GLOBAL PREVALENCE OF PERIODONTITIS: A LITERARURE REVIEW

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Abstract
The prevalence of periodontitis is dependent on the studied population and the case definition adopted. Periodontal diseases assume a greater global importance as the senior population is on the rise in most countries.
The aim of this article is to review the global prevalence of perio-dontitis. Studies describing the prevalence of periodontitis in the world were searched through various indices using the key words 'periodontitis, national survey, prevalence' and reviewed. Many national surveys have used the WHO method for assessing prevalence. Yet several studies have not used the community periodontal index (CPI) for periodontitis case definition. Most surveys have used partial recording which can underestimate the periodontitis prevalence. There is a need for a standardized and valid population-based case definition of periodontitis.

Keywords: prevalence – periodontitis - survey.

Résumé
La prévalence de la parodontite dépend de la population étudiée et des critères qui la définissent. Les maladies parodontales dans le monde gagnent en importance avec la tendance qu'a la popu-lation dans la plupart des pays développés à vieillir davantage. L'objectif de cette étude est d'évaluer la prévalence mondiale de la parodontite. Les études rapportant la prévalence de la paro-dontite dans le monde ont été recherchées en utilisant les mots clés « parodontite, enquête nationale, prévalence » et analysées. De nombreuses enquêtes nationales ont utilisé la méthode de l'OMS pour évaluer la prévalence. Pourtant, plusieurs études n'ont pas utilisé l'indice de la communauté parodontale pour la définition de cas de parodontite. La plupart des enquêtes ont utilisé l'enregistrement partiel qui sous-estime la prévalence de la parodontite. Il est nécessaire d'établir une définition de la maladie parodontale qui soit standard et valide quelle que soit la population étudiée.

Mots- clés: prévalence – parodontite - enquête.

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Introduction

Periodontal disease is one of the two major dental diseases that affect human populations worldwide at high prevalence rates. The World Health Organization (WHO) [1] reported that 10 – 15% of the world populations suf-fer from severe periodontitis. Yet any information on the periodontitis pre-valence must be interpreted in light of the population studied and the case definition used for periodontitis [2]. Available population-based data ori-ginate from studies encompassing a wide range of objectives, designs and measurement criteria [3]. This can hamper the comparability of the pre-valence's estimates among various populations.

The aim of this study is to evaluate the prevalence of periodontitis among different populations by reviewing the published literature.

Materials and Methods

Various indices including PubMed, MedInd, WHO, DAOJ were searched using the key words "periodonti-tis, national survey and prevalence". Published material reporting preva-lence on a national level or on a major section (population) of the country were selected. This resulted in the identification of 31 publications of 19 countries.

Results

Prevalence of periodontitis estimated in a representative sample of a population depends on the case definition used and the studied population. WHO recommends the use of the Community Periodontal Index (CPI) for prevalence studies so that the results can be compared among different populations. With a partial recording, disease is defined (periodontitis; CPI=3) when the CPI probe records between 3.5mm and 5.5mm in at least one of the teeth while severe periodontitis (CPI=4) is defined when the probing depth is >5.5mm.

Many national surveys have used the WHO criteria in the case definition of periodontitis.

In a cross-sectional analysis of the Japanese National data [4], 42.5% exhibited periodontitis at CPI≥3, and the prevalence dropped to 9.5% at the CPI=4. In the national survey of Korea [5] done on a proportionately region-stratified clustered sampling, 10.3% had CPI≥3 and 3% CPI=4. The authors observed that the prevalence was lower than that reported by other studies performed in industrialized nations like the United States, Australia and Japan.

Prevalence of periodontitis was significantly higher in males and increased with increasing age groups, as reported by a national survey in India [6] using CPI for disease assessment. Moderate periodontitis was seen in 17.5% of 35-44 years-old and in 21.4% in 65-74 years-old, whereas severe disease defined as at least one tooth with >6mm probing depth was observed in 7.8% and 18.1% of the two age groups, respectively. Similar conclusions were drawn from a CPITN survey involving 1150 Chileans [7] (2 age groups: 35-44 years-old and 65-74 years-old) though the percentages were higher since the prevalence of chronic inflammatory periodontal disease (codes 3 + 4) was 91% in subjects aged 35-44 years-old and 100% in subjects aged 65-74 years-old. The total prevalence for both age cohorts

was 92.2%. Prevalence of periodontal disease was slightly lower in females and severity was significantly higher in males.

The prevalence of severe periodontal disease is lower than the chronic periodontitis, a hypothesis highlighted by many studies. A survey among Canadian adults [8] included 2110 adults aged 35–44 years in Quebec and used a stratified sample of randomly selected census areas and households in Quebec. Periodontal pockets of ≥4mm were observed in 73.6% persons, and those ≥6mm were prevalent in 21.4% of the examined persons. Also, in a national study [9] carried out in France in 1993 to assess the periodontal status of the population aged 35-44 years, a representative sample of 1000 subjects was studied using the CPITN index. Gingivitis prevalence was high (80.4%) while 26.6% of dentate subjects had shallow pockets (4-5 mm). Deep pockets (> 6 mm) were rare (1.6%). In the national survey of Finland [10], 5255 persons were examined for periodontitis from the total sample of 8028 adults (≥30 years). 64% had periodontitis (CPI≥3) while 21% had severe periodontitis (CPI=4). The age group of 35-44 years-old reported a prevalence of 61% and 14% of moderate and severe periodontitis, respectively. In another study in Southern Finland [11], 325 workers (aged 38-65 years) with access to subsidized dental care and 174 controls without access were periodontally examined. The authors [11] stated that deep pockets ≥ 6 mm were observed in 5% for the health care subsidized workers and 11% of the controls.

Krustrup and Petersen [12] did a cross-sectional study on a random sample of 1,115 Danish adults aged 35-44 years and 65-74 years. 42% of the younger adults had moderate periodontitis while 6.2% had severe periodontitis. In the older participants group, the prevalence of moderate and severe diseases was 82% and 20%, respectively. There was no difference in prevalence between males and females in both age groups.

In a national study of United Kingdom adults, Morris et al. [13] reported that pockets greater than 5.5mm were uncommon (5%) in the total adult population. The prevalence in the 35–44 years group was 5% and thereafter it increased to 17% in the 55–64 years group and 15% among those ≥ 65 years. In the latter group, only 4% had pockets of 8.5mm.

WHO [14] compiled data from prevalence studies conducted in many countries on periodontal status. Severe periodontitis was considered when a subject had at least one site with ≥6mm. The lowest prevalence of severe periodontitis was seen in Madagascar and Hungary (3%). China, Brazil, Denmark, French Polynesia, Pakistan, Poland, Japan, Norway and Malaysia reported a prevalence of less than 10% of severe periodontitis [14]. Prevalence of more than 20 % was seen in the populations of Bangladesh, Canada, Germany, India, Belarus and Chile. In India, according to WHO data, the prevalence of severe periodontitis was in the range of 19 to 32%.

Corbet et al. [15], in a cross sectional survey of a province in Southern China, selected 1572 ages 35-44 years and 1286 aged 65-74 years by a two-stage cluster sampling method. A complex case definition modified from CPI was used for prevalence estimates separately for the two age groups to account for the age influence on the prevalence estimates. The periodontal disease was defined as having at least 2 sextants with a clinical attachment level (CAL) ≥4mm; 40% of 35-44 years-old had the disease, while 65-74 years reported a prevalence of 34.5% for their case definition of at least two sextants with CAL ≥6mm. 4% of 35-44 years and 6.5% of 65-74 years had severe disease (CPI=4). The periodontal status of 8462 residents of Keelung, Taiwan, was studied by Lai et al. [16] in a cross-sectional survey, using the CPI and CAL indexes at subject (prevalence) and sextant levels (severity). 95% had some signs of periodontal disease, of whom 29.7% had periodontal pockets >3mm

and 35% had attachment loss >3 mm. In a Thai survey [17] of high income retired persons of 50-73 years, severe disease was diagnosed when a person had a mean CAL≥4mm. Severe disease was prevalent in 16% of the population.

The United-States was the first to recognize the importance of surveys in the determination of periodontal disease's prevalence with their landmark NHANES I [18] conducted between 1971 and 1974 on a probability sample of approximately 28,000 subjects. The periodontal conditions were assessed by the Periodontal Index (PI) on all teeth present. The average PI scores increased steadily with age, and were higher in males than females (0.96 vs. 0.7) and in blacks than in whites (1.28 vs. 0.76). These differences between the four subgroups were consistent across all age groups.

The Dental Health Outcomes Survey [19] conducted in 1981 was a household-based survey in which 1792 participants, aged ≥19 years were selected for periodontal examination using a multistage probability sampling design from all American states. Thirty-six percent of the participants had periodontitis (at least one tooth with probing depth ≥4 mm) and only 15% of the participants had no periodontal disease. In the whole population, 28% had moderate periodontitis (≥ 1 tooth with a probing depth of 4–6mm) and 8% had advanced periodontitis (≥1 tooth with a probing depth ≥7mm).

The National Survey of Oral Health [19] was conducted by the NIDR in 1985–1986 to assess the oral health status of adults in the United States. The targeted population was employed adults (aged 18–64 years) and seniors (aged ≥65 years). The sampling frame included a multistage sampling design from which 15,132 persons 18–64 years of age and 5,686 persons aged 65–85 years were examined. 14.3% of employed adults and 22.2% of seniors had one or more teeth with ≥4mm probing depth. The prevalence of ≥4mm probing depth increased with age, from 4% in the 18–19 years group to 22% in the 60–64 years group. However, in the seniors group, it decreased slightly with age. The prevalence of attachment loss of ≥3mm, ≥4mm, and ≥5mm were 44.6%, 24.1% and 13.6%, respectively, in employed adults and 86.3%, 68.2%, and 51.7%, respectively, in seniors.

The NHANES III [20] survey was conducted between 1988 -1994; 3.1% had advanced periodontitis, 9.5% had moderate periodontitis and 22% had mild periodontitis. The survey used a complex case definition combining probing depth and clinical attachment level assessment as well as the determination of furcation involvement. The prevalence of periodontitis increased steadily with increasing age. However, moderate and advanced periodontitis increased in prevalence between 30 and 70 years of age and then levelled off to slightly decline thereafter.

In the NHANES IV [21], the periodontitis was defined as the presence of at least 3 sites with CAL> 4 mm and at least 2 sites with PD > 3 mm. Black (6.8%) exhibited the highest prevalence of periodontitis, followed by Mexican-Americans (4.6%) and White (3.8%).

In the national survey [22] conducted between 1986 and 1987 to evaluate the oral health of 14,013 American children aged 13 to 19 years, CAL ≥ 3mm was used as a threshold for periodontitis. Aggressive periodontitis defined by having attachment loss ≥3 mm in ≥4 teeth including two or fewer canines, premolars and second molars was present in 0.4% of 13–15 years-old, 0.8% of 16–19 years old, 0.06% of White, 2.6% of Black and 0.5% of Hispanic. The prevalence rates for chronic (at least one tooth with≥3mm attachment loss) periodontitis were higher and were 2.3% and 3.2% in the two age groups, respectively.

In a cross sectional survey [23] as part of the Erie County study in New-York, prevalence was estimated by mean CAL. 8.6% had severe disease (mean CAL ≥4mm). Prevalence ranged from 14.7% in the 35-44 years group to 23% in the 65-74 years group.

The Piedmont Health study [24] is a longitudinal study based on a stratified, clustered, random sample of people aged ≥65 years in five contiguous North Carolina counties. Severe periodontitis was defined as the presence of ≥4 sites with loss of attachment ≥5mm and ≥1 of those same sites had a pocket depth of more than 3 mm; the estimates were 16% for the White and 46% among the Black.

Bial & Mellonig [25] used clinical and radiologic (panoramic and bitewings) examinations to screen a large group comprising 49,380 male naval recruits in Okinawa, Seattle, 17 to 32 years old. Cases demonstrating greater bone loss on the permanent first molars and/or incisors than on other teeth were classified as having juvenile periodontitis. It was estimated that 0.55% of the subjects had bone loss, 0.37% subjects had early onset (juvenile) periodontitis, 0.13% subjects with rapidly progressing periodontitis and 0.05% with isolated bone defects.

In Australia, the National Dental Telephone Interview Survey 2002 was conducted in Adelaide [26]. It comprised 709 persons, aged 45-54 years. The prevalence of CAL ≥4mm, ≥ 5mm and ≥ 6mm was 66%, 37% % and 19%, respectively. The prevalence of PD ≥ 6mm was 10.2%.

In the National Survey of Australia 2007 [27], approximately one of five Australian adults had moderate (20.5%) or severe (2.4%) periodontitis based on the Center of Disease Control (CDC) classification [28]. The prevalence for age group 35-54 years was 24.5%; males 30.4%, females 18.6%. The percentage of the Australian population with CAL ≥ 4 mm was 42.5%. The prevalence of CAL ≥4mm was lowest in the most recent generation (17.4%) and increased across the generations, with a prevalence of 49% in the 1950–69 generation, 73.0% in the 1930–49 generation and 80.5% in the pre-1930 generation.

The national survey [29] of France was conducted on persons between 35 and 64 years, living in all 22 administrative regions of metropolitan France

(N= 2144). The sample of 2144 subjects was 51% women, with a median age of 49.6 years (Q1 = 42.44 years; Q2 = 58.37 years). Population prevalence estimates indicated that loss of attachment ^{3} 5 mm was 46.68% and probing depth (> 5 mm) was 10.21%. One or more deep pocket (> 5 mm) was present in 10.2% of the sample. 1.73% presented probing depths of >7 mm. Schürch et al. [30] found the prevalence of deep pockets (≥6mm) was low, 2–3%, in a sample of 206 persons randomly selected from Canton of Berne, Switzerland while 25% persons of all age groups had moderate periodontal disease.

Discussion

The CPITN is a treatment index commonly used for estimating the prevalence of periodontitis in population; it is simple and easily reproducible. WHO modified it as CPI by introducing the CAL measurement. Yet many drawbacks were pointed, mainly the use of a partial recording. CPITN overestimated prevalence and severity of periodontal diseases in younger age groups and underestimated them among older subjects [28]. The performance of a partial recording system is affected by the actual prevalence of periodontal disease in the population in question. The less frequent the disease, the more difficult it becomes for a partial recording system to detect it and thus may lead to a greater underestimation of its prevalence. A full-mouth examination remains the best method for accurately assessing the prevalence and severity of periodontal disease in a population. Yet in a large survey, it becomes practically difficult to have a whole mouth periodontal recording.

The lack of standardized study design, definition of periodontal disease, methods for disease detection and measurement and criteria for subject selection markedly limit interpretation and analysis of available population-based periodontal disease data from around the world [3]. Significant disparities appear to exist in the level of periodontitis among young, adult and senior populations in the world. Subjects of African ethnicity seem to have the highest prevalence of periodontitis, followed by Hispanics and Asians. Disparities in periodontal status appear to be related to socio-economic levels.

Conclusions

After reviewing the most relevant published studies reporting the prevalence of periodontal diseases, the following conclusions can be drawn:

-CPI/CPITN was the most used index for assessing periodontitis in many populations.

- The use of partial recording underestimates the prevalence of the disease, thus reduces the accuracy of the results.

-The use of a variety of case definitions in the different surveys makes comparison difficult.

These results highlight the need for a valid standardised case definition of the periodontal disease, a well-defined study design and calibrated operators.

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