Review Article

Prevalence of Periodontitis in Pakistan: a Systematic Review.

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Abstract

Objective: To determine the prevalence of periodontitis at the national and regional level across Pakistan.

Methods: Various databases, such as PubMed, Google Scholar, Pak Medi net and Eric were used for literature search. Keywords used were "Prevalence" and "Periodontitis" and "Pakistan" Prevalence of periodontitis in Pakistan, prevalence and/or periodontitis and/or Pakistan. The research methodology was done considering the PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) to extract and later analyze relevant studies. Joanna Briggs Institute (JBI) critical appraisal checklist was used for the quality assessment of all these included studies.

Results: Thirty studies were included that fulfilled the inclusion criteria and also reported the prevalence of periodontitis in the Pakistan. A total of 17,757 subjects were included in this systematic review from 30 studies. At the national level the total estimate of periodontitis was 56.62% (95% CI). The prevalence estimate of periodontitis (keeping 95%CI) was 37% from Punjab, 40% from Sindh, 20% from Khyber Pakhtunkhwa and 3% from Baluchistan. After collecting data from cities, we found that 12 studies were from Karachi, 8 studies were found from Lahore, 8 from Peshawar and 1 study each from Abbottabad , Multan , Jhelum , Quetta , Sialkot and Rawalpindi.

Conclusion: Based on our collection of data prevalence of periodontitis in Pakistan was found to be high. Therefore, we concluded that periodontitis is a serious disease that must be sorted out to improve the oral health conditions of the Pakistani population. This systematic review will help the health department for planning future health policies to address this disease in the country

Keywords: Periodontitis, Inflammation, Prevalence, Pakistan

Introduction

One of fundamental component of our general health and being well is oral health. Among different oral diseases, periodontitis affects greater populations among the developed and underdeveloped countries of the world. Prevalence is the first step to plan for the management of this disease at the community level and to know its trend. Periodontal diseases (PD) are predominant in the developing countries of the world, affecting 20-50% people internationally.[1]

Periodontitis is the condition of abnormally inflamed periodontal tissues. The most important cause is the invasion of bacteria that infects the roots of teeth and also leads to spread of infection along the surrounding gingiva. This results in gingival bleeding, formation of pus that further leads to gradual bone loss and supporting components of the teeth.[2] Frequency of periodontitis and gingivitis in all the age groups is high especially in those with risk factors like chronic medication, bad oral hygiene, diabetes, smoking, anxiety, stress and hereditary cause.[3] Plaque is the primary cause of any gum disease. The range of adolescents having heavy calculus deposits was from 35% to 70% in developing countries while in developed nations it ranged from 4% to 34%.[4] The American Academy of Periodontology (AAP) has given classification of periodontitis into different catagories.[5] Management of periodontitis is dependent largely on its risk assessment hence it is important to know its prevalence in Pakistan.[6]

Periodontitis has a strong association with certain factors such as low socio-economic status and poor access to healthcare services. Other health related problems include alcohol consumption, habitual smokers, increase intake of carbohydrates in diets.[7] After dental caries periodontitis is the second most frequent disease and is one of significant cause of tooth mortality among adults. This shows that it is a significant oral health issue in developing countries predominantly Bangladesh, Afghanistan, Kenya and Nigeria.[8] Hormonal changes can also lead to periodontal diseases in women.[9] Stress is also a contributing factor in PD, it diminishes the salivary flow which increases dental plaque accumulation.[10] One of the causes of periodontal disease in men is smoking which is common among low-income adults. Many studies have shown the relationship between, periodontal disease, tooth loss and osteoporosis.[11] The most common factors leading to tooth loss are dental caries along with periodontal diseases. In some cases, missing teeth can cause a significant structural and functional impairment and may lead to

periodontitis.[12] According to documented studies, periodontitis has been a burden through out the world on oral health, in fact it also harms the overall health and quality of life, particularly in underdeveloped countries.[13]

For the prevention of periodontitis and the provision of treatment, the analysis of global data about the prevalence of this disease is useful. This will lead to proper policy development and the allocation of financial and human resources.[14] However, it is shown from previous literature that the prevalence of periodontal disease in different age groups and in different income countries ranging from low to high has not been reported yet.

The extent of disease and its distribution in any particular region offers a unique way for planning strategies and designing public health policies for that area. A systematic review is the most vital research methods for calculating an accurate estimation of specific disease in a society.[15] Therefore in this study, a systematic review was planned to collect an evidence-based information about situation of periodontitis at national / regional level amongst the Pakistani population.

Methods

Search strategy: Literature was searched from 2009 to June 2021 in English language using search engines like PubMed, Google Scholar, Pak Medinet and Eric. Different search strategies were used, like "Prevalence" and "Periodontitis" and "Pakistan" Prevalence of periodontitis in Pakistan, prevalence and/or periodontitis and/or Pakistan. "Prevalence and periodontitis and Pakistan". Additional information was found from gray literature, google scholar, and research gate. Moreover, the reference lists of identified articles to explore further information about the prevalence of relevant studies was also explored.

Criteria for Inclusion and Exclusion: Only those studies that provided the information about the prevalence of periodontitis of any sex or age group in the Pakistani population were included. Those papers were excluded that did not provide any information about prevalence of periodontitis, also those articles that were not published in English language. We did not include review articles, book chapters, case reports and letters.

Data abstraction: After a preliminary search, we explored the abstracts of included articles for relevance and suitability to the study question of this systematic review. The next step was to obtain the full text of the included studies. Using a standardized form, extensive work was done for identifying duplication and abstraction of data from each study. The relevant information about the prevalence of periodontitis, its sample size, methods used and the year and place of study was documented.

Quality assessment: Independent reviewers then assessed the quality of the included studies. In order to check the risk of bias, a checklist of Joanna Briggs Institute (JBI) was used for critical appraisal.[16] It is a list composed of nine items and each parameter is assessed by marking I as yes, 2 as no and 0 as unclear or not applicable. The total score obtained from each study was presented in the form of percentages and then each study was classified according to the different levels of bias (low risk of bias if 80–100% items scored yes, high risk of bias if 20–50% items

scored yes, moderate risk of bias if 50–80% items scored yes as per JBI checklist).

Results

After detailed search of existing literature, the total number of studies incorporated were 4752 that were explored from search engines like PubMed (n=58), Google scholar (n=3520), and Eric (n=1180) (Table 1). The additional data found from other sources including gray literature were 1051 in number. For checking the duplication 'The Reference Management Software Package (Endnote X9)' was used which omitted 1251 studies. The ones that were conducted outside Pakistan, including 2263 studies, were also excluded. Now the remaining 2303 articles were further evaluated, screened and finally, 40 studies were included for full text read. Out of these, 2 were review articles and 8 articles did not report the prevalence and so, were further excluded. Finally, 30 studies were included which fulfilled the objectives and matched the inclusion criteria for systematic review (Figure 1).

Table 1: Search results from data bases: Before and after applying filter

Keywords	PubMed	PakMediNet	ERIC	Google scholar	Total
(Prevalence of periodontitis)	B= 608 A= 40	0	B= 66 A= 15	B= 3280 A= 2250	2305
(Prevalence) AND (Periodontitis OR Periodontal disease)	B= 7 A= 7	0	B= 33 A=13	B= 291 A= 214	972
(Prevalence) AND (Periodontitis OR Periodontal disease OR Perio problem)	B= 19 A= 14	0	B= 135 A= 10	B= 192 A= 169	1093
(Prevalence) AND (Periodontitis OR Periodontal disease OR Perio-problem) AND (Pakistan)	B=3 A= 3	0	B= 6 A= 4	B= 88 A= 75	382

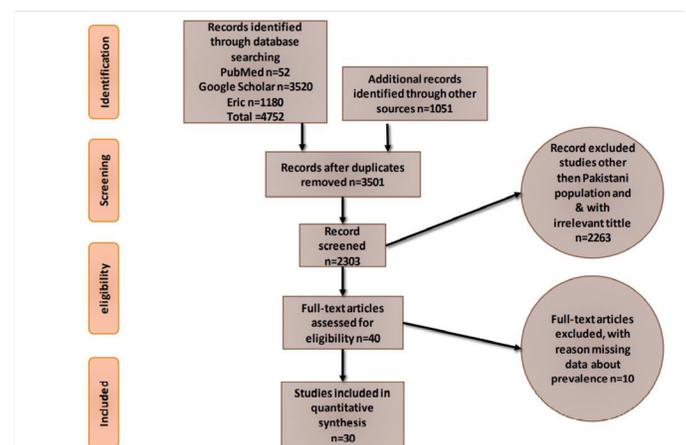**Note:** 'B' means before applying filters, 'A' means after applying filters.

Figure 1: Flowchart showing selection of studies.

A total of 17,757 subjects were included from 30 included studies. A demographic analysis was done for the studies. Amongst the subjects, 55% were male (n=9767) and 45% were female (n=7990). A total of 40% studies were from province Sindh (n=12), 37% studies were from province Punjab (n=11), 20% studies were from the province Khyber Pakhtunkhwa (n=6) and

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3% studies were from the province Baluchistan (n=1). We also analyzed related systematic diseases with periodontitis. A total of 39% people with periodontitis suffered from diabetes mellitus. The prevalence of periodontitis in association with systematic diseases is shown in figure 2.

Table 2: Details of local studies conducted in the past 5 years across Pakistan.

Title	First Author	Year	Age Group (years)	City / Province	Method of Diagnosis	Sample Size	Prevalence of Periodontitis
Prevalence of aggressive periodontitis in patients visiting Dow Dental College, DUHS.	Siddiqui S	2021	18-29	Karachi	BPE*	5390	5.56%
Comparison of periodontal diseases among genders in KPK, Pakistan.	Shehzad S	2021	35-74	KPK**	BPE	1017	25% males ; 21% females
Comparative study of antidiabetic medications in periodontitis at tertiary care hospital of Hyderabad, Sindh.	Anwar K	2018	25 - 74	Hyderabad	BPE	100	69 %
Clinical correlation of periodontal disease parameters with crevicular blood glucose levels	Saeed Q	2021	25 - 60	Karachi	Plaque Index	348	-
Frequency of periodontitis in diabetes patients. a hospital based study	Kausar S	2019	18-70	Lahore	Community Periodontal Index	150	87.49 % in diabetics; 8.51% in non-diabetics.
Prevalence of dental caries and periodontal disease among elderly patients attending a private dental college in Karachi.	Rafiq M	2018	20-80	Karachi	World Health Org. proforma CPITN*** Index	377	82.8%
Chronic periodontitis, preeclampsia and serum interleukin-8: is there a link?	Sadiqa A	2019	18-34 years	Punjab	CPITN probing technique	70	57 % chronic periodontitis
Periodontal health literacy among type 2 diabetes mellitus patients suffering from chronic periodontitis	Rehmat S	2020	adult age	KPK	Community Periodontal index	151	not satisfactory results
Association between prediabetes and periodontitis -A case control study	Riasat M	2021	22-60 years	KPK	Clinical Attachment Loss	60	80 %
Oral health status and gender-wise prevalence of periodontal disease among cancer survivors in Pakistan	Siraj HA	2020	not mentioned	Punjab	Community Periodontal Index	100	males 30 % ; females 0 %
Frequency of oral diseases among dental patients in Quetta	Gichki AS	2021	7-96 years	Quetta	not mentioned	3406	0.7 %
Predominance of periodontal disease in adult population - a cross sectional study	Adeel M	2020	25-30 years	Sialkot	Periodontal Disease Index	547	25.2%
Prevalence of periodontal disease in Gadap region, Karachi	Mohsin S	2019	10-75 years	Karachi	Determined by clinical evidence	536	Chronic periodontitis in males 64% ; 35 % females . Aggressive periodontitis 100% in males only.
Oral health status and treatment needs of police personnel in Karachi	Majeed MM	2020	20- 60 years	Karachi	WHO Oral Health Assessment Form	174	males 32 6% ; females 28.78 %
Association between smoking and periodontal disease	Shah SG	2020	20-50 years	KPK	Periodontal Probe	300	smokers 57.3 %; non smokers 42.6 %

BPE* – Basic Periodontal Examination, KPK** – Khyber Pakhtunkhwa, CPITN***- The community periodontal index of treatment needs

The entire detail of studies included from the past 5 years is shown in table 2. It represents the title of the study, authors details, participants' age groups, study setting, sample size of each study, method of diagnosis, prevalence of periodontitis and associated disease / condition.
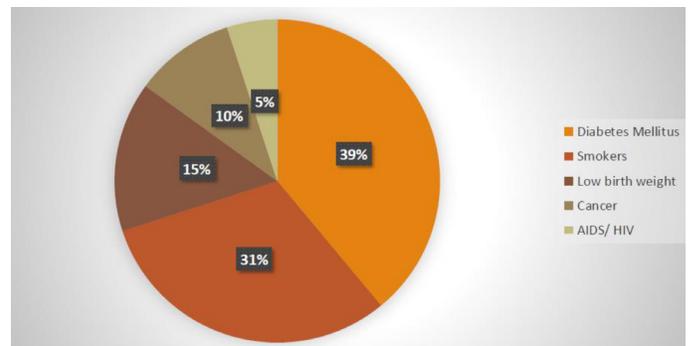
Figure 2: Prevalence of periodontitis in association with systematic diseases

Discussion

When this review was being conducted, there were none others that had been done in the past. Therefore, this review so far is the first of its kind conducted to analyze the prevalence of periodontitis in Pakistan. A total of thirty studies which fulfilled the inclusion criteria were included in this systematic review. Prevalence of studies was displayed and other variables like gender, age group and associated systematic disease were also included.

Our study included literature from all four provinces of Pakistan. Even though, we do not claim that our review is representative of the entire population because we could find only one study from Baluchistan. However, we would argue that since all provinces contain similar socioeconomic strata, we may assume that the results of other provinces might reflect in Baluchistan as well.

The review of studies reported that of all the subjects, 55% of them were male. Periodontal disease is extremely prevalent worldwide affecting both males and females. In few studies male dominance has been shown in periodontitis patients.[17,18] Prevalence of periodontitis has shown to be high in 18 - 30 years old males in a retrospective study. Similarly, in HIV patients, periodontitis rate was higher in males than females.[19] In China, older age population of ages 35-44 years also displayed greater male prevalence of periodontitis than in females.[20] Thus, our review results are in line with previously done studies in other regions of the world. The reason for higher male prevalence is linked

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with greater nicotine and alcohol consumption among the male gender.[21] In studies conducted in developed countries like USA and Canada etc., there is no significant difference in the prevalence of periodontitis between the genders.[22,23,24] Frequent dental visits, maintenance of oral hygiene and equal consumption of nicotine and alcohol in these countries might be the reason for absence of gender difference.[25]

Another interesting feature we noted in the current review was the method of diagnosis of periodontitis. Various different diagnostic methods have been used to diagnose this condition. A few studies have used basic periodontal probing method and most of the other studies have diagnosed using WHO standard criteria. Studies worldwide use WHO criteria and it is accepted globally.[26] Latest procedures have been introduced for the definitive diagnosis of periodontitis which include salivary biomarkers,[27] gingival crevicular fluid biomarkers,[28] matrix metalloproteinase-8 levels,[29] sandwich type biosensors and quantitative point-of-care test.[30,31] However, for clinical diagnosis, WHO criteria remains the gold standard for periodontitis diagnosis.

The overall quality of the included studies was moderate to low, with majority of the studies having moderate risk of bias. We also observed heterogeneity amongst the included studies but since we did not decide to proceed further for meta-analysis, the element of heterogeneity was ignored for this particular review. There was increased variance in the results of the studies with lest reported prevalence of 5% and a maximum of 84% in a study. The difference could be the level of socio-economic status and the level of oral health awareness between the study population.

Conclusion

Within the limitations of the study, it can be assumed that periodontitis is highly prevalent in Pakistan. It is mostly prevalent in male population and is mainly associated with diabetes mellitus and smoking habits. A rich oral hygiene campaign is proposed in Pakistan especially in rural areas. Patient education and proper oral hygiene instructions are recommended.

Limitations of Study

The present study entails several limitations. Most of the studies conducted in Pakistan on periodontitis are of low quality with medium to high risk of bias which is why we could not procure good quality. We did not differentiate amongst studies conducted in various cities because of lack of available literature. Further studies should be conducted to gather quantifiable data. A further meta-analysis must be conducted to quantify these results.

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