

Diet as a Partial Explanation for Wisdom Teeth Problem

Pratiwi Soesilawati,^{1,2,3} Anita Yulianti,⁴ Fany Fandani,⁵ Noor Z. S. Prabowo,⁵ Tamariska,⁵ Rizki F. Salma,⁵ Felia L. Dewi,⁵ Padma C. Pertiwi⁵

¹Department of Oral Biology, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia.

²Cell and Tissue Bank-Regenerative Medicine, Dr. Soetomo General Academic Hospital - Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia.

³Immunology Program, Postgraduate School, Universitas Airlangga, Surabaya, Indonesia.

⁴Departement of Dental Material, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia.

⁵Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia.

E-mail: pratiwi-s@fkg.unair.ac.id

Received: March 2, 2022; Accepted: April 8, 2022; Published on line: April 11, 2022

Abstract: Impacted wisdom teeth is a condition where the third molars experience malposition. Change in dietary pattern is one of the reasons of impaction, as it results in less space for tooth growth. This study aimed to analyze the relationship between diet and wisdom teeth. This was a narrative review study using databases of Google Scholar, Science Direct, and Pubmed (MEDLINE) with a publication period between 2010-2019. The keywords used were amelogenesis imperfecta, enamel, and genes. The results showed that the definition of impaction was a condition that caused a tooth to fail to reach its functional position. Third molars, canines, and premolars were the most frequently impacted teeth. At present, evolution causes a reduction in the jaw dimensions due to dietary factors, namely the nature of the food or the level of utilization of chewing tools that affect the eruption of wisdom teeth. In conclusion, the modern diet results in the loss of growth stimulation in the jaw, which is a risk factor for non-eruption wisdom teeth that will cause impacted wisdom teeth.

Keywords: wisdom teeth; diet; impaction

INTRODUCTION

Wisdom teeth, also known as third molars, are the most posteriorly-located molar teeth in the oral cavity. Wisdom teeth most commonly erupt between the age of 17 and 25 years. Wisdom teeth are also considered useless leftover organs because of a diet developed with many modifications and is used as evidence to support human evolution from primate ancestors. Wisdom teeth or third molars approach the vestigial structure's condition because they most often do not appear between 20 and 30 years. Wisdom teeth grow at the end of adolescence or early age around 20 years which is considered as the "age of wisdom" (the age at which someone starts to be wise), so that wisdom teeth in

English are called "wisdom teeth". Vestigial itself refers to structures that are not yet perfect, atrophied, degenerated, or non-functioning. These are also called the remains of organs or structures that were fully developed or functioning in previous generations' early stage of development. In some cases, the teeth never appeared, and some of them became affected, so that surgery was carried out. In about 30% of individuals, one or more third molars of either the maxilla or mandible fail to develop. In general cases, the eruption of wisdom teeth grows partly distal to the second molar, and if this occurs, an infection will occur, which can cause pericoronitis.¹

Several studies have shown significant reduction in the size of the jaw, which was

caused by the continuous consumption of tender food, such as processed and cooked food in modern-day diets.¹ Diet refers to the food that a person eats among all that can be eaten, and the direct relationship between the organism and its environment.² The modern human diet is much softer due to the introduction of cooking techniques in food. Overcrowded teeth increased in the development of modern human teeth, and with minor wear on the molars, the jaw space became higher so that the third and last molars grew out of space for eruptions.¹

Modern humans with a total of 70% experience problems in the third molars with cases of failure to erupt (impact) or not develop at all (agenesis).³ Then in cases that occurred during five years, from 2013 to 2017 in Surakarta, there were 13.2% cases of impacted teeth in every 10,000 people of the total population with 1,778,152 people.⁴ In the case of impacted teeth, which also occurred in *Rumah Sakit Gigi dan Mulut (RSGM) Universitas Airlangga* patients, there were 1057 cases of impacted third molars with a prevalence of 72%.⁵ Based on the high prevalence of wisdom teeth problems and development of diet, the aim of this review is to analyze the relationship between diet and impacted third molars.

METHODS

The method used in writing this article review was a narrative review sourced from Google Scholar, Science Direct, and Pubmed (MEDLINE). The strategy used in data collection was in the form of writing keywords

that were used to find articles to be reviewed with a publication period between 2010-2019 (Table 1). The keywords used were *amelogenesis imperfecta*, enamel, and genes.

RESULTS

The identification results from a search on Google Scholar, Science Direct and Pubmed (MEDLINE) in which the title contained one or more keywords obtained 30 articles with appropriate titles and five review articles. There were five Indonesian journal articles and 25 international journal articles. The next step was process of screening the search result data to obtain data types that had similarities in the research theme. The eligibility stage was carried out to determine which articles fulfilled the inclusion and exclusion criteria based on the suitability of the title and content of the article. The next stage was a search with inclusion criteria, namely articles with a time limit of the last ten years that had been set by the author in the form of studies related to the topic: Diet as a partial explanation for wisdom teeth problem.

DISCUSSION

Wisdom Teeth

Wisdom teeth, also known as the third molars, often develop and are common in humans with abnormal positions. Most of them do not erupt properly. Inflamed gingiva around teeth, diseased gingiva and alveolar bone, decayed neighboring teeth, tumors, cyst development, and root resorption, are local pathological changes associated with

Table 1. Tracking scientific articles

No.	Keywords	Year	Database	Number of Articles
1.	Wisdom teeth	2010-2019	Google Scholar	6.000
			Science Direct	119
			Pubmed	882
2.	Diet		Google Scholar	7.000
			Science Direct	377
			Pubmed	924
3.	Impaction		Google Scholar	3.200
			Science Direct	100
			Pubmed	965

impacted third molars.^{6,7} The third molars are often impacted, grow much later than the other teeth but also are the ones that usually got extracted first. This tooth most likely experienced collisions due to the mismatch between tooth size and jaw size.⁸

If there are no signs or symptoms of illness that affect the wisdom tooth or its surrounding structure, the affected wisdom tooth is asymptomatic, however, it can also become symptomatic. With the gingival tissue around the wisdom teeth may be swollen or ulcerated, the second molars are damaged at the root, and the wisdom teeth are also damaged, Gingiva and bone can be damaged around the second molars, as well as cysts and tumors can develop.⁷

Impaction

The teeth erupt when about half to three-quarters of the length of the roots have been formed. Impacted teeth may be diagnosed after this period occurs and often is asymptomatic.⁹

Impaction is a pathological condition where normal eruption cannot occur, as a result the tooth is unable to reach its functional position in the dental arch in a predictable time frame. Impaction occurs most commonly on the third molar, maxillary canines, mandibular premolars, and maxillary first incisors. Impacted third molars have a prevalence that varies from 16.7% to 68.8%. On the other hand, the prevalence of maxillary canine impacts ranges from 0.8% to 2.8%. Maxillary canines can be impacted along the palate, buccal side, or arch, with palatal impaction being the most common.¹⁰

¹¹ Impacted canines can affect the structure of adjacent teeth.¹² Mandibular third molar impact is a clinical condition that can lead to pericoronitis, caries, and resorption of adjacent teeth.^{11,13}

Impacted third molars are categorized into three levels based on the depth of impaction to the adjacent teeth, according to Pell and Gregory's classification: level A, level B, and level C. The occlusal plane of the impacted third molar is at the same level as the occlusal plane of the adjacent tooth on level A. On Level B, the impacted third

molar's occlusal plane is facing in between the occlusal plane and cervical line of the second molar. On level C, the occlusal plane of the impacted third molar is apical to the cervical line of the adjacent tooth. Whereas, according to the classification made by Winter, the impacted third molars angulations are defined as Distoangular (Da), Mesioangular (Ma), Transverse (T), Vertical (V), and Horizontal (H).^{10,14,15}

According to Kaczor-Urbanowicz et al,⁹ the etiological factors of impaction are divided into three groups: systemic, local, and genetic. Systemic factors that can influence impaction are endocrine deficiency (hypothyroidism), cleidocranial dysostosis, amelogenesis imperfecta, and radiation therapy. Meanwhile, the local factors that influence impaction are the failure of bone resorption in deciduous tooth, premature loss of deciduous tooth, prolonged retention of deciduous tooth, abnormal eruptive path, supernumerary teeth, dental crowding and space loss, formation of soft tissue into a pathological shape, enlargement of dental follicles, early extraction of a deciduous tooth, thickened post-extraction or post-trauma repair of the mucosa, dental trauma, odontoma, anomaly of a tooth position, ankylosis of deciduous molar, root dilacerations, and alveolar cleft. Lastly, the genetic factor includes genetically inherited factors such as malpositioned teeth and alveolar cleft.⁹

Growth of the Jaw

Maxillary growth is significantly affected by the cerebral, cranial, and nasal septal growth since birth until seven years of age. Maxillary growth occurs in two ways. The first one is when the growth occurs through suture apposition, which connects the maxilla to the cranium and the cranial base; and the second one through bone remodeling. Apposition occurs on both sides of the suture and the posterior edge of the maxilla. The bone where the maxillary attaches would grow in size and the posterior edge that is the tuberosity area, forms more room for the permanent molars to erupt. Surface apposition also occurs on the anterior sides of the maxillary arch, which would cause the

growth of the maxilla after two years of age.¹⁶

The mandibular growth can also occur in two types of way. The first is the mandibular growth pattern when the chin grows downward and forward while the posterior and cranium base remains. The second type of growth pattern is when the growth occurs more prominently on the ramus' posterior edge, coronoid, and condyles of the mandible. The mandible growth is generally influenced by changes due to the maxilla's growth.¹⁶ The dental arch generally grows up until the age of 13, or until the peak of the growth period. After this period passes, the dental arch's size gradually stabilizes.¹⁷

Diet

Diet is a type of food that a person usually eats.¹⁸ The definition of a healthy diet continues to evolve, as the understanding of how essential nutrients, role of different foods in the body, and the components of food may affect the health and disease still continuously shifts.¹⁹ Nutrition is the process of taking food used for growth, metabolism, and repair of tissues.^{18,20}

The first few years after birth are crucial because of an increasing diet change from an exclusive diet of milk and liquids to a modified adult diet. Breast milk is the recommended diet in the first year of a baby's life because it has many advantages such as immunity and adequate nutrition. Parents have an important role in the development of diet from milk to solid food by prioritizing food quality, weight status, and sorting out preferred foods for children.²¹

Malnutrition or what is also known as over and undernutrition in children is caused by improper eating and feeding behavior during infancy and childhood. Malnutrition also causes disturbances in the small intestines which can cause malabsorption in children. Factors that influence malnutrition are difficulty in accessing fresh food, substituted nutrient-dense food with cheaper, low nutrition, high energy, high-fat, and high-sugars food. The eating habits of a traditional ethnic group can also influence diet and increase the risk of dental disease in childhood and growth period.^{21,22}

In the period of growth, diet patterns affect growth. To be able to avoid various diseases, prevention is carried out in the form of consuming healthy and nutritious food, reducing sugar consumption, brushing teeth with the right technique, and applying fluoride to the teeth. Fluoride can easily be obtained from drinking water. Reducing sugar consumption is also food as in energy drinks because they contain citric and phosphoric acids which can demineralize tooth enamel. Teeth brushing, gargling regularly, and chewing sugar-free gum are some of the things that can be done to prevent carbohydrates from fermenting quickly. Some substances that can protect teeth from disease in the form of fat, protein, and calcium. Milk which is high in calcium and phosphorus will prevent the pH in the oral cavity from dropping and help remineralization to avoid diseases and infections. Choosing foods that contain high fiber can also increase saliva in the oral cavity, therefore, antibacterial activity increases.²¹

Correlation between Diet and Wisdom Teeth

Growth is subject to variability and imperfections due to the evolutionary process of human species. In the past, humans needed more molars to chew raw and hard foods, but as they evolved, their jaws became smaller and there was more space for the eighth tooth to develop normally.²² As a result of the gradual evolutionary reduction in the size of the human mandible and/or maxilla, the mandible or maxilla is too small to develop proper molar or retromolar spaces.^{23,24,25}

The remains of early humans' cranium that were found tend to have bigger jaws and more teeth which had the essential function to crush and grind raw plants to help with the digestion of cellulose, as well as dense meats. As time flew by, the change in the human's diet caused a decrease in the jaw size, which made it have less space for the teeth to grow in. This obviously causes a lot of dental problems, especially when the third molars, the last teeth to erupt, starts to grow. There is not enough space for the third molar to grow, resulting in the impaction or abnormal erup-

tion of the third molar, which ultimately led to the declining function of the third molar.¹

The time of eruption the third molars can be influenced by the nature of the food that can cause attrition, the diameter of the mesiodistal crown has decreased, the level of use of chewing tools, and heredity factors. It was also found that the modern diet results in loss of growth stimuli in the jaw, therefore, modern humans have experienced impacted and unerupted teeth. Since modern diets tend to be gentler, they require no effort in chewing, which results in the loss of growth stimuli in the jaws. As a result, modern humans have teeth that are damaged and do not erupt. Among adults in Ireland, Western Europe, the United States, and Canada, it was suggested that the leading cause of deviation and impaction of teeth was artificially fed infants. Some cases in childhood show that habits can develop due to interbreeding and excessive consumption of food, especially sweeteners eaten by children and adolescents, which will result in an imbalance between the jaw and teeth.^{26,27,28}

Nutrition is essential in the development of teeth, albeit, it will affect oral hygiene. Lack of nutrition can lead to developmental diseases such as: 1) protein deficiency will cause salivary gland dysfunction, decreased enamel solubility, and delayed tooth eruption; 2) epithelial tissue development, tooth formation, and enamel hypoplasia are all affected by vitamin A deficiency; 3) hypomineralization, delayed tooth eruption, abnormality of alveolar bone pattern, and absence of lamina dura, due to vitamin D and calcium deficiency; 4) vitamin C insufficiency causes delayed wound healing, dentin malformations, bleeding gums, pulp changes, and impaired collagen development; and 5) vitamin B insufficiency causes angular cheilitis and periodontal disease.^{21,29}

CONCLUSION

Dietary shifts can affect the growth of jaws, therefore, modern humans can experience impacted or unerupted teeth more commonly.

Conflict of Interest

The authors declare that there is no conflict of interest in this study.

REFERENCES

1. Bharathi A, Babu KY, Mohanraj KG. Vestigiality of wisdom teeth in relation to human evolution and lifestyle modification: A cross-sectional study. *Drug Invent Today*. 2018;10(10).
2. Reitsema LJ. Dietary reconstruction from bones and teeth. *The International Encyclopedia of Biological Anthropology*. Hoboken, NJ: Wiley Blackwell, 2018; p. 1-3.
3. Alkhen B, Abumustafa A, Tolarova M. Are we going to have wisdom teeth in the future? Cologne, Germany: Institute for Quality and Efficiency in Health Care (IQWiG); 2019. 473-81 p.
4. Qutbi R. Gambaran sosiodemografi serta prevalensi dan insidensi kasus gigi impaksi di RSUD Dr. Moewardi Surakarta periode 2013-2017 [Skripsi]. Surakarta: Universitas Muhammadiyah Surakarta; 2018.
5. Safril JW. Karakteristik impaksi gigi molar ketiga rahang bawah pada pasien Rumah Sakit Gigi dan Mulut Universitas Airlangga Tahun 2017-2019 [Tesis]. Surabaya: Universitas Airlangga; 2019.
6. Siddiqui SR, Agrawal S, Monga HS, Gaur A. Prophylactic removal of the third molars: justified or not. *J Int Oral Health*. 2015;7(11):132.
7. Ghaeminia H, Nienhuijs ME, Toedtling V, Perry J, Tummers M, Hoppenreijts TJ, et al. Surgical removal versus retention for the management of asymptomatic disease-free impacted wisdom teeth. *Cochrane Database Syst Rev*. 2020; 5(5):CD003879.
8. Shoshani-Dror D, Shilo D, Emodi O, Rachmiel A. Impacted wisdom teeth: to extract or not to extract? Review of the literature. *Refuat Hapeh Vehashinayim* (1993). 2016;33(3):40-8.
9. Kaczor-Urbanowicz K, Zadurska M, Czochrowska E. Impacted Teeth: An interdisciplinary perspective. *Adv Clin Exp Med*. 2016;25(3):575-85.
10. Al-Dajani M, Abouonq AO, Almohammadi TA, Alruwalii MK, Alswilem RO, Alzoubi IA. A cohort study of the patterns of third molar impaction in

- panoramic radiographs in Saudi population. *TODENTJ*. 2017;11:648-60.
11. Scarfe WC, Angelopoulos C. Maxillofacial cone beam computed tomography: principles, techniques and clinical applications. Cham, Switzerland: Springer; 2018.
 12. Arnautska H. Clinical application of a protocol for early diagnosis of impacted upper canines. *Int J Sci Res*. 2015; 4(11):1392-7.
 13. Oad HK, Devi K, Mirani SA. Mandibular wisdom teeth; evaluation of mandibular wisdom teeth impaction pattern, frequency and associated variables among patients of Larkana. *The Professional Medical Journal (TPMJ)*. 2019;26(01):155-9.
 14. Hashemipour MA, Tahmasbi-Arashlow M, Fahimi-Hanzaei F. Incidence of impacted mandibular and maxillary third molars: a radiographic study in a Southeast Iran population. *Med Oral Patol Oral Cir Bucal*. 2013;18(1):e140-e145.
 15. Simoneti LF, Weckwerth GM, Dionísio TJ, Torres EA, Zupelari-Gonçalves P, Calvo AM, et al. Efficacy of ketoprofen with or without omeprazole for pain and inflammation control after third molar removal. *Braz Dent J*. 2018; 29(2):140-9.
 16. Anggraini LD, Utomo RB, Sunarno, Pramono D. Premature loss dan perkembangan rahang. *Insisiva Dental Journal*. 2018;7(2):53-7.
 17. Prihatiningrum B, Sudarso ISR, Soeprihati IT. Pengaruh pemakaian braket tipe straight wire low friction (SWLF) terhadap lebar lengkung gigi anak laki-laki dan anak perempuan usia 11-14 tahun (Kajian di Klinik KGA RSGMP. Prof. Soedomo FKG UGM). *J Ked Gi*. 2015;6(4):321-6.
 18. Hujoel PP, Lingström P. Nutrition, dental caries and periodontal disease: a narrative review. *J Clin Periodontol*. 2017; 44(Suppl 18):S79-84.
 19. Cena H, Calder PC. Defining a healthy diet: evidence for the role of contemporary dietary patterns in health and disease. *Nutrients*. 2020;12(2):334.
 20. Zohoori FV, Duckworth RM, eds. *Nutrition and Diet: The Impact of Nutrition and Diet on Oral Health* Vol. 28. Basel: Karger; 2020. p. 1-13.
 21. Tungare S, Paranjpe AG. Diet and nutrition to prevent dental problems. In: *StatPearls [Internet] Treasure Island (FL)*. StatPearls Publishing; 2020. p. 1-15.
 22. Owino V, Ahmed T, Freemark M, Kelly P, Loy A, Manary M, et al. Environmental enteric dysfunction and growth failure/stunting in global child health. *Pediatrics*. 2016;138(6):e20160641.
 23. Cervino G, Cicciù M, Biondi A, Bocchieri S, Herford AS, Laino L, et al. Antibiotic prophylaxis on third molar extraction: systematic review of recent data. *Antibiotics*. 2019;8(2):53.
 24. Becchio JG, Rosende RO, Monzón JE, Fernández D, Said-Rücker PB. Ultrasonic techniques to obtain dental pulp from impacted third molars. *J Clin Exp Dent*. 2021;13(1):1-7.
 25. Fan W, Gao D, Wang Y, Chen Y, Li Y, Lu S, et al. Three dimensional measurement and analysis of mandibular characteristics in subjects with impacted mandibular second molars. *Orthod Craniofac Res*. 2020;23(3):332-41.
 26. Santosh P. Impacted mandibular third molars: Review of literature and a proposal of a combined clinical and radiological classification. *Ann Med Health Sci Res*. 2015;5(4):229.
 27. Matsuyama J, Kinoshita-Kawano S, Hayashi-Sakai S, Mitomi T, Sano-Asahito T. Severe impaction of the primary mandibular second molar accompanied by displacement of the permanent second premolar. *Case Rep Dent*. 2015;2015: 582462.
 28. Ajith SD, Shetty S, Hussain H, Nagara T, Srinath M. Management of multiple impacted teeth: a case report and review. *J Int Oral Health (JIOH)*. 2014; 6(3):93.
 29. Sheetal A, Hiremath VK, Patil AG, Sajjanetty S, Kumar SR. Malnutrition and its oral outcome—a review. *J Clin Diag Res (JCDR)*. 2013;7(1):178.