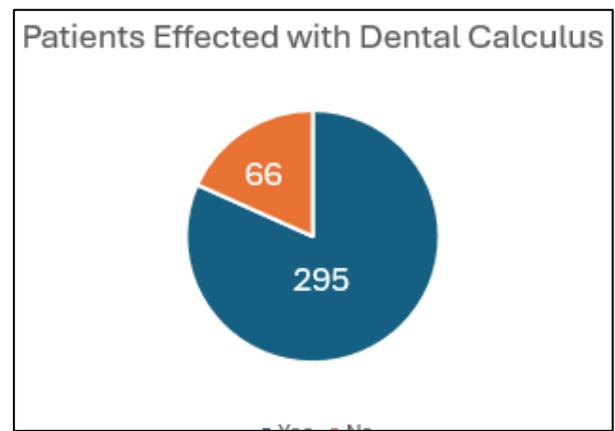


Figure: 3. Effected patients with Dental calculus

On the basis of gender, 203 (56.23%) patients were male and 158 (43.76%) were female total examined. In which 164 (80.78%) males were with dental calculus while 39 (19.21%) males were having no signs of dental calculus. Females with dental calculus were 131 (82.91%) while 27 (17.08%) were having no calculus. Represented in figure 3.2.

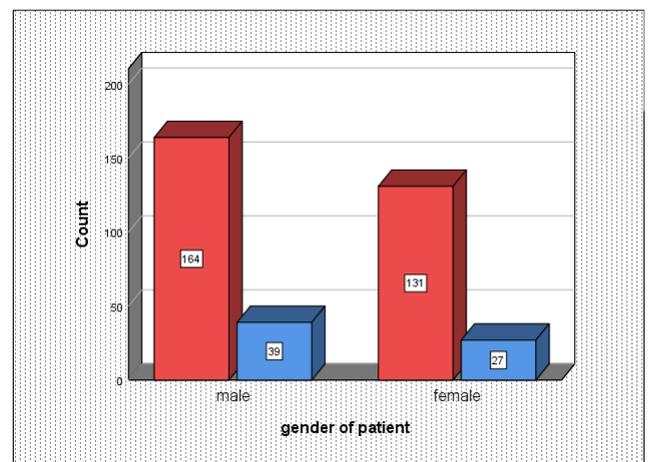


Figure3.: Dental calculus related with the gender of patients.

The patients were grouped age wise; there were 237(65.65%) patients aged 18 to 35 years, among them 188(79.32%) patients were affected with dental

calculus while 49(20.67%) patients were not affected. There were 86(23.82%) patients aged 36 to 49 years, among them 71(82.55%) were having dental calculus while 15(17.44%) patients were not affected. Another group was having patients aged 50 to 65 years, total patients were 38 (10.52%), in which 36(94.73%) patients were reported with dental calculus, while 2 (5.26%) patients were on preventive side. Overall prevalence of dental calculus was higher (94.73%) in group aged 50 to 65 years, followed by group aged 36 to 49 years (82.55%), and group aged 18 to 35 years (79.32%)

When type of calculus was taken into consideration 90 (24.93%) patients had supragingival calculus while 205 (56.78%). The patients which were using toothbrush and toothpaste were 266 (73.68%) and among them 205 (77.06%) patients were having dental calculus, and 61 (22.93%) patients were not affected with dental calculus. Patients using toothbrush and powder were 26 (7.20%), among them 21(80.76%) patients were affected while 5(19.23%) patients were safe. Patients cleaning their teeth with fingers were 40 (11.08%), all of them 40 (100%) patients were having dental calculus while patients using other tools for cleaning were 29 (8.03%), all 29(100%) patients were reported with dental calculus.

Patients using toothbrush once a day, among them 90 (85.71%) patients were affected with dental calculus while 15(14.28%) patients were not affected. Patients using toothbrush twice a day were 106 (29.36%), among them 69 (65.09%) patients were having dental calculus, and 37 (34.90%) patients were not affected. Patients using toothbrush more than twice a day were 13 (3.60%), among them 6(46.15%) patients were involved in dental calculus while 7 (53.84%) were not affected. Patients using toothbrush sometimes were 69 (19.11%) among them 62 (89.85%) patients were involved in dental calculus while 7(10.14%) were not affected.

When asked about tooth brushing method, Patients used various methods and correlation of which is given in table 1.

Method of Brushing	Presence of Calculus		Total
	Yes	No	
Vertical	14	2	16
Horizontal	92	12	104
Both Methods	79	49	128
Don't Know	42	3	45
N/A	68	0	68
Total	295	66	361

When asked about texture of patient's toothbrush, 37(10.24%) patients were using hard textured toothbrush, among them 29(78.37%) patients were having dental calculus while 8(21.62%) patients were not affected. 100(27.70%) patients were using toothbrush with soft bristles, among them 72(72%) patients were affected with dental calculus while

28(28%) patients were not affected. Patients using medium textured toothbrush were 141(39.05%), among them 117(82.97%) patients were having dental calculus while 24(17.02%) patients were not affected. 15(4.15%) patients were those whose answer was don't know there was 9(60%) patients having dental calculus while 6(40%) were on safe side and 68(18.83%) patients it was not applicable. Figure.3.8 shows Dental calculus associated with toothbrush type used by patients.

Patients using dental floss as a secondary method for plaque control were 44 (12.18%), among them 21 (47.72%) patients were affected with dental calculus while 23 (52.27%) patients were not affected. Patients using interdental brush as a secondary method for plaque control were 58(16.06%), among them 49 (84.48%) patients were having dental calculus while 9 (15.51%) patients were not affected. Patients using toothpick were 117(32.40%), among them 91 (77.77%) patients were affected with dental calculus while 26 (22.22%) patients were not affected. 142 (39.33%) patients were not using any secondary method for plaque control.

When asked about bleeding gums while brushing, 192 (52.90%) patients were bleeding gums while brushing, among them 148(77.08%) patients were having dental calculus while 44 (22.91%) patients were safe. Patients having no problem of bleeding gums while brushing were 169(46.81%), among them 147 (86.98%) patients were affected while 22 (13.01%) were having no dental calculus.

When asked about smoking, 57 (15.78%) patients were smokers, among them 53 (92.98%) patients were having dental calculus while 4 (7.01%) patients were not affected. Patients not smoking were 265 (73.40%), among them 206 (77.73%) patients were affected while 59 (22.26%) patients were not affected with dental calculus. Former smokers were 39 (10.80%) among them 36(92.30%) were having dental calculus and 3(7.69%) were safe.

Discussion:

Dental calculus, also known as hardened dental plaque or tartar, is a complex microbial biofilm that has solidified and developed on the surfaces of teeth. Saliva and gingival crevicular fluid have also been known to contribute to the formation of this biofilm. In the current study we found out the dental calculus, which statistically discovered that 295 (81.71%) of patients were having dental calculus, while 66(18.28%) were not affected. A study in Saudi Arabia by Abdul-Haleem et al find out in their study the prevalence of Dental calculus as 87 to 90%, which strongly supported our findings.¹⁰ A survey of Norwegian people showed as 30% dental calculus which is much lower than our findings so it doesn't support our conducted study.¹¹ The higher prevalence of dental calculus in our study may be due to poor oral hygiene in our community.

In current study we detected that dental calculus was higher in males (55.6%) as compared to females

(44.4%). A study in Tanzania by L. C. Carneiro found out dental calculus as supragingival plaque (74%) and calculus deposits (56.9%) were higher in males than females which strongly supports our study.¹¹ Most articles concluded females as most targeted to dental calculus, like a study in Jeddah by Salma A. Bahannan, Somaya M. Elteley et al reveals that dental calculus was higher in females (53.1%) than in males (31.6%).¹² Which is in contrast with our study. This is due to chain smoking in males in our society and lack of education.

A study conducted in Sweden by Jan Bergstrom perceived that smoking is the major risk cause for dental calculus. He observed that the prevalence rates for current, former, and nonsmokers as 86%, 66%, and 65% respectively. The interpretation imply a great and independent connection between tobacco smoking and supragingival calculus deposition.¹³ We also found smoking as a risk factor for dental calculus, which is approved by the above article. This may be due to more devotion of dental plaque leading to calculus. After studying a few articles we didn't find any article regarding smoking which is in contrast with our study.¹⁴⁻¹⁵ On the basis of types of dental calculus, supragingival calculus was noticed with higher prevalence than subgingival calculus in our study. A study conducted in Sweden by Jan Bergstrom revealed that supragingival calculus occurrence was high than subgingival calculus, which supports our study. A study conducted by National Survey of Oral Health in United States revealed that among those who formed calculus, supragingival deposits were found in 25 percent to 30 percent and sub- gingival deposits in 40 percent to 55 percent.¹⁶ Which is not in favor with our study. On the basis of brushing frequency, patients using toothbrush less than twice a day were more affected with dental calculus than patients using toothbrush more than twice a day. This may be due to poor plaque control. A study conducted in Australia by L. A. Crocombe et al reveal that patients brushing their teeth more than or equal to twice a day showed less dental calculus than patients brushing their teeth less than twice a day. Which supports our conducted study. Talking about dental visits, patients visiting dentists only in problems were more affected with dental calculus than patients visiting dentists routinely. This may be due to not removing plaque on time from teeth surfaces. A study conducted in Australia by L. A. Crocombe et al reveal that patients visiting dentists only in problems were more affected with dental calculus than patients visiting dentist routinely. This article strongly supports our study.¹⁷ On the basis of age, older patients were more prone to dental calculus deposition in our study. This may be due to poor oral hygiene practice in old, aged patients. A study conducted in India by Suchetha Aghanashini et. al¹⁸ concluded that dental calculus deposition increases with increase in age of the patients, Which strongly supports our conducted study. A study conducted in Australia

by L. A. Crocombe et al.¹⁹ reveal that old, aged patients are less targeted by dental calculus, which is in contrast with our study

Conclusion:

Dental calculus was found to be a most commonly abnormality of the oral cavity. Almost every participant was found to be affected with dental calculus. Male were mostly affected. Older ages were mostly targeted. Supragingival calculus was most common, followed by subgingival calculus respectively. Risk factor found were cigarette smoking, scaling of teeth, teeth cleaning, cleaning tools, frequency of brushing, method of brushing, type of brush, frequency of changing toothbrush, control of plaque by secondary method. Because their "p" value was less than 0.05.

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Author Contributions

1. Kamran Shah- Data collection, and literature review
2. Junaid Khan - Literature review and Methodology of study
3. Bakht Nawaz- Original Draft and Data Interpretation
4. Abdul Basit- Manuscript review and Data Analysis
5. Nawaz - Conceptualization, and Manuscript review