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# **Knowledge, Attitude and Practice Among Dental Students on Amelogenesis Imperfecta**

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#### ABSTRACT

The study aims at assessing the awareness of amelogenesis imperfecta among dental students of a private dental college. Amelogenesis imperfecta is a genetic disorder which affects both primary and permanent teeth. It occurs due to the defective formation of enamel. The study had a sample size/respondents of 100 dental students. An online survey with a pretested and validated questionnaire consisting of 10 questions testing awareness of amelogenesis imperfecta. The Questions regarding reason for AI,occurrence, types, clinical features, differential diagnosis and treatment were framed and shared with 100 dental students and their answers were recorded. Data was entered in Microsoft Excel sheets. The results were demonstrated in the form of pie charts. It is found from this study that there is moderate knowledge on amelogenesis imperfecta amongst dental students. It is essential to create awareness of amelogenesis imperfecta to diagnose it with clarity and to suggest treatment for Amelogenesis Imperfecta accordingly

**KEY WORDS:** AWARENESS, AMELOGENESIS IMPERFECTA, DENTAL.

#### **INTRODUCTION**

Amelogenesis imperfecta is a rare genetic disease affecting enamel.Both primary and permanent teeth are affected(Toupenay et al., 2018).The prevalence varies from 1:700 to 1:14 000, according to the populations studied. Clinical features of patients with AI varies according to the type of AI involved. AI has been classified and categorised based on clinical, radiographic, and

#### ARTICLE INFORMATION

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NAAS Journal Score 2020 (4.31) SJIF: 2020 (7.728) A Society of Science and Nature Publication, Bhopal India 2020. All rights reserved. Online Contents Available at: http://www.bbrc.in/ Doi: http://dx.doi.org/10.21786/bbrc/13.7/88 histologic appearance of the enamel defect and the mode of inheritance of the trait. AI has been categorized as hypoplastic (autosomal dominant/autosomal recessive/xlinked dominant), hypocalcified (autosomal dominant/ autosomal recessive), hypomaturation types (autosomal recessive/x-linked recessive/autosomal dominant) and hypoplastic-hypomaturation type(Mehta, Shah and Thakkar, 2013.

Hypoplastic AIH (type I) consists of quantitative alteration of enamel with localized or generalized reduced thickness. Teeth are yellow to light brown, the surface is rough with pits or larger area defects(Toupenay et al., 2018). Radiographically, hypoplastic type is characterised by the presence of thin radiopaque layer of enamel with normal radiodensity. Hypocalcified type of amelogenesis imperfecta is the most common type and is characterized by normal size and shape of crown. It is caused due to the defects of matrix structure and mineralisation. It



consists of softer enamel which wears down rapidly and can be removed by a prophylaxis instrument, teeth are dark brown colored. Radiographically, hypocalcified type is characterised with normal thickness of enamel but radiodensity of enamel is less than that of dentin.

Hypomaturation form of amelogenesis imperfecta is characterized by normal thickness of enamel but softer than normal but harder than hypocalcified type and may crack away from the crown, mottled-colored cloudy white/yellow/brown/snow capped. Radiographically, enamel radiodensity is similar to that of dentin. Histologically, in hypomaturation type, alterations in enamel rod and rod sheath structures had been noted in various studies(Mehta, Shah and Thakkar, 2013).In hypoplastic hypomaturation with taurodontism, the enamel is thin, mottled yellow to brown, and pitted. Molar teeth exhibit taurodontism and other teeth have enlarged pulp chambers. Diagnosis is based on the family history, pedigree plotting and meticulous clinical observation(Crawford, Aldred and Bloch-Zupan, 2007). Differential diagnosis includes fluorosis, dentinogenesis imperfecta. Preventive and restorative treatment as well as considerations for esthetic issues is very important since the crown are yellow from exposure of dentin due to enamel loss.

The main objectives of treatment is pain relief, preserving patient's remaining dentition, and to treat and preserve the patient's occlusal vertical height.Previously our department has published extensive research on various aspects of prosthetic dentistry ('Evaluation of Corrosive Behavior of Four Nickel–chromium Alloys in Artificial Saliva by Cyclic Polarization Test:An in vitro Study', 2017; Ganapathy, Kannan and Venugopalan, 2017; Jain, 2017a, 2017b; Ranganathan, Ganapathy and Jain, 2017; Ariga et al., 2018; Gupta, Ariga and Deogade, 2018; Anbu et al., 2019; Ashok and Ganapathy, 2019; Duraisamy et al., 2019; Varghese, Ramesh and Veeraiyan, 2019), this vast research experience has inspired us to research about the knowledge,attitude and practice on amelogenesis imperfecta, a survey has been conducted.

#### MATERIAL AND METHODS

The study was conducted in a private dental institution in Chennai. The study setting was carried out in a University setting with approval of the Institutional review board.

**Inclusion criteria and Exclusion criteria:** Undergraduate third year students, final year students and Interns were included in the study. Post graduate students and dental practitioners were excluded from the study.

**Data Collection:** A pre-tested questionnaire with 10 questions was formulated for the collection of information. The questionnaire was simple and brief. The self made questions were developed. The questionnaire included self made questions to assess about the knowledge, practise and awareness among the dental students regarding reason for AI,occurrence, types, clinical features, differential diagnosis and treatment

were framed.The questionnaire was shared with 100 dental students and their answers were recorded. Data was entered in Microsoft Excel sheets. The results were demonstrated in the form of pie charts.

### **RESULTS AND DISCUSSION**

40% of male students and 60% of female students participated in this study. 90% of students are aware that amelogenesis imperfecta results due to defective enamel formation while 10% of students are not aware about the reason for amelogenesis imperfecta (Figure 1). Dental enamel is a highly mineralised tissue. 95% of its volume is occupied by hydroxyapatite crystals. Ameloblasts control its formation through the interaction of organic matrix molecules and various enzymes. Organic matrix molecules are enamelin, amelogenin, ameloblastin, tuftelin, amelotin, dentine sialophosphoprotein and enzymes are kallikrein and matrix metalloproteinase (Crawford, Aldred and Bloch-Zupan, 2007). During organogenesis, the enamel transitions from a soft and pliable tissue to its final form, which is almost entirely devoid of protein (Paine et al., 2001). The final composition of enamel is a result of the unique molecular and cellular activities which occurs during its genesis. Deviation from this process may lead to amelogenesis imperfecta(Chaudhary et al., 2009). Hence the defective formation of enamel causes AI.

Figure 1: Pie chart depicts the students response on the reason for amelogenesis imperfecta. 90% of students aware (blue) that amelogenesis imperfecta results due to defective enamel formation while 10% of students are not aware(green) about the reason for amelogenesis imperfecta.



30% of students are aware that amelogenesis imperfecta occurs both in primary and permanent dentition. 60% of students felt that AI occurs only in permanent dentition whereas 10% felt AI occurs in primary dentition (Figure2). 70% of students aware of the types of amelogenesis imperfecta whereas 30% of students are not aware on types of AI(Figure 3).Witkop and Sauk listed the varieties of AI, divided according to a reduced amount of enamel (hypoplasia), deficient calcification (hypocalcification), or imperfect maturation of the enamel (hypomaturation) (Weinmann, Svoboda and Woods, 1945).

60% of students aware of clinical features of amelogenesis imperfecta whereas 40% of students are not aware of clinical features of AI (Figure 4). Hypoplastic AIH (type I) consists of quantitative alteration of enamel with localized or generalized reduced thickness. Yellow to light brown coloured teeth. The surface of the teeth is rough with pits or larger area defects. Severe hypoplastic phenotype leads to morphological anomalies seen on radiographic examinations. No pain is associated with this type of amelogenesis imperfecta, although some slight thermal sensitivity may sometimes be reported(Wright et al., 1992).

Figure 2: Pie chart depicts the students response on the occurrence of amelogenesis imperfecta.Only 30% of students are aware that amelogenesis imperfecta occurs both in primary and permanent dentition.



Figure 3: Pie chart depicts the students response on the type of amelogenesis imperfecta. 70% of students aware(blue) of types of amelogenesis imperfecta whereas 30% of students are not aware(green) of types of AI.



Hypomature AIH (type II) occurs due to the defect in degradation of matrix protein. In enamel, proteins must undergo degradation to achieve final crystal growth. In type II, enamel appears white or brown, without translucency. Hardness during probing and thickness of the enamel layer are normal. However, enamel breakdown often occurs. On radiographs, enamel opacity is decreased especially near the enamel dentin junction. This type of AIH is the mildest form and frequently undiagnosed. Aesthetics is the first cause of consultation(El-Sayed et al., 2011). Figure 4: Pie chart depicts the students response on the clinical features of amelogenesis imperfecta.60% of students aware(blue) of clinical features of amelogenesis imperfecta whereas 40% of students are not aware(green) of clinical features of AI.



Figure 5: Pie chart depicts the students response on the treatment of amelogenesis imperfecta.Only 10% of students are aware that all(full veneer crowns,prosthodontic treatment, orthodontic,periodontal) are the management of amelogenesis imperfecta.



Hypomineralized AIH (type III) is the most severe form of Amelogenesis Imperfecta. Mineral content of enamel is reduced causing pain during mastication and brushing. Teeth are very sensitive to temperature and brushing. Enamel is dark yellow or brown. Radiographically, enamel and dentin have the same radiodensity. Anxiety has often been reported in these patients due to permanent dental pain(McDonald et al., 2012).

Figure 6: Pie chart depicts the students response on the factors affecting the treatment of amelogenesis imperfecta. Only 10% of students are aware that all( type,age,severity of AI) were the factors affecting the treatment of amelogenesis imperfecta



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60% of students felt that only full veneer crown is the treatment of choice.20% of students felt that restorative is the treatment of choice. 5% of students felt that orthodontic and periodontal therapy is the treatment of choice.Only 10% felt that all (periodontal, orthodon tic, restorative, full veneer crowns) are treatment for AI (Figure 5). All periodontal, orthodontic, restorative and full veneer crowns are the treatment options. The gingival condition and oral hygiene among patients with AI were reported to be poor. Periodontal status in AI and without AI patients did not differ, but AI patients who are hypomineralized type tend to have high scores in periodontal parameters. The overall results showed that the restorations performed well, and that all the patients had positive reactions to prosthodontic treatment. Patients with AI need orthodontic treatment due to dental and/or skeletal problems. Root canal therapy is indicated when pulp exposures are caused by severe attrition or tooth reduction(Chen et al., 2013).

Figure 7: Pie chart depicts the students response on the differential diagnosis of amelogenesis imperfecta.60% aware(blue) of differential diagnosis of AI.40 % of students were not aware(green).



10% of students felt that type of AI influences treatment, 20% felt that age influences treatment,60 % felt that severity of AI influences treatment, 10% of students felt that all(type,age, severity) influences treatment(Figure 6). Treatment of AI varies according to the type of Amelogenesis imperfecta, age and severity of AI. 60% aware of differential diagnosis of AI. 40% of students were not aware(Figure 7).The commonest differential diagnosis of amelogenesis imperfecta is dental fluorosis.Other differential diagnosis is dentinogenesis imperfecta.

## CONCLUSION

Majority of students have moderate knowledge on AI.Hence it is essential to create awareness on amelogenesis imperfecta to diagnose it with clarity and to suggest treatment for Amelogenesis Imperfecta accordingly.Diagnosis of amelogenesis imperfecta is significant for proper treatment planning since each type requires different management.

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#### Conflict of Interest: Nil

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