

The Threat to the Survival of the Permanent First Molar in Children from Developing Nations

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Like other types of human teeth, the permanent first molar (PFM) has important masticatory function. Since its development and eruption is almost predictable, and the tooth can resist taphonomic conditions, it can form part of possible materials for use in forensic dentistry. The enamel, which forms the coronal outer covering of the tooth, is the hardest tissue of the tooth and is seen with lustrous surface that evenly reflects light and the glow of its subsurface. During the initial development of enamel, and even after erupting within the oral cavity, this tissue can be affected by various factors within and without the body. Excessive intake in the body of fluoride containing foods, medications, other chemicals or factors like malnutrition, can affect the development, quality and integrity of the enamel. Resultant defects like dental fluorosis, hypoplasia, hypomineralization, amelogenesis imperfecta etc. will often ensue. Further, traumatic injuries, erosion and abrasion are other insults that also affect the integrity of enamel post-eruptively. Capping to all those insults to the enamel is the common scourge of dental caries that also affect the tooth after eruption.

There is profound global inequality in oral health of children between nations and within nations, but the most distinct gradient is seen between developed and less developed nations. The global prevalence of dental caries commonly range from 3.1% to 53%, and even in extreme cases it rises up to 95% of the child population. In most cases, the commonly affected tooth is the permanent first molar (PFM), probably because of its earlier eruption in the oral cavity, its position within the oral cavity that makes it harder to clean [1]. Nonetheless, PFM is also recognized as one amongst the first teeth to form within the dental arches prior to the birth of the child, and its crown continue to mineralize and mature up to 3rd year after birth. The period immediately after the birth of the child, encompasses harsh environmental changes to the child and later new experiences like direct intake of foods through either breast feeding or direct drinking, exposing the child to new chemicals and even illness arising from the effects of all the changes.

Consequently, arising from the changes in the intake of these foods, medications for various illnesses and even temperature changes arising from illnesses associated with the changes, the developing PFM can experience certain insults at those times. One of the express changes currently being seen as a result of such insults is the form of Molar Incisor hypomineralization (MIH) [2]. This condition affects the PFM, and quite often involves also one or all the 8 permanent incisors. It is seen as white to creamy to yellow to brown discolouration, and the enamel easily chip off under stress. The affected teeth have porous enamel, are very sensitive and higher risk to dental caries, and for those previously restored are seen with atypical restorations [3]. Some of the children affected by MIH end up with early extractions of one or all the four molars, due to severe caries or tooth break-down. The aetiology of MIH is basically associated with environmental changes, preterm birth, antibiotics ingestion etc [4]. MIH is distinct from fluorosis, which is common in fluoride endemic areas, and differs from fluorosis with its opacities being diffuse and demarcated as opposed to fluorosis whose opacities are diffuse and without well demarcated borders [5], and teeth are general resistant to caries as opposed to those with MIH (Figures 1, 2).



Figure 1: An intra-oral photograph showing carious lower first molars that had also been affected with MIH.



Figure 2: An intra-oral photograph showing dental fluorosis affecting all the teeth, and the general opacities on the teeth as a result of this condition.

In the developing nations, the threat to the survival of PFM in children is much elevated. Poor oral health maintenance, lack of oral health information to the majority of the caregivers, lack of prevalence and pattern of dental caries amenable to preventive and nonsurgical interventions, and even the surgical interventions are not easily accessible. Further, the frequency of consumption of fermentable foods like milk, juices infant formula is on the rise, providing good environment for the caries to thrive. The correlation of dental caries with socioeconomic status of the child is strong, and so is the family income, education level of their caregivers. It is expected that these children will be susceptible to dental caries as the majority of them are born in families this type of background [6].

It is, therefore, not outrageous to assume that the two conditions: dental caries and MIH, will thrive more in these children from the less developed nations, with these conducive factors, including the many childhood diseases. This in itself is a panacea for the current

threats to the very survival of the PFM. Consequently, the burden of caries is growing in many of the less developed countries leading to pain, sepsis and suffering, impairment of the masticatory function of the PFM and a reduction in the quality of life of the children living in these nations [6]. Even though the science supporting caries prevention and control is universal, the less developed nations appear not to apply the benefits of this science. This is in contradiction with the developed nations, where the application of this science has helped to reduce the prevalence of caries and their children continue to keep the PFM into adulthood. This has been done through aggressive oral health care programmes.

The prevalency of MIH has continued to show increasing figures in less developed nations, where consumption of medicines has increased due to various illnesses, poor nutritional status, stressful lives, poor sanitation that exposes children to ingestion of heavy metals and diseases associated with fevers. All these form part of the panacea of having MIH. Prevalence of MIH have been recorded as 9.7% in Chennai, India [7], 9.7% and 17.6% in Nigeria [8], 13.7% in Kenya [9] and 40.2% in Brazil [10], which is quite high.

Social factors: income, education, behavior changes are all pointing to life degradation and possibility of the child contracting caries and or MIH. Due to the fact that MIH results in a weakened tooth structure of the affected enamel, the presence of cariogenic factors in the oral cavity, makes the affected tooth more amenable to dental caries and early destruction and tooth loss (Figure 3).



Figure 3: An extracted first molar that was affected by MIH and had extensive caries lesion involving the coronal part of the tooth.

For both dental caries and MIH, controlling modifying diet, increasing the resistance of the tooth to acid attack, or reversing demineralization process will enhance the survival of the PFM in the children from the less developed nations. Prevention through the use of Fluoride toothpaste and varnish enhances remineralization in the case of early carious lesions, and also re-strengthening the teeth with MIH. The placement of sealants, which also help to protect those teeth with MIH can help also prevent dental caries of the PFM. In terms of aesthetics and tooth structure protection, the use of micro-abrasion, bleaching + sealants, GIC, Composite, preformed metal crowns, Ortho extraction, cast restorations will be suffice for both conditions. This will optimize the quality of life for the children affected by dental caries and MIH of the PFM.

In order to achieve maximum benefits to these children, the support of the larger health providers in the less developed nations must be sought. The fact is that these children are already disadvantaged before birth and accumulate all these disadvantages throughout life. They are born in a harsh environment, overcrowded situations, poor nutritional status and limited access to oral health care. The available health workers can only succeed by beginning to solve these disadvantages from before birth, and include general and oral health education to mothers, on how mothers can effectively prevent the expected suffering as a result of preventable oral conditions in the expected child. Current research demonstrates various approaches to solving these emerging conditions. One key factor is the capacity building in oral health systems by the concerned governments, oriented to disease prevention and primary health care. This will help in the movement away from restorative oriented approach to dental caries management, realizing that dental caries is essentially the bigger threat behind the increasing loss of the PFM in children from less developing nations.

There is already a mismatch of competences to patient and population care in less developed nations leading to episodic encounters rather than continuous access to oral health care for the children living in these countries. Multi-professional approach through common risk factor approach can provide hope for prevention of preserving the PFM into adulthood [11]. In this regard, public health programmes developed for prevention of diabetes, obesity, heart diseases, nutrition, role of saliva, diet, behavior change related health programmes could be used to prevent oral diseases, as all of them have common risks. It is the best means of implementing comprehensive health promotion programmes that would enable caregivers and their communities increase control over determinants of health and thereby improve their general and oral health and that of their children [12]. It is also hoped that various nations will see it fit to create supportive environment to implement policies geared to improving the general and oral health related quality of life for the children within their jurisdiction. The priority is prevention of childhood diseases, simplicity in management of these diseases, collaborative initiative to improve oral health of children, all of which will prevent the threat to the survival of PFM in children from less developing nations.

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