Short Communication

An evaluation of genesis and impaction of 3rd molar in Adolescents

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ABSTRACT

In the process of evolution the jaw has become smaller, allowing less room for the 3rd molars and causing numerous dental problems. Research now indicates that in many of cases there is complete agenesis of 3rd molars which may be because of environmental influence on human evolutionary process. An objective of this study is to asses genesis and impaction of 3rd molar in adolescents of Ahmedabad city. This study was done in 100 adolescents (age 15-19 years) of Ahmedabad city during January 2013 to July 2013. Genesis or agenesis and impaction of 3rd molar was confirmed by Orthopantomogram (OPG) and data was analyzed using Fisher's exact test in GraphPad Prism software (6.0.3). Out of 100 adolescents, 66 have presence of tooth-buds of all four 3rd molars, while in 23 cases OPG shows absence of tooth-bud (agenesis) of one of the four 3rd molars, in 6 cases tooth-buds of two out of the four 3rd molar were absent, in 3 cases tooth-buds of three out of four were found to be absent and in 2 cases all the four 3rd molar tooth-buds were absent. Gender difference was not significant. Different pattern of impaction was found in 38 subjects. Agenesis & impaction of 3rd molar may be a part of evolutionary process which has undergone because of changes in food habits from coarse abrasive diet to soft western diet.

Keywords: *Agenesis, 3rd molar, impaction, adolescent, food habit*

Introduction

A major conclusion of evolution is that the human jaw has shrunk from its much larger ape size to the smaller modern human size as humans evolved. In short, evolution has produced an increase in brain size at the expense of jaw size. [1] In the process, the jaw has become too small for the last teeth to erupt which are normally the 3rd molars, often called wisdom teeth. This view is usually explained as our ancestors had larger jaws, so there was room in the human mouth for 32 permanent teeth, including 3rd molars—wisdom teeth. But now our jaws are smaller. The result: There is no longer room in most of our mouths to house 32 teeth. So the last teeth we develop—our wisdom teeth—often become impacted, or blocked from erupting. [2] Impaction is defined as completely or partially unerupted and positioned against another tooth, bone or soft tissue, so that its further eruption would be unlikely. [3]

Primitive man has learned to break up food with his hand and jaw and also nature of their food was coarse and rough like leaves, roots, nuts and meats etc. which required more chewing power and resulted in excessive wear of the teeth. Nature of modern food is well cooked and soft and it does not require powerful grinding mechanism which at one time was necessary for survival of ancestors. In modern man there is very less room for 3rd molar to be spaced as compared to our oldest ancestor Neanderthal which had adequate space so that 3rd molar fit quite well. (Fig.1) [4] It is a well known fact that nature tries to eliminate that which is not used. Likewise, civilization, which has

eliminated the human need for large, powerful jaws, has decreased the size of our maxillae and mandibles.

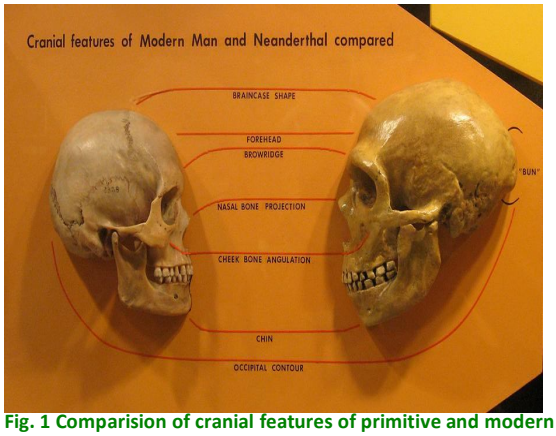

Fig. 1 Comparision of cranial features of primitive and modern Man. (www.sciforums.com)

As a direct result, in a large number of adults, the lower third molar occupies an abnormal position and may be considered a vestigial organ without purpose and function. [5] This study was done to evaluate present status of 3rd molar in evolutionary process by observing genesis or agenesis and different patterns of impaction found in adolescents in Ahmedabad city.

Material and methods

This study was carried out on 100 adolescents between age group of 15 to 19 years of Ahmedabad city. Out of 100 adolescents 68 were female and 32 were male. The reason for selecting this age group is as compared to all the other permanent teeth whose formation and eruption are completed by 12-13 years of age, the development timeline of 3rd molar is as follows. [6]

- Tooth bud formation – 4-5 years of age
- Initial mineralization – 7 -9 years of age
- End of crown mineralization – around 15 years of age
- Tooth eruption – 16-21 years of age.

Thus two upper 3rd molar and two lower 3rd molar are the last formed teeth.

Patients of 15-19 years of age group coming to clinic for dental problems were selected for the study purpose. Prior approval from ethical committee of BJ Medical College, Ahmedabad was taken. Informed consent was taken from all of them. History was taken about any extraction or trauma in past. Food pattern of all subjects is similar. All of them are vegetarian and major contents in their daily foods are green leafy vegetables, pulses and cereals which they consume in well cooked state. At first they were clinically observed for any eruption or just beginning of eruption of any of the four 3rd molars. After clinically confirming the presence or absence of eruption of 3rd molars, Orthopantomogram (OPG) was taken.

Orthopantomogram is a panoramic or wide view x-ray of the lower face which displays all the teeth of upper and lower jaw on a single film. It demonstrates the number, position and growth of all the teeth including those that have not yet surfaced or erupted. [7] OPG have certain advantages over intra-oral x-ray as low radiation dose, short time, convenient for patients and easy to store. [8]

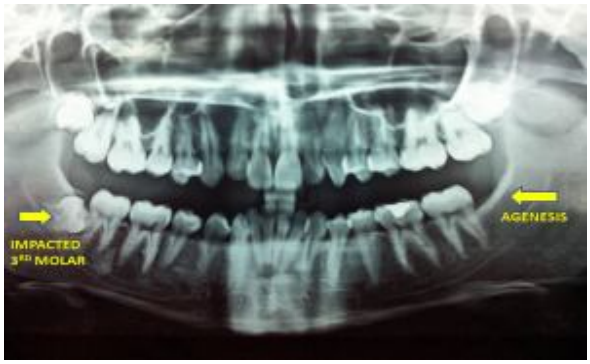

Fig. 2 Orthopantomogram showing agenesis and impaction

Orthopantomograms were analyzed using radiographic viewer and interpreted for the following.

- Agenesis (absence) of 3rd molars
- Present but not yet erupted 3rd molars
- Impacted 3rd molars
- Angulation of impacted 3rd molars like mesio-angular, disto-angular, vertical and horizontal.[9]

Data was analyzed using Fisher's exact test in GraphPad Prism (6.0.3) software.

Results

In the present study, 66% of study subjects have presence of all the four 3rd molar tooth buds while 23% have absence of any one 3rd molars, 6% have absence of any two 3rd molars, 3% have absence of three 3rd molars and 2% have absence of all the four 3rd molars. (Table 1)

Table 1: Distribution of study subjects according to genesis of 3rd molars

Genesis of 3rd molars (number)	Number (n=100)	%
All are present	66	66
Three are present	23	23
Two are present	6	6
One is present	3	3
All are absent	2	2

In this study there are 68 females, in which 42 have presence of all four 3rd molars and 26 have absence of one or more 3rd molars. Out of 32 males, 24 have presence of all four 3rd molars and 8 have absence of one or more of them. When gender difference for genesis of 3rd molar was compared using Fisher's exact test, P value equals 0.2588 which indicate this difference is statistically not significant. (Table 2)

Table 2: Gender distribution of genesis or agenesis of 3rd molars

	Genesis of all four 3rd molars	Agenesis of one or more 3rd molars	Total
Male	24	8	32
Female	42	26	68
Total	66	34	100

As the age structure of study group is kept 15 to 19 years, there are only 9 subjects found to have complete eruption or in stage of normal eruption of all four 3rd molars. While rest of the subjects have not any sign of eruption of any 3rd molar. But on Orthopantomogram 38 subjects have one or more of their 3rd molars with different angulation which may not erupt normally and get impacted in future. As previously mentioned there is complete agenesis of all four 3rd molars in 2 subjects while rest of the 51 subjects may have normal eruption in future.

Most common pattern of impaction found is mesioangular which is present in 19 subjects followed by vertical in 11 subjects, distoangular in 6 subjects and horizontal in 2 subjects. P value of frequency distribution for different pattern of impaction is <0.001 which indicates that these difference is statistically significant. (Table 3)

Table 3: Pattern of impaction of 3rd molars

Pattern	Numbers (n=38)	%
Mesio-angular	19	50*
Vertical	11	28.95*
Distoangular	6	15.79*
Horizontal	2	05.26*

***p<0.001**

When impaction of 3rd molar in maxillae and mandible is compared, impaction only in mandible is found in 18 subjects and impaction only in maxillae is found in 8 subjects while in 12 subjects impaction is found both in maxillae as well as mandible. P value of difference in frequency of maxillary and mandibular impaction is > 0.001 which indicates that this difference is statistically not significant. (Table 4)

Table 4: Frequency of impaction in maxillae and mandible

Impaction in	Number (n=38)	%
Maxillae only	8	21.05
Mandible only	18	47.36
Both	12	31.57

Discussion

In present study 34% of subjects exhibit one or more 3rd molar agenesis which is higher than findings by Garn et al. (1963)[10] (16%) , Kruger et al.[11] (15.2%) for New- Zealand population and Nanda and Chawla[12] (25.8%). Contrary to Celikoglu et al. (2011)[13] who reported missing all four 3rd molars as the most common form of 3rd molar agenesis, the present study found the most common form of 3rd molar agenesis to be missing one 3rd molar.

There is no significant difference in gender for agenesis though female have more prevalence (38.23%) of agenesis then male (25%) which is in agreement with sandhu et al [14] and Hellman. [15] In present analysis most common pattern of impaction is mesio-angular (50%) followed by vertical, (28.95%) disto-angular (15.79%) and lastly horizontal (05.26%). This result is in agreement with the findings of Nzima, [16] who found that mesioangular impactions were the most predominant type of impaction which was followed by vertical and horizontal impactions.

Impaction in mandible is the most common (47.36%) followed by impaction in both maxilla and mandible (31.57%) and impaction only in maxilla is least common

(21.05%). This tendency of more impaction in the mandible is also expressed by the results of Nanda and Chawla, [12] Gunter, [17] and Stones. [18]

Today, the modern man is working on vaccine for dental caries and stem cell dentiogenesis. But, he could not prevent impaction which is a complication of normal eruption that is created by the host due to the commonest etiologies, like facial growth, jaw size, tooth size and dietary habits. [19] Lack of space is the major cause for abortive eruption. As an associated complication, it can also cause incisor crowding, resorption of adjacent tooth root, pericoronitis and temporo-mandibular joint dysfunction. [20]

We have kept sample size of 100 which is limitation of our study but our objectives of finding increasing incidence of agenesis and impaction of 3rd molar was achieved. Though this is pilot study, there is requirement of more detail research in response to larger sample size and statistical analysis in future to support theory of evolution.

From the above study it can be concluded that there is increase in the prevalence of agenesis and impaction of 3rd molar. Mesio-angular is the commonest pattern of impaction of 3rd molar. Percentage prevalence of agenesis of 3rd molar is more in female. Impaction is more common in mandible as compared to maxilla.

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