Life course epidemiology and its implication for oral health

Flávio Fernando DEMARCO[(a)]
Karen Glazer PERES[(b)]
Marco Aurélio PERES[(b)]

[(a)]Graduate Programs in Dentistry and Epidemiology, Federal University of Pelotas, Pelotas, RS, Brazil.

[(b)]Australia Research Centre for Population Oral Health, School of Dentistry, The University of Adelaide, Adelaide, Australia.

Life course epidemiology has been defined as the study of the long-term effects of biological, behavioral and psychosocial pathways that operate across the life course as well as across generations, and influence the development of chronic disease.[1] These studies are designed to help the establishment of causal relationships between exposures and outcomes, taking into consideration the duration and the time of disease development.

Chronic diseases have a long period of development, generating a mismatch between the exposure, the beginning of the disease and the first clinical signals. Oral health is an excellent area to study life course determinants of the diseases since the most impacting oral diseases and disorders are cumulative and chronic, present relatively high prevalence and are easy to be identified.[2] Several models have been postulated to explain the relationship between exposure and outcome during the life course.

The biological programming model[3] considers that there is a limited time window in which an exposure can have adverse or protective effects on development and subsequent disease outcome. For example, the delay in tooth emergence at 12 months of age was associated with those who were shorter at birth, and those who were classified as stunted. Also, the prevalence of not having lower permanent molars at 6 years old was higher among children who had a chronic malnutrition indicator at 6 months of life.[4]

The second model is the critical period with modifier effect, which considers that there are key early-life exposures which interact with later ones, increasing or diminishing the risk to develop chronic disease. A study investigating the effect of breastfeeding and non-nutritive sucking habits on the occlusion patterns at 6 years old highlighted that the presence of breastfeeding combined with the non-use of pacifiers ensured a protective effect of the presence of posterior crossbite in the primary dentition.[5]

The third model, accumulation-of-risk, suggests that detrimental and beneficial exposures accumulated through life affect health. Therefore, the number, duration and severity of the exposure generate a cumulative damage in the biologic system. A clear gradient according to the number of episodes of poverty from birth to adulthood was associated with fewer sound teeth in young adulthood. The group who never experienced poverty in life had a higher prevalence of dental visits and routine of going to the dentist and checkups. The higher the number of episodes of poverty during the course of life, the higher the proportions of smokers and individuals with unsound teeth in young adult life.[6]

Finally, the chain-of-risk model is another version of the accumulation of risk model, in which one adverse/benefic exposure leads to another to

influence health. The instruction of oral hygiene by a dentist during adolescence had an impact in the reduction of tooth loss at 24 years of age.[7]

These proposed models may not be exclusive, and may occur at the same time, emphasizing the complex interactions between social environment and biological and behavioral aspects involved in the development of chronic oral diseases and conditions.

Longitudinal prospective studies, such as birth cohort studies, are the most appropriate design to investigate the life course epidemiology, allowing the collection of exposure at the time of event, therefore minimizing the occurrence of recall bias.

To study oral health nested in multidisciplinary cohort studies is very important: firstly, because birth cohort studies allow the assessment of the "natural history" of dental diseases and dental outcomes; secondly, it is possible to understand better the causal mechanisms that explain oral conditions; finally, because there is some evidence regarding the association between oral health and general health. However, the direction of these associations remains unclear. Oral diseases may be a risk factor for general health and, on the other hand, general health may play an important role in oral conditions; for example, a higher number of obesity episodes in the life course increased the occurrence of dental calculus in young adulthood, which may be a risk factor for periodontal disease.[8]

The contribution of life course epidemiology, using findings from birth cohort studies, seem to be essential for understanding some unclear mechanisms involved in the etiology of some oral diseases and conditions. Thus, a research agenda to increase the number and quality of studies in this area along with long term period financial support are crucial.