

The Importance of Epidemiology in Dental Medicine

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Abstract

Epidemiology in oral health is an increasing field of knowledge for scientific research, providing a tool that combines clinical dental care models to optimal protocols. Moreover, it deepens discussions about oral pathologies and the association with bio-psychosocial factors.

Dental caries and periodontal disease are one of the major public health problem, therefore epidemiological studies are useful for identifying and monitoring their prevalence among different age and geographical groups, giving new treatment perspectives.

It is understood that epidemiology can confer a predictive significance to clinical data, becoming very useful in implementing preventive strategies to reduce the incidence of dental problems.

This literature review aims to gather information, in a critical point of view, on the importance of epidemiology in modern dental medicine.

Keywords: Epidemiology, Oral health, Oral pathologies, Clinical practice

Introduction

The World Health Organization (WHO) states that oral health is part of a person's health and general well-being and it is considered very important to a good and consistent quality of life [1].

The current definition of oral health according to WHO consists on the absence of chronic orofacial pain, oral or oropharyngeal cancer, mouth sores, congenital anomalies, gum disease, dental caries, loss of teeth and other disorders affecting the oral cavity [2,3].

Over the last decades, dental caries and periodontal diseases have been the most common oral disorders affecting 60-90% of schoolchildren and 5-20% of middle-aged adults [4,5]. Oral pathologies represent, because of their high incidence, one of the major health problems among children and adolescents. However, if early prevented and adequately treated, dental caries and periodontal diseases are both easily controlled, having reduced economical costs and important health benefits. Thus, rather than preventing this pathologies, it is important to promote oral health in an overall strategic context [2]. The application of epidemiological research in the study of rare diseases is also important to understand the main risk factors and distribution of the disease. Only with correct health research the health professional can develop the correct diagnosis, treatment and future prevention of a disease with the establishment of correct guidelines to be applied [6].

Over the past 20 years, the General Health Directory of Portugal has been developing programmes for oral health promotion and oral disease prevention. At first targeting children and adolescents and then the general population. The national programme for oral health promotion strategy has the following objectives [7]:

- Improve food and oral hygiene awareness and behaviors;
- Decrease oral disease incidence and prevalence;
- Increase the percentage of children free of dental caries;
- Create a national and international database related to oral health;
- Provide oral health care to children with oral pathology and rare diseases that need urgent special care needs;

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- Treatment and prevention of oral diseases among the economically and socially disadvantaged/excluded groups.

In the last decade, in Portugal, due to the current measures, dental caries prevalence has declined among children and adolescents. Yet, there is a large incidence of oral pathologies, representing a major public health problem [8]. All the oral health promotion strategies defined in Portugal and in other countries could not be developed without the knowledge about the pattern of distribution and the determinants of oral diseases. This can also be possible by the adaptation of epidemiology research in dental medicine.

The first national survey in 1983-84, in partnership with WHO, the *Direcção-Geral de Saúde* of Portugal (DGS-Portugal) and the Faculty of Dental Medicine of the University of Lisbon showed that for children with 6 years old the decayed, missing and filled deciduous teeth (dmft) and for permanent teeth (DMFT) indexes were 5.2 and 0.5, respectively, while the 12 year old children had a DMFT index for permanent teeth of 3.8 [9]. Almeida et al. estimated that the prevalence of caries in children with 6 years of age was 46.9% in children and 12 years was 52.9%. The dmft index was 2.1 for children aged 6 years and DMFT index was 1.5 in children aged 12 years. According to this study, Portuguese children have prevalence similar to that found in countries with more advanced oral health programs such as the United Kingdom and Denmark [9].

Through the national study of the prevalence of dental caries in the educated population, conducted by the DGS-Portugal in 2000, the DMFT at age 12 was 2.95 reaching the goal advocated for the WHO European region in 2000. However, in this study, the number of children under 6 years without any dental carie only reached 33% [10].

Over the past years, epidemiology increased research related to dental medicine. Only in a recent past, epidemiology became a topic of clinical interest. As shown in Figure 1, the interest in scientific study of epidemiology related to dental medicine been increasing significantly. According to PubMed, it was in 1980 that this subject started to be fairly published.

Epidemiology: definition and importance in Health Sciences

This review intends to reflect the recent definition of epidemiology that consists in “the study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to the control of health problems” [11].

In other words, epidemiology seeks to discover the causes of a disease, in order to deepen its understanding, intending to improve the population’s health. Currently, epidemiology expands the boundaries of quantifying a disease to spread across all health fields, particularly in identifying the causes, quantifying the burden of a disease, the therapeutic effectiveness and monitoring activities. It is believed that health professionals should be responsible for gathering epidemiological data, contributing to a more informed technical staff concerning treatments, assistance and health policies [12].

Epidemiologic knowledge has countless applications in public health field, mainly in those related to health services planning and assessment. Different from a purely clinical approach, that studies patients’ health-disease processes intending to treat and cure individual cases, epidemiology focuses on the disease occurrence process, death or risk situations to community’s health, creating strategies to improve public health.

Epidemiology in oral health research

Oral health status of 12 years old children is the subject of several epidemiological studies conducted worldwide. According to the WHO, this age group is important, because this is the first age after leaving primary school (reliable sample of the school system) [13]. Moreover, at this age, it is likely that all permanent teeth, excluding third molars, have already erupted and are present in the oral cavity. Therefore, 12 years old have been chosen as the global monitoring age for dental caries for international comparisons and monitoring of oral pathologies trends. Even considering the large number of scientific evidence from several epidemiological studies in school children around the world, the majority of them are outdated regional studies [14].

The DMFT index (unit of measure for decayed, missing and

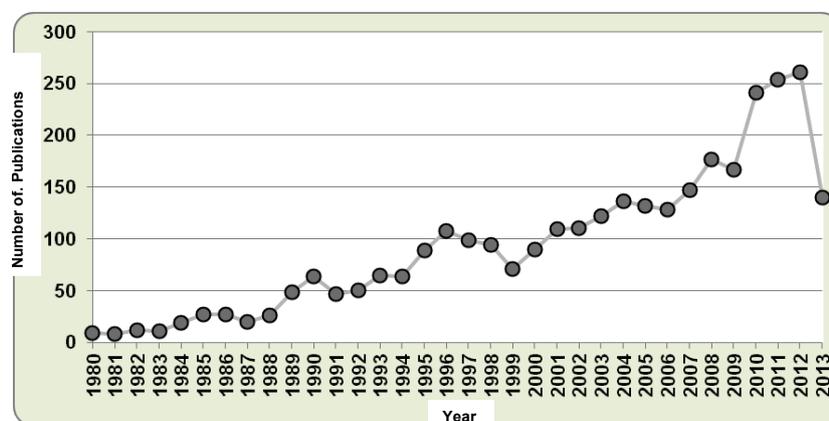


Figure 1: Number of articles related to epidemiology in oral sciences. Frequency of research articles using the keywords “epidemiology oral health dental research” on the platform NCBI PubMed.

filled teeth) has been a transversal tool in these studies. Although there are differences, in sampling and types of individuals, epidemiology developed epistemological and methodological tools that enable revising both old and new data, in order to understand the effect of environmental characteristics on individual results, trying to correct the broad effect, also known as ecological fallacy. Geographic information systems (GIS) and statistical methods are both considered an important increase to the data's strength and to its spatial analysis. A global health database development fits into the WHO Global InfoBase and intends to assess national and community's oral health results, fostering disease prevention programmes [14].

Epidemiology in Oral Sciences

One of the main aspects pointed out to epidemiology is its integration in public health practices. Its major gap lies in the populations' inadequate knowledge, making difficult the establishment of effective preventive measures. Although epidemiology plays a key role in human health research, it is not always used as a tool for health promotion [15].

Epidemiology can be defined as the study of determinants to health-disease states among populations.

Clinical studies have shown that the majority of oral pathologies are easily preventable through simple primary prevention measures such as oral hygiene, regular dental appointments, application of fluoride products and fissure sealants.

Social status may influence the risk of developing dental caries and other oral diseases. Individuals with low socioeconomic status have less access to healthcare, inadequate nutrition and hygiene conditions, are often more likely to develop oral pathologies. Also children from higher class, due to the consumption of more sugary food, considering their parents' economic strength, register an increased prevalence of these diseases. It is further estimated that the family's low level of education may be related to dental caries high incidence among children and adolescents [16,17]. There is strong evidence that oral diseases are related to oral health behaviors. By improving oral hygiene and reducing the consumption of sugary foods these diseases could be reduced. Patients' education and motivation are key points for obtaining appropriated oral health behaviors [18].

Epidemiological research in dental medicine has three overall objectives:

1. Describe the prevalence of oral pathology and its risk factors;
2. Clarify on the causes of oral disorders;
3. Provide the necessary information to plan/ manage services and oral health programmes, contributing to prevention, control and treatment of these pathologies.

In epidemiological research, "diagnostic tests" are, not only as laboratory tests, but also other procedures such as clinical questioning and physical examination. Their quality is based on concepts such as reproducibility and validity of the test. Thus, reproducibility can be defined as the test's capacity of producing consistent results when performed independently and under the same conditions. The validity of a test is in quantitative or

qualitative terms, a useful test for identifying an event or to predict it. To assess clinical or population value of diagnostic test there are two aspects that should be considered: the first concerns the randomness principle and the second is related to the current clinical practice [19].

The importance of epidemiological research for clinical dental practice

Scientific production on epidemiology has been slowly set up and the majority of research works on oral health epidemiology are related to postgraduate programmes, namely in social dental medicine and public oral health. In this sense, there has been a massive participation from universities developing scientific papers on this subject [20].

Although there has been notable national and international epidemiological research for some years, the study of dental epidemiology is a relatively new field in dentistry that has been stimulated by its increasing concern in public health. Epidemiology is fundamental to understanding the clinical and the public health importance of the disease, as well as providing insights for devising and assessing methods of caries control [21].

To understand the disease process and how caries affect the different groups of society, one needs to know the distribution of the disease in various communities. The average levels of disease seen in the inherently atypical groups of self-selected and/or referred patients attending dental clinics frequently give a false picture compared with the rest of the population. The mean levels and distribution of disease seen in representative samples of the total population will usually be different. The existence of this inherent and explainable difference is a key issue that dental students, dentists and public health planners must understand [22].

In a study developed in Thailand, it was found that 96.3% of children under 6 years of age had dental caries and the DMFT and dmft index in children with 12 years was 8.1 and 2.4, respectively. In the same study it was found that 53% of children under the age of 12 reported toothache in the last 12 months. Of these, only 66% had a dental appointment in the last year. A large number of children who participated in this study consumed daily sugary foods and this has been correlated with the onset of dental caries [23]. Traebert et al. conducted a study in the municipality of Santa Catarina, Brazil, and found that the prevalence of caries in the primary dentition in children aged 6 years was 60.9% in public schools, enrolling more disadvantaged children (dmft index 2.98) and 34.9% in private schools (dmft index 1.32) [24].

One of the topics about epidemiology in dental sciences that is still little explored is the prevalence and social impact of toothache [25]. This symptom is caused mainly by dental caries and affects the human population significantly, especially young and economically disadvantaged people. It must be reminded that toothache has a negative impact on individuals' quality of life, causing pain, decreasing work performance, hindering social interaction and learning [26]. Many oral diseases and conditions have been targeted by studies, but the most worrying for their expression have been dental caries and periodontal disease, with particular epidemiological characteristics [27,28].

Conclusions

The knowledge behind the distribution and determinants of common and rare diseases is fundamental in order for the health professional to orientate adequate prevention and treatment strategies in an individual and community level. Epidemiology is important to identify the causes of diseases / health issues and apply those findings to prevent or correct those pathologies, obtaining health gains. Further epidemiological studies are needed for proper development of oral health programmes among individuals of different ages (pre-school, school and adult age) to tackle diseases by promoting oral health, so that the population quality of life can be improved.

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