

## Behaviors: Actions with purpose at the forefront of Dental Caries Management

**García-Quintana Alejandra\***

*General Dentist, Universidad Central de Venezuela; MPH candidate, University of Texas Health and Science Center at Houston, USA*

**\*Corresponding Author:** García-Quintana Alejandra, General Dentist, Universidad Central de Venezuela; MPH candidate, University of Texas Health and Science Center at Houston, USA.

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For years we have been viewers of the extensive burden of Dental Caries in our populations. From global to local, this disease is considered a public health problem that significantly impacts the quality of life of societies, communities, families, and individuals. This health problem affects children worldwide and represents a significant challenge for health systems. Moreover, those most critical risk is socially disadvantaged communities with extensive health inequities and poor social determinants.

Damaging consequences by severe dental caries go beyond the local physical impact on the tooth surface. It is well known that chronic pain, infections, and tooth extraction are inevitable consequences of disease progression. However, opening scope of the problem should expand our diagnostics and assessment to understand other areas that are also being highly affected.

Dental caries persists with a high prevalence among young populations, affecting their general health. Under the description of the disease being non-communicable, the relationship between common risk factors among nutritional problems and chronic illness (e.g., obesity, undernutrition, diabetes) and dental caries is evident [1, 2].

The global burden of untreated caries lesions in primary dentition affects 532 million children worldwide [3]. My work thus far has been focused on Latin American populations, were at a regional level, a systematic review and meta-analysis of studies examining children aged 5-6 years and adolescents aged 11-13 years in Latin American Countries concluded that more than 50% of the study population exhibited dental cariesm [4-6]. From a national perspective, in Venezuela, the last national study revealed for children six years of age a dmft of 2.27 [7]. Venezuela has limited official up-to-date epidemiological data at the state level, and thus, reliable data comes from local studies [8-10]. At a local level, a study among schoolchildren in Caracas and the 6-7-year-old group, exhibited a high prevalence of caries lesions (>60%) in advanced stages ( $\bar{x}$  dmft-index=2.64), with increased disease severity and poor quality of life [11]. Other local studies among indigenous populations also showed similar needs and poor health outcomes [12]. Moreover, this problem can also be tracked even earlier in life, and results from a pilot study evidenced that at such an early stage of life (0-24 months old), the severe disease is present, in some cases with clinical signs [13].

Considering this last study, the first 1000 days of life is a critical period for human development, and exposures during this time could unleash metabolic programming that can modify the structure and function of organs and systems, impacting health status later in life [14]. Maternal and family influences, modulated by behavior and conditioned by the environment, become very important during this period. Parents and caretakers of children are primarily responsible for their oral hygiene, dietary behaviors, and dental service utilization. Studies show that mothers' behaviors, education, stress levels, oral health beliefs, attitudes, and cultural factors are strongly linked to dental caries early in life and dental service use [15-20].

Within this context, it seems imperative to understand behavioral and environmental influences for dental caries onset and progression and identify them as critical targets for prevention and health promotion. Although interest has grown in exploring children's oral health outcomes using a broader framework that incorporates psychosocial, behavioral and environmental predictors with biological measures to prove a comprehensive concept of oral health and its preservation, an evident gap of knowledge, skills and confidence to

address such factors exists in the dental profession.

With this being said, it is necessary to broaden our responsibility and action towards quality research and training in methods and strategies rooted in Behavioral Sciences and Public Health Sciences that effectively assess and manage dental caries disease from its beginnings.

Behavior is an intricate, multidimensional characteristic of a human being. Purpose and action, consciously or unconsciously, convey at one point that sparks a condition in which things are happening or being done.

Transferring this concept to a complex multifactorial disease such as dental caries is no easy task. A level of systems thinking approach where elements and their relationships are the core processes of emergence is key to addressing behaviors for Dental Caries Management. With systems, we move from observing events or data to identifying behavior patterns over time, thus surfacing the underlying structures that drive those events and patterns. By understanding and changing elements and constructs that negatively impact behavior, we can expand the strategies available to us and create more satisfying, long-term solutions to chronic problems [21].

Today, dentistry is in a crucial historical moment, where integrated knowledge is the key to understanding dental caries as a chronic oral disease prevalent in our populations. Such integration is being conveyed in The Integrated Ecological Dental Caries hypothesis [22, 23] which extends the concepts that have evolved for more than 100 years. It incorporates ideas of socioecological models and behavioral theories understanding that behavior affects and is affected by multiple levels of influence. The integration of 4 fundamental pillars is at the core of the hypothesis and are decisive in the etiology of the disease: biochemistry, microbiology, behaviors and the environment. The authors describe the interrelation of these elements in the complexity of the origin of dental caries disease, from the unique moment of pregnancy to 2 years of age. It exerts that dental caries is a disease that progresses through phases from mild to severe. The chronic dysbiosis of the microbiome of the dental biofilm causes unfavorable conditions that are reflected and expressed in dynamic interaction on the tooth surface. As a consequence, its expression occurs in a lesion. Moreover, it implies that health and its preservation are starting points, and a healthy oral condition reflects biological homeostasis and psychosocial well-being.

Behaviors are actions with a purpose at the forefront of Dental Caries Management; their negative impact affects biological factors, but their positive management enhances individual wellbeing, and may prevent dental caries disease onset. Ultimately, public policies and preventive programs with community-based participation and alignment with local cultures must be developed and implemented in varied settings where oral health behavioral management serves as a prevention method that may be employed to manage dental caries disease in vulnerable communities [11].

If I have awakened in you the curiosity to understand this complex disease, then I have achieved a long-lasting goal; it is our moment to transform thinking and learning for the common good of our society.

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