

## Theories that Underlie the Prevalence of Third Molar Impaction: New Theory

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### Abstract

**Purpose:** The purpose of this comprehensive review was to introduce a new theory to explain the increased prevalence of impacted third molar. **Hypothesis:** The new theory being the mechanical theory which hypothesizes that modernization is related to a reduction in the functional activities of the jaw which in turn negatively impacted the structure of the jaw, mandibular teeth line. **Materials and Methods:** A comprehensive review of the literature on the theories that explained the prevalence of tooth impactions was conducted, using a PubMed and Cochrane databases. **Results and Discussion:** Based on the information that were reviewed, it was found that two theories that explained the prevalence of third molar impactions; being the evolution and growth theories. However, it was noticeable that modern societies possess higher prevalence of third molar tooth impaction and temporomandibular joint dysfunction. During the transition, from a traditional society to a modern one, societal factors and peoples' quality of life changes people's eating behavior and the associated activities of the mastication apparatus, hence, all contributed to reduction of the jaw activities. **Conclusions:** The proposed mechanical theory is an added value to explain the impact of modernization on the prevalence of impacted third molar.

**Keywords:** Evolution Theory, Growth and Development Theory, Modernization Theory, Prevalence, Third Molar Tooth Impaction.

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Date of Submission: 12-10-2018

Date of acceptance: 27-10-2018

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### I. Introduction

Tooth impaction is a pathological condition in which the tooth does not erupt completely or partially into the normal functional position. Worldwide the number of asymptomatic and symptomatic surgical operations to remove impacted third molar teeth is common dental practice (Almendros-Marques and Alaejos-Algatrae et al., 2008). Looking back the history, it is important to note that the prevalence of third molar impaction is on the rising as the society goes through transitions from a traditional society to a modern one. There are two theories that describe the etiology of escalating the prevalence of mandibular third molar impaction. These theories included evolution theory and growth and development theory. The evolution theory which stated that evolution of the third molars in the longer jaws of the human ancestors revealed the benefit for the third molar to grow normally. Whereas growth and development theory was based on the hypothesis that an increase in the prevalence of third molar impaction in recent year was due to improper biological growth of the jaw. However, both of these theories did not describe the association of modernization that a society goes through as it transits from a traditional society to a modern one. During this transition societal factors and peoples' quality of life changes people's eating behavior and the associated activities of the mastication apparatus, jaw activities. The aim of this review was to introduce a new theory being the mechanical theory which hypothesizes that modernization is related to a reduction in the functional activities of the jaw which in turn negatively impacted the structure of the jaw, mandibular teeth line. A secondary aim was to briefly review the evolution and growth theories.

#### I- Mechanical theory: limited jaw dynamic theory

The authors of this review propose a new theory known as **mechanical theory: limited jaw dynamic theory** which is based on the decrease in functional activity of the jaws as the society transit from traditional to modern life style. This theory is based on the hypothesis which states the incidence of tooth impaction has been increasing in recent years as modernization progresses. Obviously less functional activity of the Jaw induces changes in the morphology of the jaw (Westesson et al., 1996; Bansal and Ajwani, 2010). This new theory is proposed to explain the process of modernization that a society goes through as it transitions from a traditional

society to a modern one and how it is associated with the decreased functionality of the jaw. As societies industrialize and further develop the influence of social construction on chewing, biting and mastication behavior becomes more delicate style, hence, the magnitude of daily jaw activities decline leading to reduced temporomandibular functionality. The intensity and wide range of motion during the use of the masticatory apparatus have been declining due to population migration and the changes in eating style and social background (Yamak et al., 1996; Olanji and Odusanyo, 2000; Colorado-Boninnet al., 2006). Chewing-like activities induct bone growth, development and maintenance and stabilize the temporomandibular joint (Okumura, 1964). In support of this, it was reported that modern society possess higher prevalence of temporomandibular joint dysfunction (Sevedsen and Maertens, 1997; Hugoson and Kugelberg, 1988; Corruccini, 1984; Quek et al., 2003; Sandhu and Kaur, 2005; Bahbehani and Artun, 2006; Cloves et al., 2006; Hassan, 2010; Manfredini and Lobbezoo 2010; Pursafar et al., 2011; Syed et al., 2013; Al-Anqudi et al., 2014). In modern life style parents are more self-conscious with regard to their children chewing behavior, mastication and jaw movement during eating. Differences have been reported in the prevalence of third molar tooth impaction between and within countries with different levels of development, with greater third molar impaction prevalence in developed countries and in urban areas of developing countries (Omar, 2008; Afify and Zawawi, 2012; Secic et al., 2013). In other word eating behavior and limited mastication movement and the subsequent activity of the jaw are less in upper social classes and more urban areas. Jaw movements affect the muscle growth and strength that are essential to apply force on the bones (maxilla and mandible), hence, normal growth provides more space for the eruption of teeth. Omar in 2008 recorded a significant effect between chewing gum and singing on impaction as he recorded that individuals who chewed gum and sang often are less likely to have impacted third molars than individuals who do not because their associated increase in their jaw activities and the subsequent sufficient space of their jaw. The eruption of teeth increases the amount of contact between the teeth and the food that allow for normal modulation of the topology of the tooth and food contact surface area for more efficient development of the mastication apparatus (Ferrario et al., 1998; Westesson et al., 2011).

Evidence from epidemiological studies suggested that the increase in tooth impaction prevalence in developing countries may be explained by changes from traditional/rural to modern/urban societies (Olanji and Octusanyo, 2000). Rural areas tend to have a low tooth impaction prevalence and this has been explained by the protection against wide range of movement of the jaw provided by factors associated with a traditional rural lifestyle and mastication pattern (Quek et al., 2003; Seci et al, 2013). Furthermore, in modern society parents became more concerned with regard to their children eating behavior, as compared to traditional society. Slow and small range of chewing food became popular in modern society, hence, limiting jaw movement during eating. It was also reported that the prevalence of tooth impaction is higher in modern countries as compared with less modern countries (Corrccini, 1984; Hugoson and Kugelberg, 1988; Kur, 2005; Hassan, 2010; Bansol and Ajwani 2010; Afifi and Zwai, 2012; Syed et al., 2013; ). Clearly the type of food, eating behavior and dietary habit (change from a coarse abrasive diet to a soft western diet) has been popular as the society becomes modernized.

**II. Evolution theory**, is based on the increase in the prevalence of impacted third molar teeth increased over history. This theory states that evolution of the third molars in the longer jaws of the human ancestors reveals the benefit of these teeth may have added to dentition millions of years ago. However, in the modern human the third molar teeth add little to the chewing efficiency of the dentition. It was reported that the reduction in functionality of the mastication apparatus caused a decrease in the length of the jaw, hence provided insufficient space for the inclusion of third molar in the dentition (Anthony et al., 2003), Biswari et al. (2010). Since the third molars are the last teeth to develop, they are often impacted and unable to erupt. The process of evolution may provide another factor responsible for third molar impaction. That is the size of the human jaw has gradually reduced from the larger ape size to the smaller modern human size. The third aspect of the evolution theory is based on the hypothesis that there is an increased brain size at the expense of the jaw size (MacGregor, 1985). Hence, the jaw has become too small for the third molar to erupt normally (Biswari et al., 2010).

**III. Growth and Development Theory** is based on the hypothesis that an increase in tooth impaction in is mainly due to improper growth of the jaw. In support of this theory, Broadbent (1943) assumed that mandibular third molar impaction occurs when the mandible fails to achieve its full growth potential. Whereas Ricketts (1979) suggested that impacted third molar teeth is related to the growth of the mandible as he explained that third molars usually develop by a mesial direction of tooth eruption rather than the resorption at the anterior border of the ramus. Although the growth of the jaw may be influenced by genetically inherited factors, lack of proper dental care during early stages of life are associated with tooth impaction secondary to more frequent infection. A second aspect of this theory is the normal development of the mandible is believed to be in response to endocrine factor which regulate the growth of the tongue and mastication muscles.

## II. Conclusions

Based on the information that were reviewed, it was found that modern societies possess higher prevalence of temporomandibular joint dysfunction. The proposed mechanical theory is an added value to explain the impact of modernization on the prevalence of impacted third molar.

## Acknowledgement

There were no institutional funds available for this work. The first and second authors are thankful for Prof. Al-Said Haffor for his efforts in organizing the information and proposing new name for the new theory that described how modernization impacted the mechanical activities of the mastication apparatus, jaw activities.

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Alhanouf Alkhurairji. "Theories that Underlie the Prevalence of Third Molar Impaction: New Theory" *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, vol. 17, no. 10, 2018, pp 54-56.