IJMPR 2018, 2(4), 38-41

International Journal of Modern Pharmaceutical Research
www.ijmpronline.com

ISSN: 2319-5878
IJMPR
Research Article
SJIF Impact Factor: 3.458

WISDOM TOOTH - ERUPTION: FORENSIC IMPLICATIONS

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Received on: 09/07/2018
Revised on: 30/07/2018
Accepted on: 20 /08/2018

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ABSTRACT

Wisdom teeth, also called adult's third molars, are the four permanent third molar teeth, the most posterior of the three molars per quadrant. They are called so as they erupt during the adolescence, between 14 and 21 years of age.[1,2,3,4,5,6] This study describes the age of eruption and its relation with other socio-demographic details of the adolescents living in Thiruvananthapuram district in Kerala, South India. **Background**: - If the age of an adolescent, either an accused or a victim, in a criminal case is unsure or disputed, examination of the third molar, physical examination with or without radiological examination, will help to calculate the most probable age especially to decide whether he/she is a juvenile or an adult. **Materials & Methods**: - Eruption of Wisdom teeth in 706 adolescent students of Higher Secondary and Senior Secondary Schools from three places, one each from an urban, semi-urban, and rural area, between the ages 14 and 18 was studied by clinical examination. **Results:** - The most probable age of gingival emergence was 16 in the male and 15 in the female. **Conclusion**: - Wisdom teeth eruption is a reliable indicator for age determination among adolescents and young adults involved in medico-legal cases when recorded dates of birth are not available or disputed. The females showed one year precedence over the males.

KEYWORDS: Wisdom Tooth, Eruption, Age Assessment.

BACKGROUND

Age is an important criteria to establish the identity of a living person, a dead body, or mutilated specimen in unknown, suspicious, missing, or disputed case. The teeth are very important especially in adolescent cases and mutilated specimens as they are resistant to putrefaction and burns. Age is significant in many civil and criminal cases. The third molar teeth erupt during the adolescence generally; but they may be totally absent, delayed or even impacted. Ages 12, 14, 16, 18, and 21 have many medico-legal significances.

OBJECTIVE

To describe the age of eruption and its relation with other socio-demographic details of the adolescents living in Thiruvananthapuram District in urban, semi-urban, and rural areas.

MATERIALS AND METHODS

- **Study Design**: Descriptive Study.
- **Study Population**: School Children between the age group of 14 and 18 years.
- **Sample Size**: 706
- **Sampling**: All healthy students in the class, irrespective of age, sex, caste, and religion were included in the present study.
- **Study Setting**: Schools, both government and private, as well as urban, semi-urban, and rural.
- **Study Variables**: Age, Gender, Age of eruption of wisdom tooth, Upper jaw – Lower jaw, Study area.
- **Study Groups**: Group 1: Age 14; Group 2: Age 15; Group: 3 Age 16; Group 4: Age 17; Group 5: Age 18.

Method

The principals were contacted in advance and date and time finalized; consent from the parents and students were obtained; all the students were educated briefly about the procedure involved; all the students present on the day were examined in person with the help of the respective class teachers. A specially designed format was used for each student. The students were healthy both physically and mentally. The examination was done under adequate natural light in an orderly way in all the four quadrants: right maxillary, left maxillary, right mandibular, and left mandibular. Digital palpation and assisted light were used as and when necessary. Eruption of wisdom teeth in 706 adolescent students of Higher Secondary and Senior Secondary Schools from three places, one each from an urban, semi-urban, and rural area, between the ages 14 and 18 was studied by such examination. All of them had documented dates of birth and the completed year of birth was taken. Rupture of the alveolar gum by the teeth visualized or felt by digital palpation was considered as eruption of the teeth.

RESULTS

There were 372 (52.7%) male sand 334 (47.3%) females. The age distribution varied from 14 to 18 years. Age and gender distribution of study participants is shown in Fig: 1. Only 27 students were of age 18. Percentage of wisdom tooth eruption in each age group is described in Table: 1.

Table 1: Wisdom tooth eruption across different age groups.

Age	Number of participants	Wisdom tooth eruption No	Wisdom tooth eruption %
14	155	4	2.58
15	206	20	9.71
16	193	75	38.86
17	125	37	29.60
18	27	6	22.22

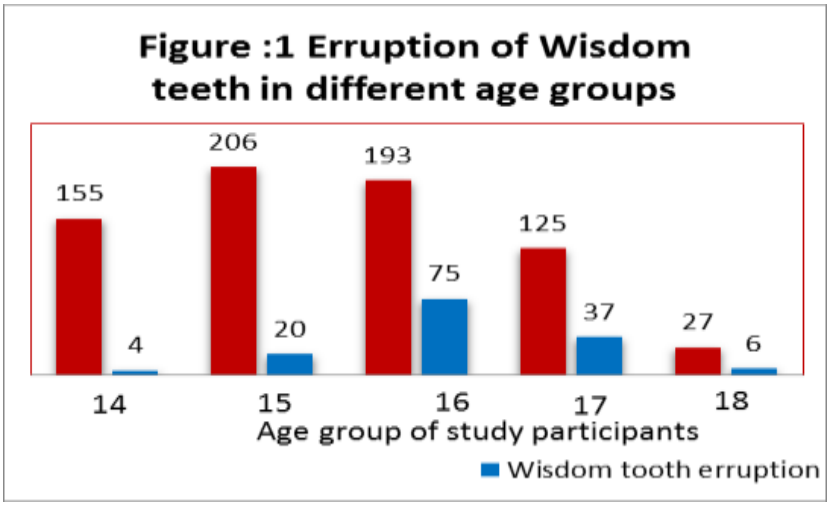

Table 2: Age and Gender distribution of Wisdom tooth eruption.

Age	Total Number	Males	Males with Wisdom Tooth No (%)	Females	Females with WT No (%)
14	155	77	2 (2.6)	78	2 (2.6)
15	206	122	8 (6.6)	84	12(14.3)
16	193	99	39(39.4)	94	36(38.3)
17	125	55	21(38.2)	70	16(22.9)
18	27	19	4(21.1)	8	2(25)
	706	372	74(19.9)	334	68(20.1)

Table 3: Association of Gender distribution and Wisdom tooth eruption.

	Males No (%)	Females No (%)
Wisdom Tooth Erupted	74(19.9)	68(20.1)
Wisdom Tooth Not Erupted	298(80.1)	287(79.9)
Total	372(100)	334(100)
Chi Square test : 4.198, p-value-0.04 → Significant		

1. Minimum age of gingival emergence was 14 in the male.
2. Minimum age of gingival emergence was 14 in the female.
3. Most probable age of gingival emergence was 16 in the male.
4. Most probable age of gingival emergence was 15 in the female.
5. Minimal age of gingival emergence was 16 in the upper jaw.
6. Minimal age of gingival emergence was 15 in the lower jaw.
7. Most probable age of gingival emergence was 16 in the upper jaw.
8. Most probable age of gingival emergence was 16 in the lower jaw.

DISCUSSION

Age determination plays an important role in anthropological research. Legal complications can be quite different if an accused of unknown age or disputed age is judged juvenile or adult erroneously. The eruption of teeth may be affected by genetics, general health, and environmental factors according to some studies, but according to some other studies racial, environmental, geographical, and religious factors do not have any

influencing role in the eruption. For their eruption smoothly, there must be sufficient space / growth at the posterior parts of the jaws – maxillary (upper) and mandibular (lower) - by normal development. Wisdom teeth that haven't erupted completely within the speculated time are called impacted teeth and semi-impacted teeth depending on whether they are fully submerged within the gum or partially erupted through the gum. Dentition is very reliable and dental examination, especially added with X-Ray examination, can be a very good tool to assess the age, either alone or in combination with other age determinants. Unlike the bones, the teeth can be directly observed or palpated digitally. The teeth are resistant to putrefaction and other destructive processes like fire for a noteworthy longer time than other body materials including bones.

Human beings have two sets of teeth in the lifetime: deciduous (primary or baby or milk) and permanent. The development of tooth originates with the creation of cellular tooth germ within the alveolar bone in the figure of a crown. Calcification of enamel and dentin takes place within this germ till the complete formation and calcification of the crown. Root materialization starts after the conclusion of the crown. As root becomes longer, crown erupts through the bone to emerge out of the jaw. During eruption of a permanent tooth, the root of its deciduous predecessor undergoes absorption and finally the unsupported crown falls off the jaw. It takes generally four years for the complete formation and eruption of a permanent tooth. Teeth calcify from the crown to the root. Deciduous teeth are 20 in numbers, incisors (2), canine (1) and molars (2) in each quadrant, and they erupt between 6 and 30 months. Permanent teeth are 32 in numbers, incisors (2), canine (1), premolars (2) and molars (3) in each quadrant, and they erupt between 6 and 21 years generally. Permanent teeth either replace deciduous teeth (successional permanent teeth) or form behind them (super added permanent teeth). So there may be deciduous dentition, mixed dentition, or permanent dentition in a particular individual during the childhood and adolescence. Third molar is a super added permanent dentition. It will be larger, longer, heavier, and stronger. After eruption of the second permanent molar, rami of maxilla and mandible grows posteriorly for the third molar to erupt. Agenesis, impaction, partial eruption, mal eruption and full eruption are possible. Again there may be variations between the jaws: upper and lower or among the four third molar teeth in the same individual. While an un-erupted tooth can be diagnosed by X-Ray, there won't be any shadow of the tooth in the X-Ray in the case of agenesis. The calcification of a tooth, both erupted and un-erupted, can be studied by X-Ray. The third molar has a predilection for irregularity: both agenesis and impaction. The incidence of impaction is 25% of all adults.

The wisdom teeth rising in is not a forthright affair sometimes. When they are not in the precise position to blowup well, they can erupt partially and offer an abode for bacteria and infection, called pericoronitis, due to change in teeth alignment and dislodged food particles. Wisdom teeth when they get impacted under the gum can produce sensitivity and swelling at the back of the mouth in some cases. They can also present with referred headache.

Age of consent for medical examination is 12; but a child above 12 years and below 18 years cannot give a valid consent for a risky procedure like surgery where consent of the parent or guardian is required.

According to the Right to Education Act, a child is supposed to be in a school up to 14 years of age. A child below 14 years cannot be employed in a factory as 14 is the minimal age for engaging in a factory or hazardous occupation.

A person below 18 years is a minor who cannot donate blood for transfusion or organs for transplantation.

According to Juvenile Justice Act - 2000, a person who has not completed 18 years on the day of a crime is a juvenile. Trial of an accused juvenile is conducted not in an ordinary criminal court, the case is referred to the Juvenile Justice Board. The board may release, advise, arrange counselling, sentence for community service, released on probation or subject to trial. If a juvenile is found guilty in a murder case, he cannot be sentenced to life imprisonment or death or imprisoned in an ordinary prison in India. Changes were made in this act with effect from 15th January, 2016 so that the age group between 16 and 18 involved in heinous offences can be tried as adults.

Age for marriage differs in different countries. According to Child Marriage Act-1978, a woman under 18 years and a man under 21 years cannot marry in India.

Age of consent for sexual intercourse in the female varies in different nations: 14, 15, 16 and 18. Age of consent for sexual intercourse in female is 18 now in India. POCSO Act 2012 was formed to protect children from offenses of sexual abuse, sexual harassment and pornography and to provide a child-friendly system for the trial of these offences. According to this act, child means any person below the age of eighteen years.

A person becomes a major at 18 years and entitled to all the civil rights and privileges of a citizen including right to vote in an election and for employment under the governments.

Twenty one is the minimal age for a person to contest for election for the Local Self Government.

The earliest age of eruption of third molar tooth is generally taken as 17 years based on studies outside Kerala. The present study is to determine whether this is

correct among the people in Thiruvananthapuram district of Kerala. Age is important in claiming civil rights, social benefits, employment, and sometimes in judicature. Determination of age among the adolescents is significant if there is any dispute in his status: juvenile or major. Physical examination for sexual characteristics, radiological examination for epiphyseal centres: appearance and fusion, and observation / palpation for the eruption of third molar teeth +/- radiological examination of third molar are the major tools for assessing the age among the adolescents and young adults so as to determine whether he/she is a juvenile or a major. Most of the data available regarding the eruption of third molar is from western countries. This case study is to find out the minimal and most probable age of eruption of third molar in Thiruvananthapuram district of Kerala and to find out whether the age of eruption is the same in the upper jaw and the lower jaw. The observations and inferences could be used to assess the most probable age in civil and criminal cases where no documented proof of age is available.

In the present study, dental examination was used to compare the eruption of wisdom teeth with the age of the adolescent and young adults. There are conflicting reports regarding the time of eruption of third molar; some studies give an earlier date for the lower jaw, while some others show no such positional difference.

In the present study, there was no appreciable difference in the age of eruption in the upper and lower jaws: the most probable gingival emergence of the wisdom teeth being 16 years of age. But in the case of gender, there was difference and it followed the overall scenario. The most probable age of gingival emergence of the wisdom teeth was 15 among the females and 16 among the males.

With the completion of the development of teeth, the wisdom tooth is a dependable, if not the most ideal, determinant for assessing the age among the adolescents and young adults.

CONCLUSION

Wisdom teeth eruption is a reliable indicator for age determination among the adolescents and young adults involved in medico-legal cases, both accused and victim, when recorded dates of birth are not available or disputed. Age of alveolar emergence of the wisdom teeth provides a useful data for assessing the minimum age and most probable age for a person under investigation or on trial. The females showed one year precedence over the males. But it may be advisable to combine with other features especially X-Ray evaluation of the crown and root of the teeth.

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