

Knowledge, Attitude And Awareness About Different Stages Of Amelogenesis Among Undergraduate Dental Students

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ABSTRACT :

Introduction: Amelogenesis is the process of enamel formation that begins with the differentiation of the inner enamel epithelium and ends with the creation of enamel.

Aim of the study: To create awareness about different stages of amelogenesis among undergraduate dental students.

Materials and methods: A cross sectional descriptive study was conducted among undergraduate dental students. The sample size was 100 and convenience sampling was used. SPSS statistical software was used and Chi square test was used for analysis. The P value was set at less than 0.05.

Results and Discussion: 14.93% of the age group between 26-30; 4.98% of the age group between 17-20; 9.95% of the age group between 21-25; 9.45% of the age group between 31-35; 10.45% of the age group more than 35 attended this survey. The present study was conducted among undergraduate students of Saveetha dental college and hospitals. All the students were aware of

different stages of amelogenesis. In our study, it was observed that interns and final year's are more aware about this topic when compared to first years.

Conclusion: From our study, we conclude that undergraduate students are aware of amelogenesis and have moderate knowledge on it.

Keywords: Amelogenesis; differentiation; enamel; innovative technique

INTRODUCTION:

Amelogenesis is the process of enamel formation that begins with the differentiation of the inner enamel epithelium and ends with the creation of enamel.(1). It is subdivided into three categories which are presecretory, secretory and post phase secretory(1,2). The pre secretory is divided into two categories which are morphogenetic and histodifferentiation(1–3). In morphogenetic stage, the shape of the crown is determined by the bell stage of the tooth development. In histodifferentiation stage, the three changes occur which are reversal polarity, reciprocal induction and reversal of nutrition(1–4). The secretory stage divides into two categories initial and final secretory stage. Initial stage secretory phase occurs in 30% mineralization of organic matrix by amelogenin and non amelogenin; final secretory phase occurs in 90% of the mineralization in which formation of rods and interods take place, rods towards the distal extension and interods towards the proximal extension(1–5). The post phase secretory phase divides into two stages transition and maturation. In transition stage, the ameloblast cell death occurs up to 50% and in maturation stage, it is subdivided into two categories ruffle ended ameloblast and smooth ended ameloblast; the ruffled ended ameloblast introduces the inorganic material which as proximal leaky junction and distal tight junction; smooth ended ameloblast removes the organic material which as proximal tight junction and distal leaky junction(6). The modulation of ameloblast occurs in every 5 to 7 hours. Our team has extensive knowledge and research experience that has translated into high quality publications (7),(8),(9),(10),(11),(12),(13),(14),(15),(16),(17),(18),(19),(20),(21),(22),(23),(24),(25),(26). The aim of the study is to create awareness about different stages of amelogenesis among undergraduate dental students.

MATERIALS AND METHODS:

A cross sectional descriptive study was conducted among undergraduate dental students. The sample size was 100 and convenience sampling was used. A questionnaire containing 15 questions. The survey

was then done through an online questionnaire using google forms. The data was entered in an excel sheet and exported to SPSS in order to carry out the appropriate statistical analysis. Frequency and percentage was calculated and the result was represented as pie charts. Chi square analysis was done to compare the data between the different years of study.

Results:

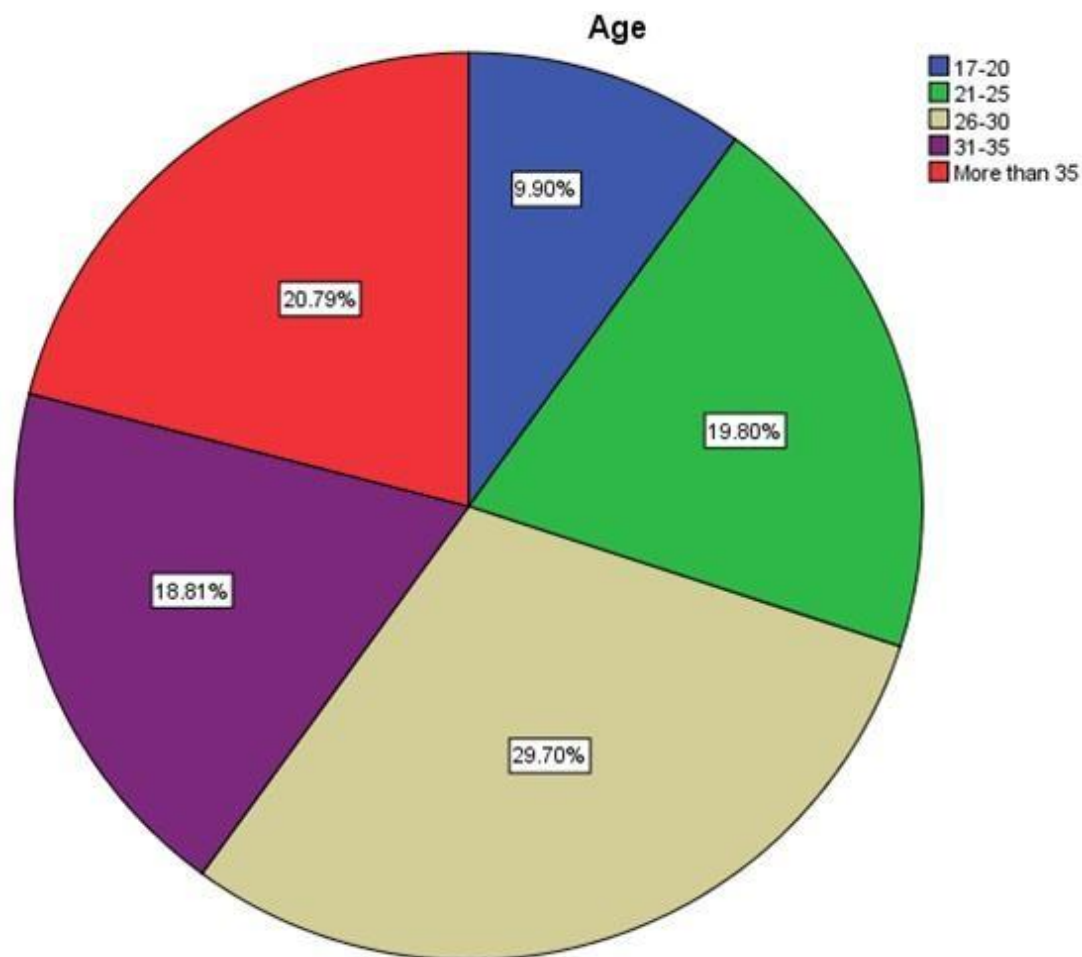


Fig 1: Shows the response of the different age group among undergraduate dental students. 29.70% of the age group between 26-30 (beige); 9.90% of the age group between 17-20 (blue); 19.80% of the age group between 21-25 (green); 18.81% of the age group between 31-35 (pink); 20.79% represents age group more than 35 attended this survey (red). Majority of the participants are of the age group of 26 to 30 years.

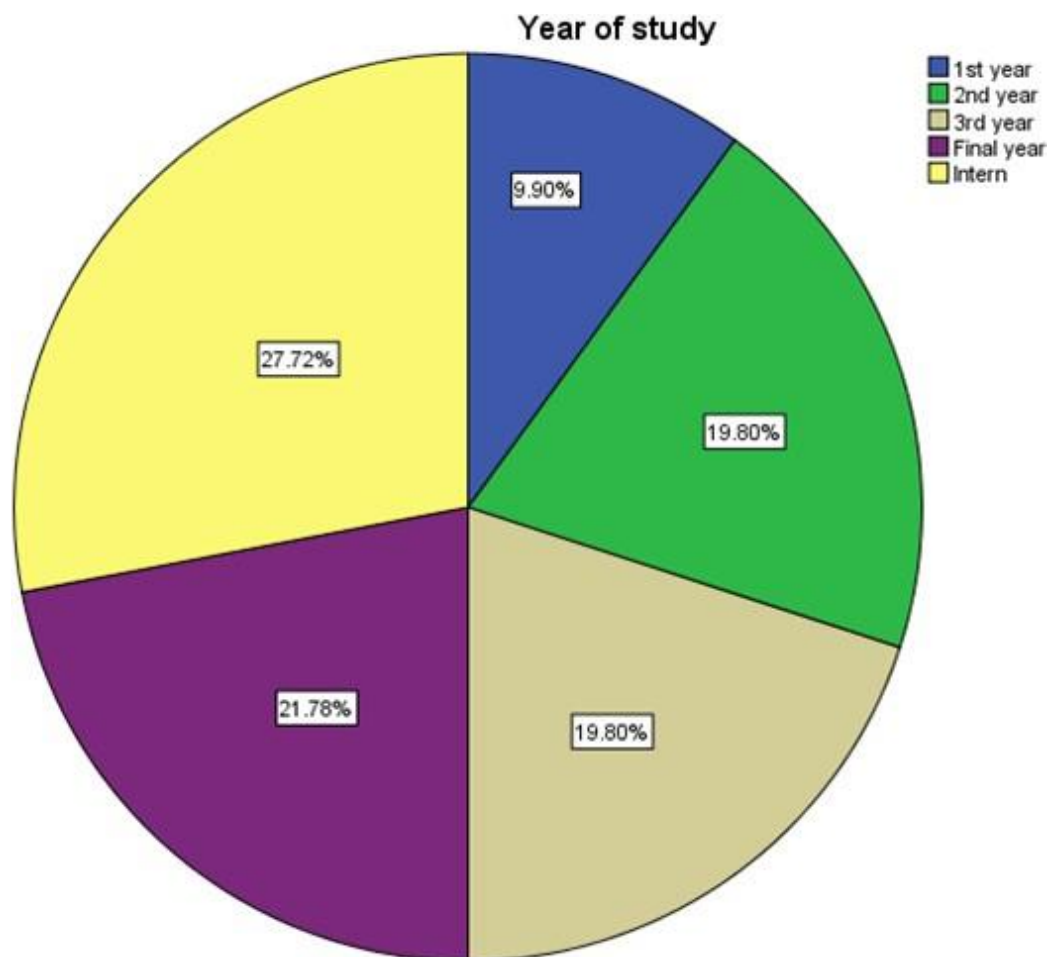


Fig 2:Shows the response of the different years of study among undergraduate dental students.9.90% of the 1st years(blue),19.80% of the 2nd years(green) and 3rd years(beige),21.78% of the final years(pink) and 27.72% of the interns(yellow) attended this survey. Majority of the participants are interns.

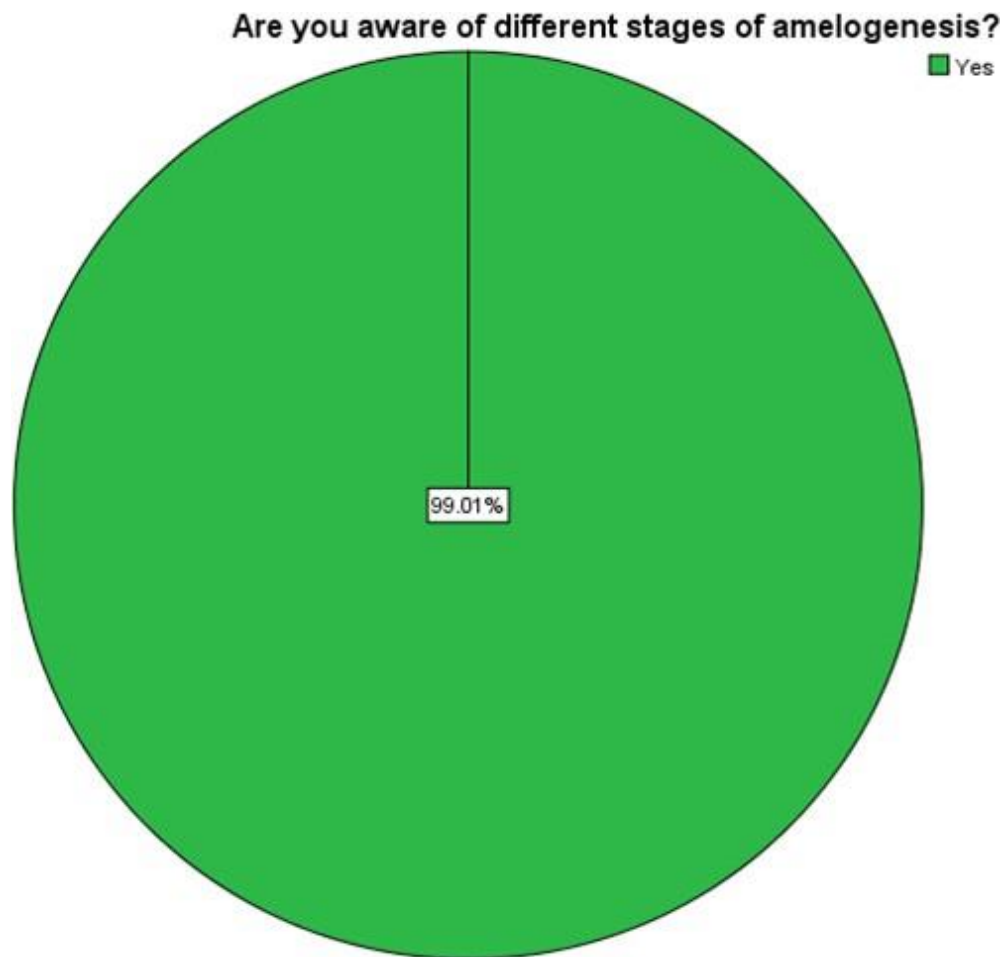


Fig 3:Shows the response of the awareness of different stages of amelogenesis among undergraduate dental students.99.01% of the all undergraduate students were aware of the different stages of amelogenesis(green).

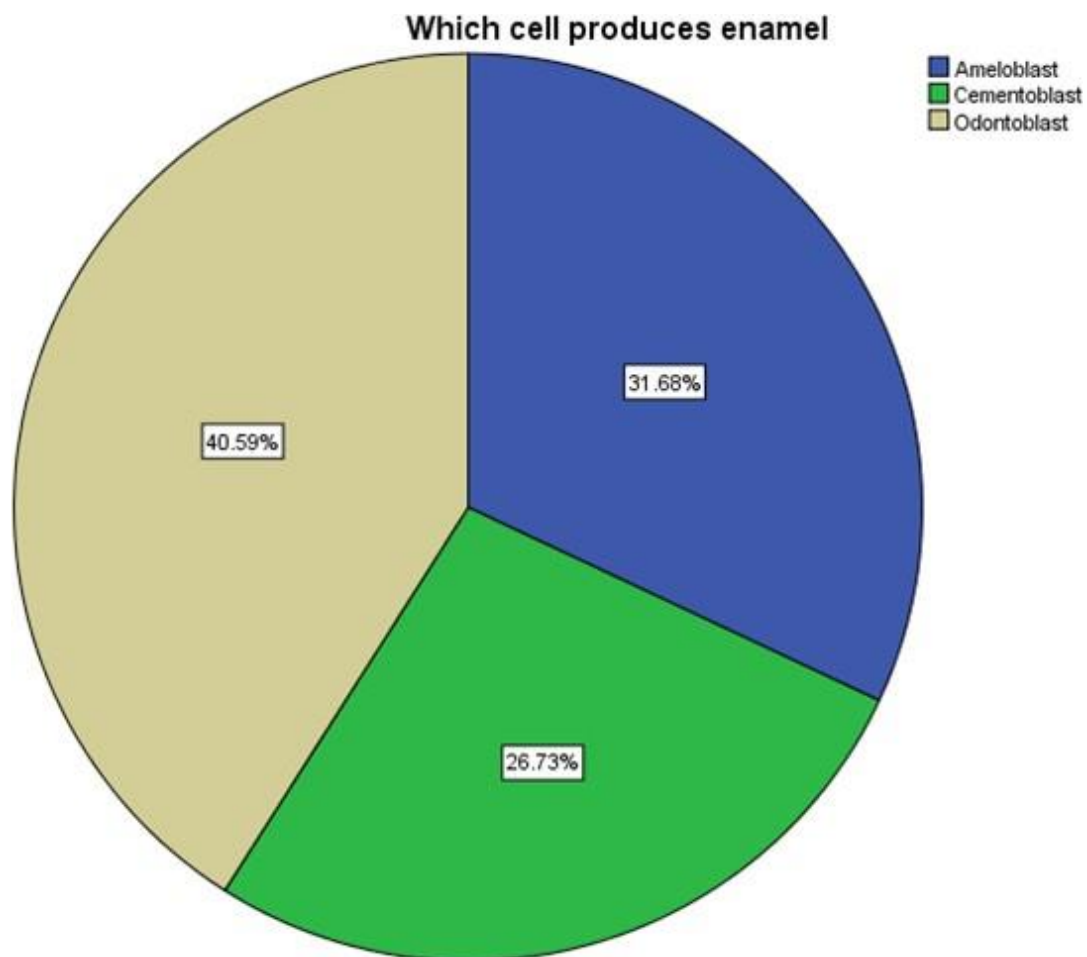


Fig 4:Shows the response of the question which cell produces enamel among undergraduate students. Blue denotes ameloblast(31.68%), 31.68% of the undergraduate students answered ameloblast correctly for the question which cell produces enamel.

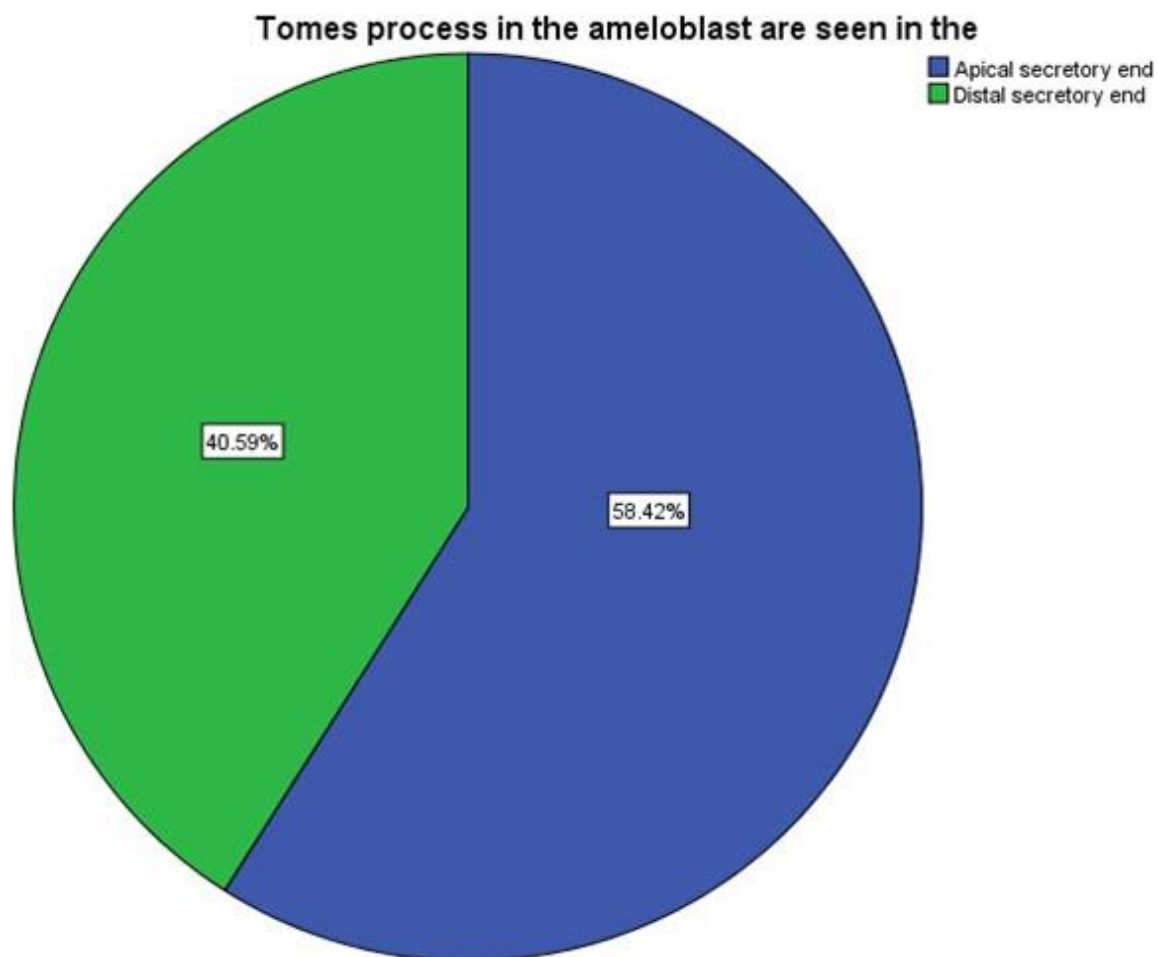


Fig 5:Shows the response of the question where the tomes process is seen , 58.42% answered that ameloblast is seen in apical secretory end(blue) and the rest 40.59% respond distal secretory end(green)

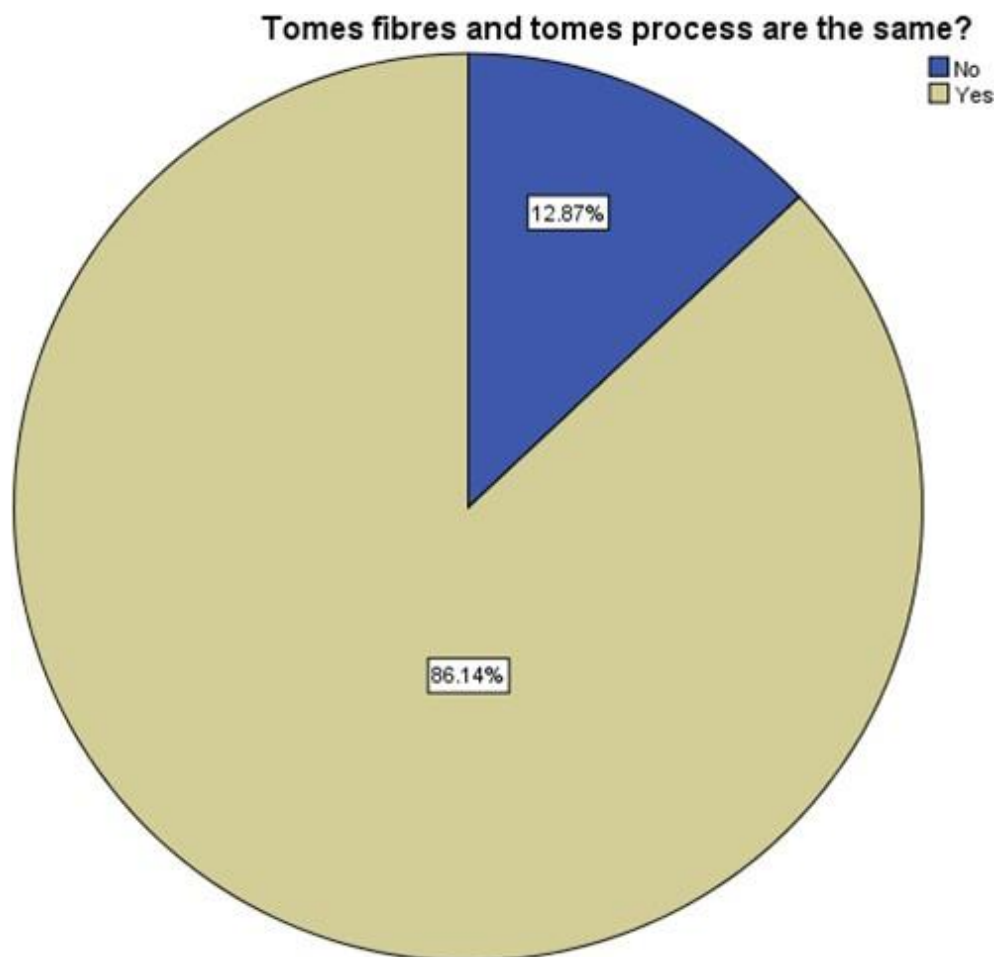


Fig 6:Shows the response of the question where the tomes process and tomes fibres are the same. 86.14% answered yes(beige) and 12.87% answered no(blue).

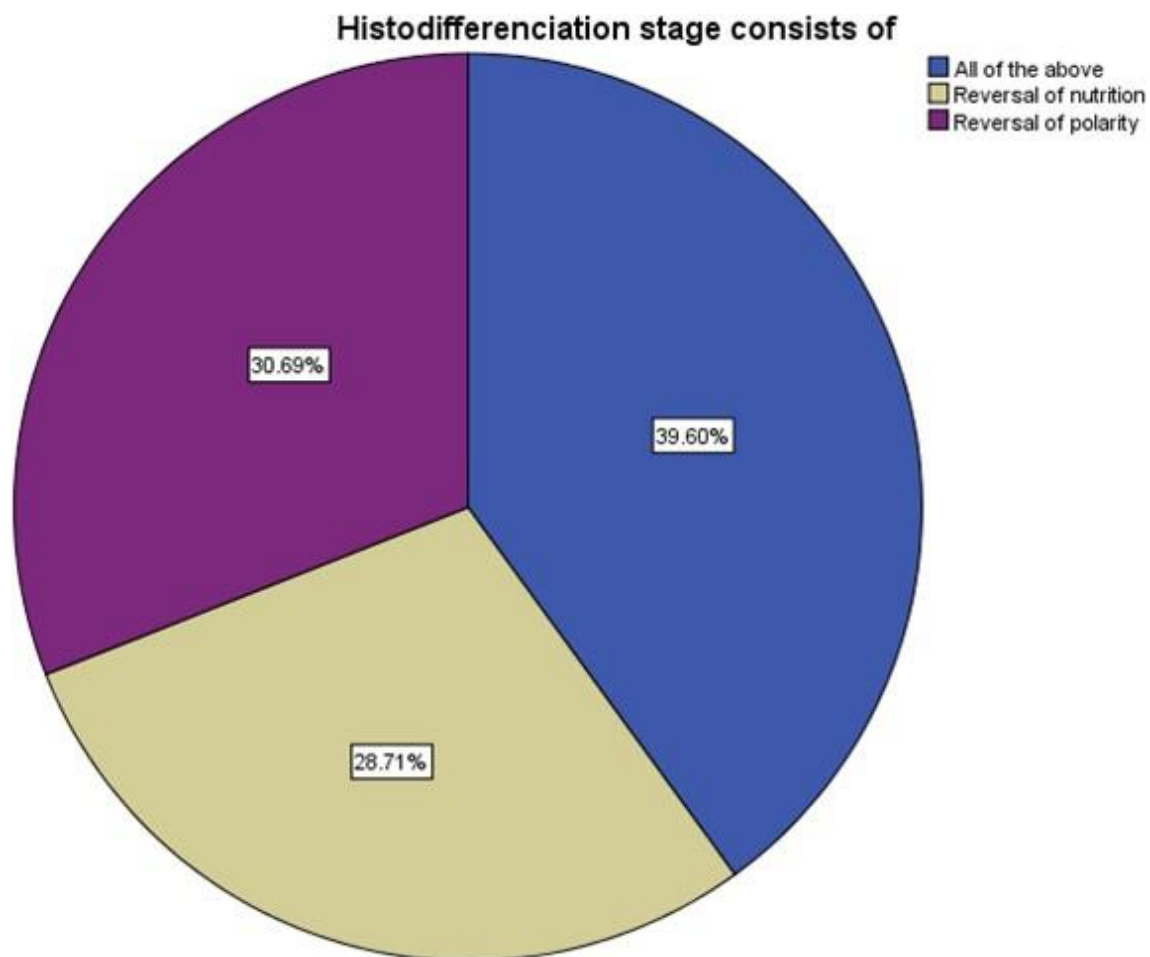


Fig 7:Shows the response of the question on various histodifferentiation stages. 28.71% answered reversal of nutrition(beige),30.69% responded reversal of polarity(pink) and 39.60% answered all of the above(blue).

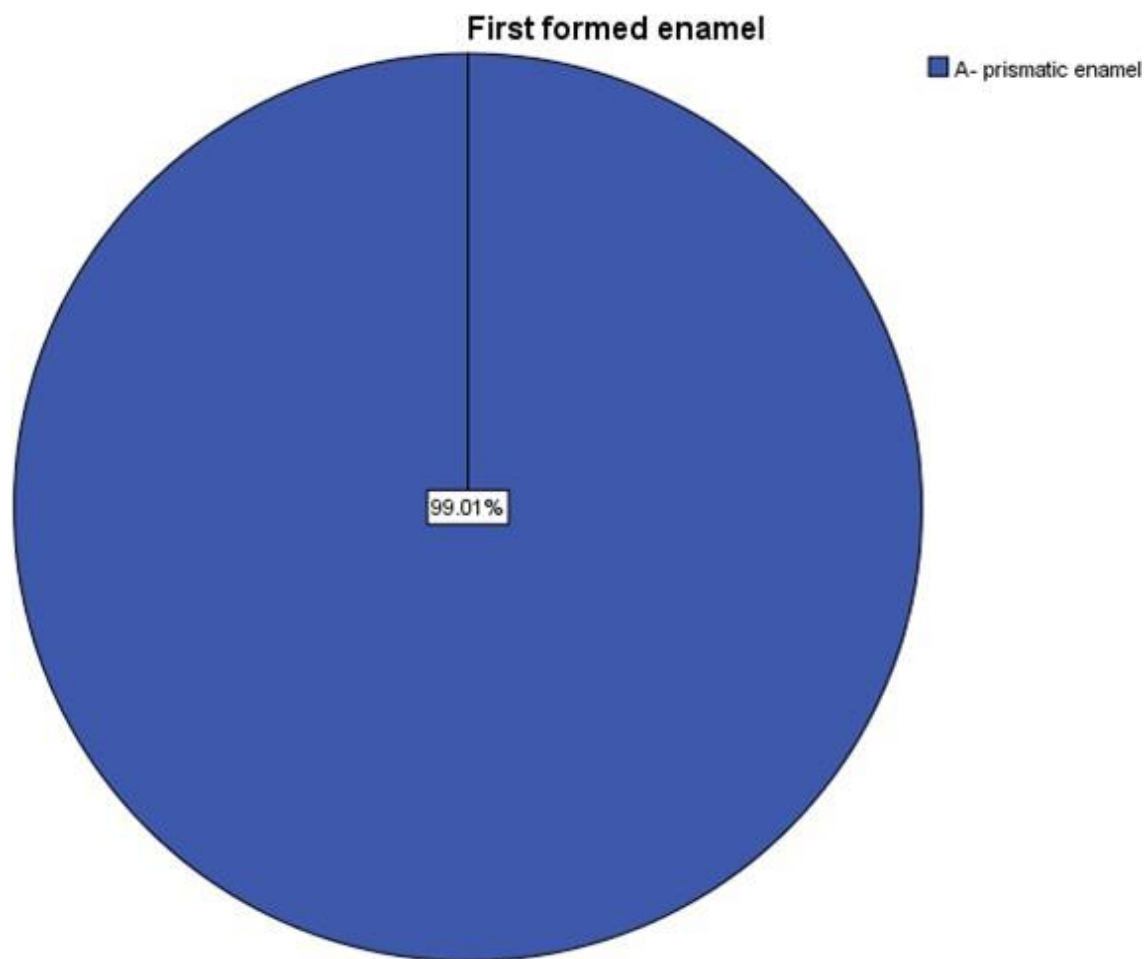


Fig 8: Shows the response of the question on the first formed enamel.99.01% answered a prismatic enamel (blue).

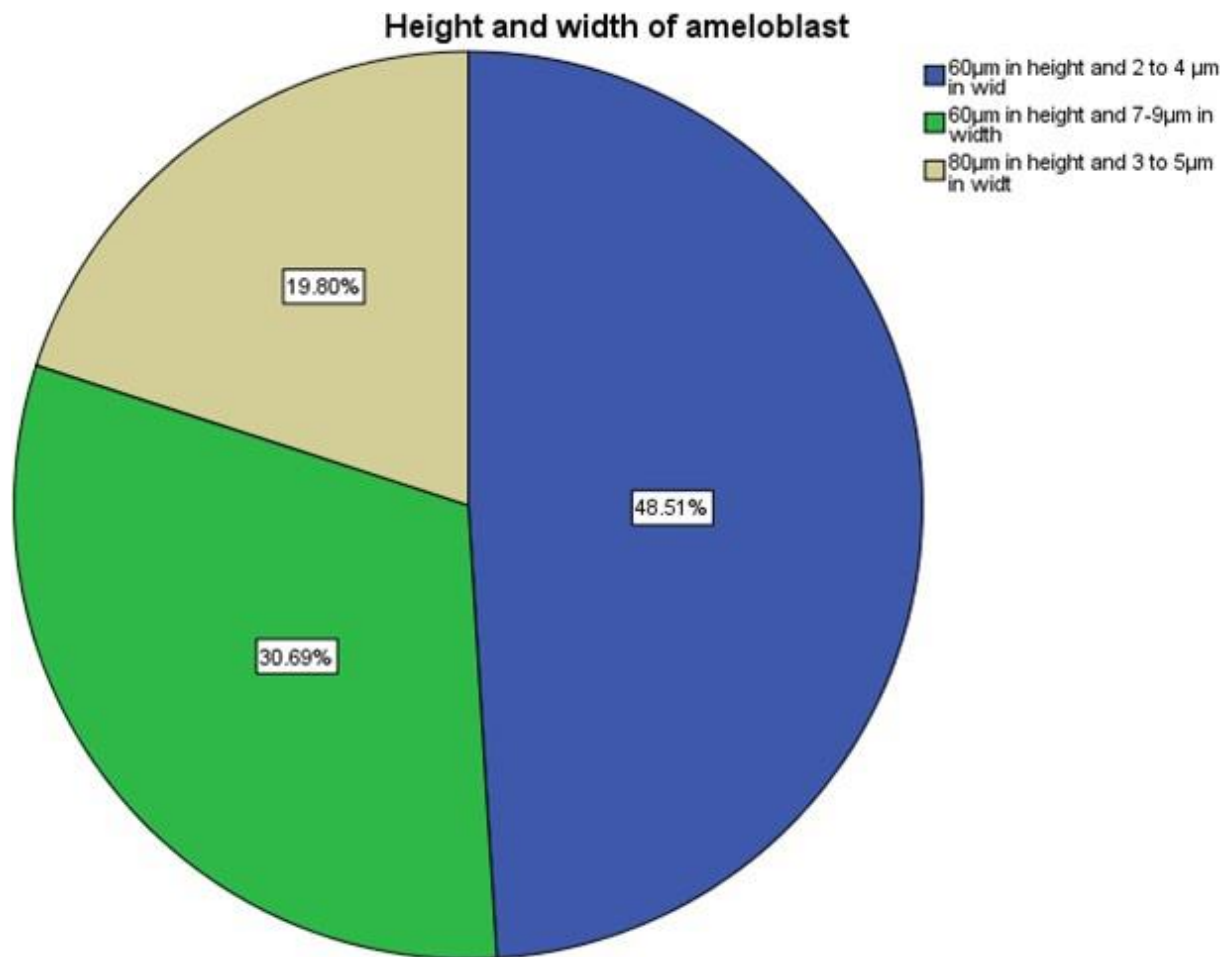


Fig 9:Shows the response of the question on the height and width of the enamel . 30.69% answered 60mu m in height &7-9 mu m in width(green) , 48.51% 60mu m in height &2-4 mu m in width(blue) and 19.80 % 80mu m in height & 3-5 mu m in width(beige).

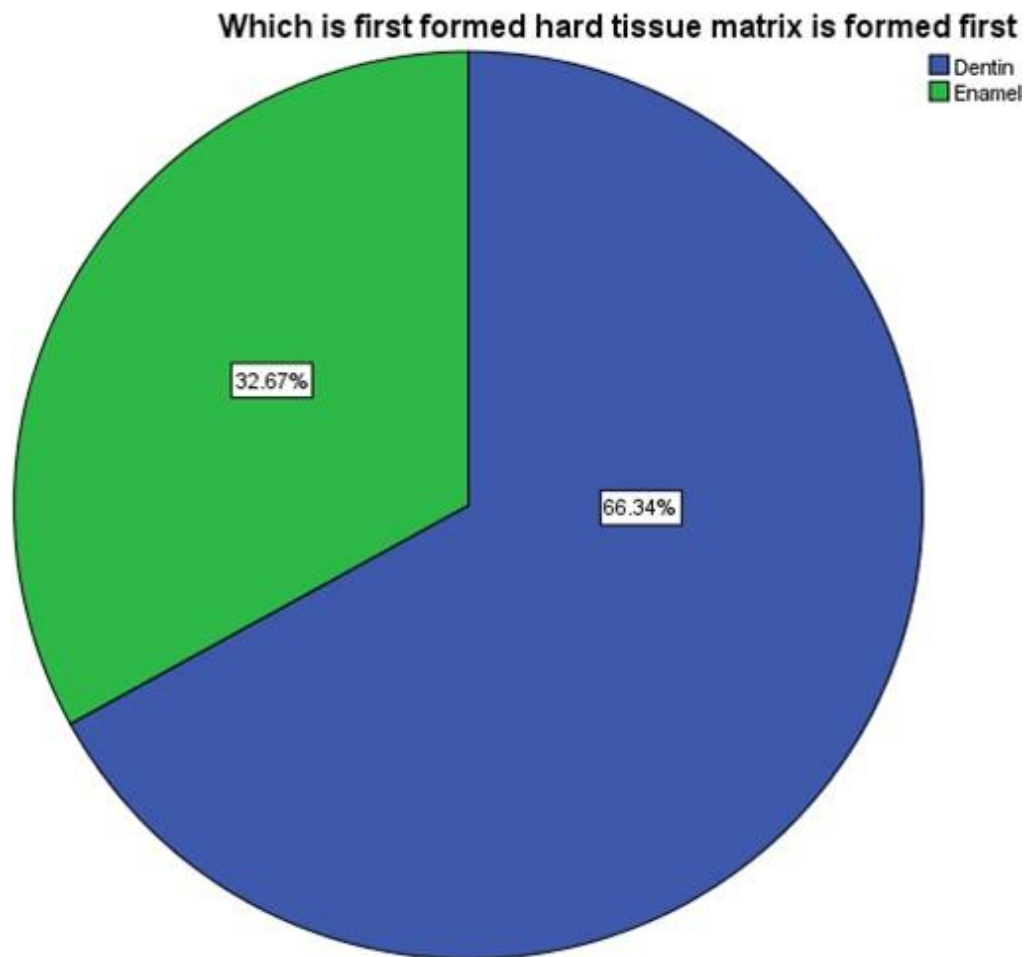


Fig 10 :Shows the response of the question on first formed hard structurel . 66.34% answered dentin(blue), 32.67% answered enamel(green).

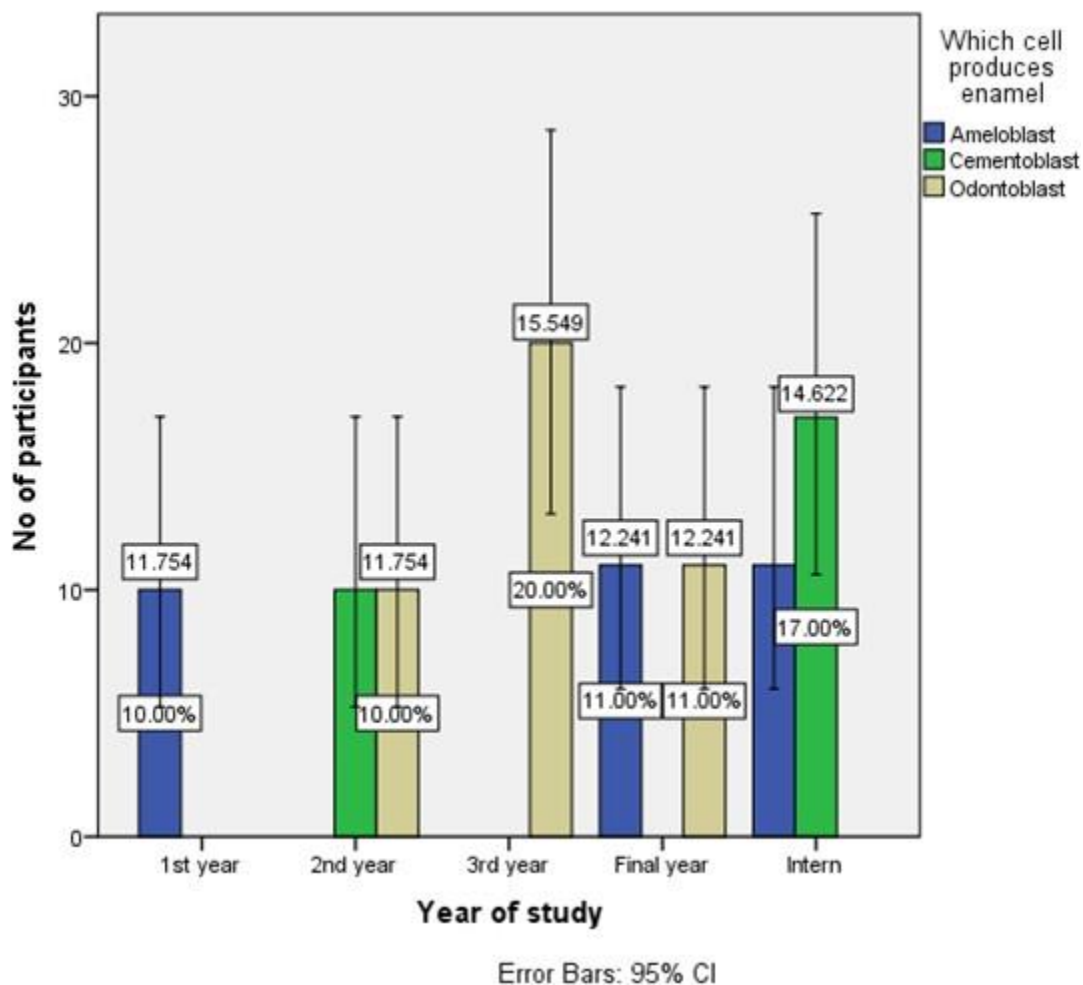


Figure 11:-Bar graph representing the association between year of study and cells producing enamel. X-axis represents the year and the Y-axis represents the no of participants, of which green indicates cementoblast, blue indicates ameloblast and beige indicates odontoblast. From this question we can associate the inference that 10-11% students of 1st year, final year and internship answered rightly for this questions and they were well knowledgeable about this topic. The difference was statistically significant {Pearson's Chi square value :195.009^a, P value - 0.01 (p<0.05)}.

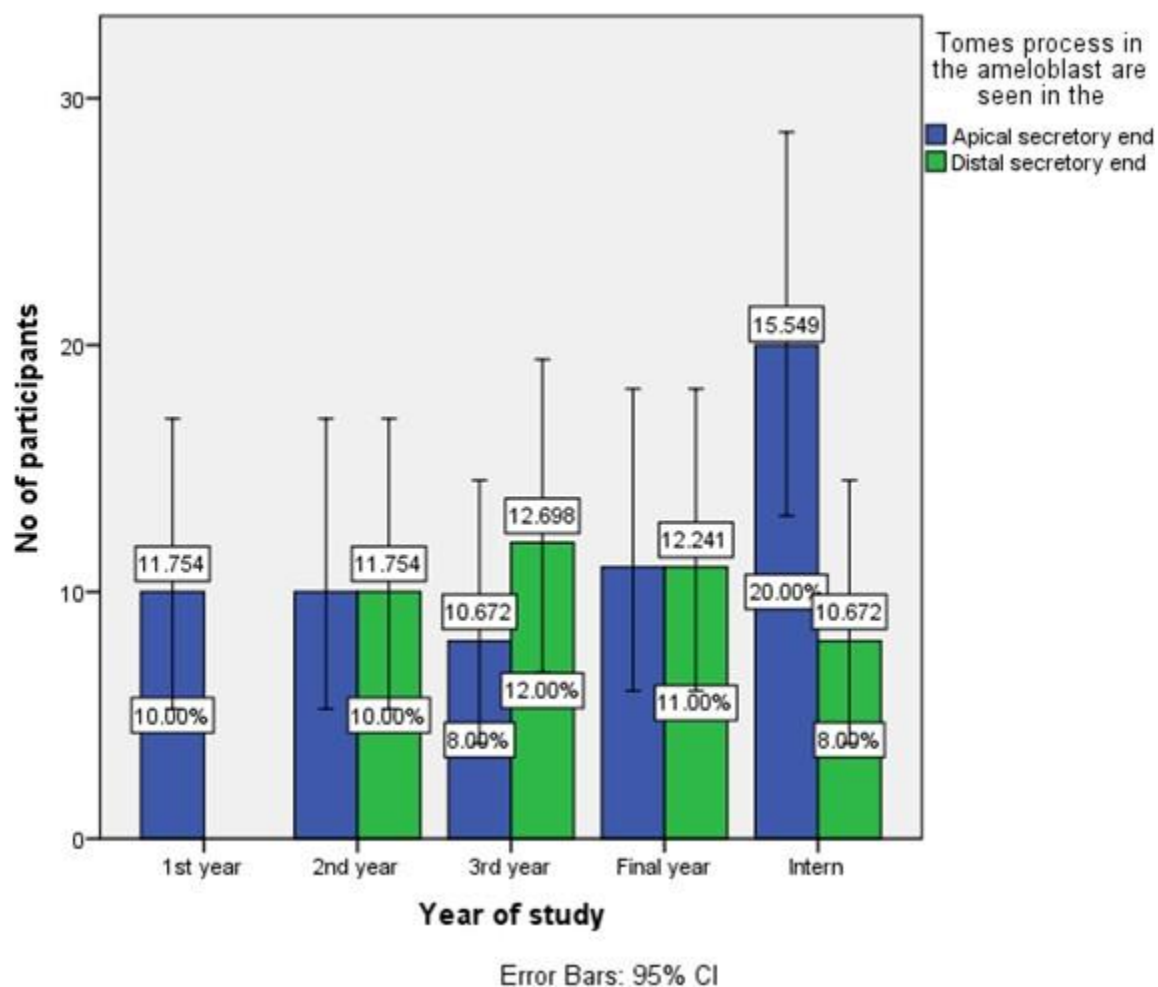


Figure 12- Bar graph representing the association between year of study and the presence of the Tomes process in ameloblast . The X- axis represents the year and the Y-axis represents the no of participants, of which blue indicates apical secretory end and green indicates distal secretory end. From this question we can associate the inference that 8-11% students of each year answered rightly for this question and they were well knowledgeable about this topic. The difference was statistically significant {Pearson's Chi square value :114.259^a, p value - 0.01 (p<0.05)}.

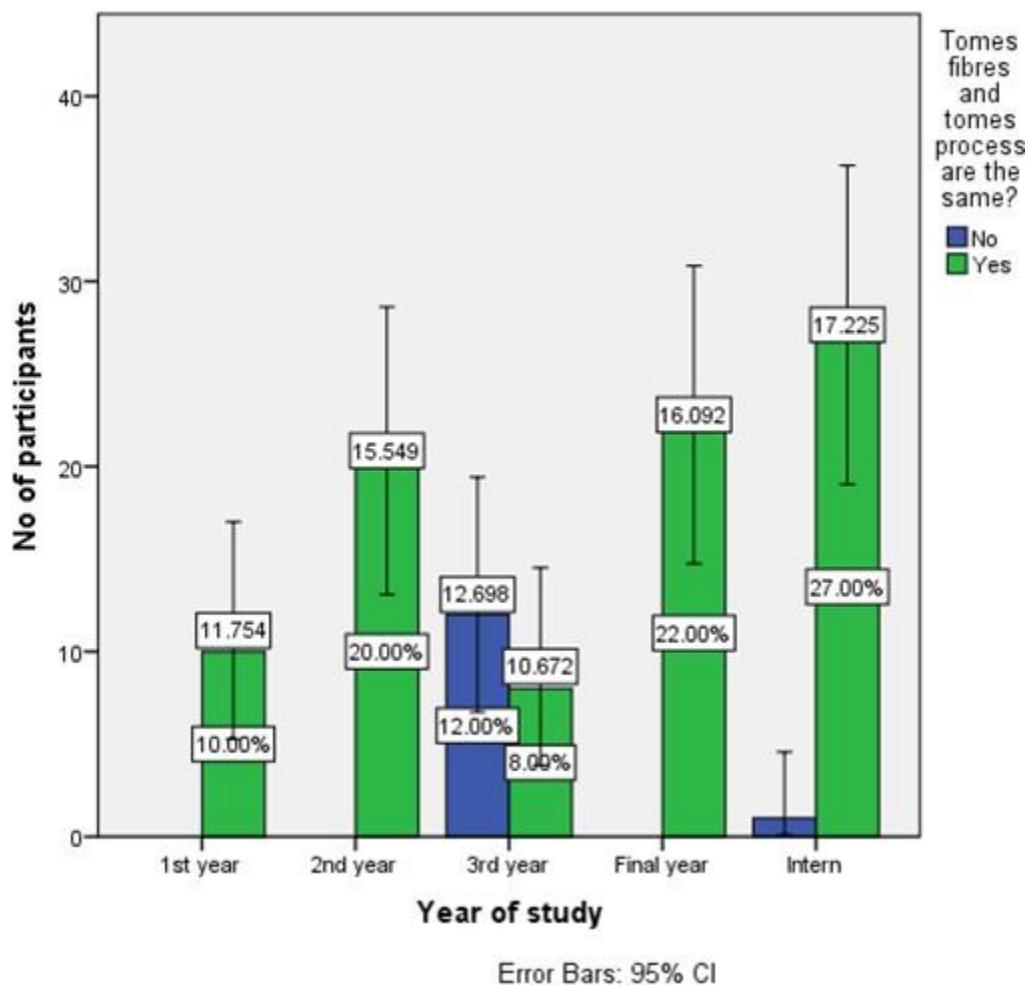


Figure 13- Bar graph representing the association between year of study and Tomes process. X- axis represents the year and the Y-axis represents the no of participants, of which green indicates yes, blue indicates no. From this question we can associate the inference that majority of 12% students of 3rd year answered rightly for this questions and they were well knowledgeable about this topic. The difference was statistically significant {Pearson's Chi square value :150.524^a, p value - 0.01 (p<0.05)}.

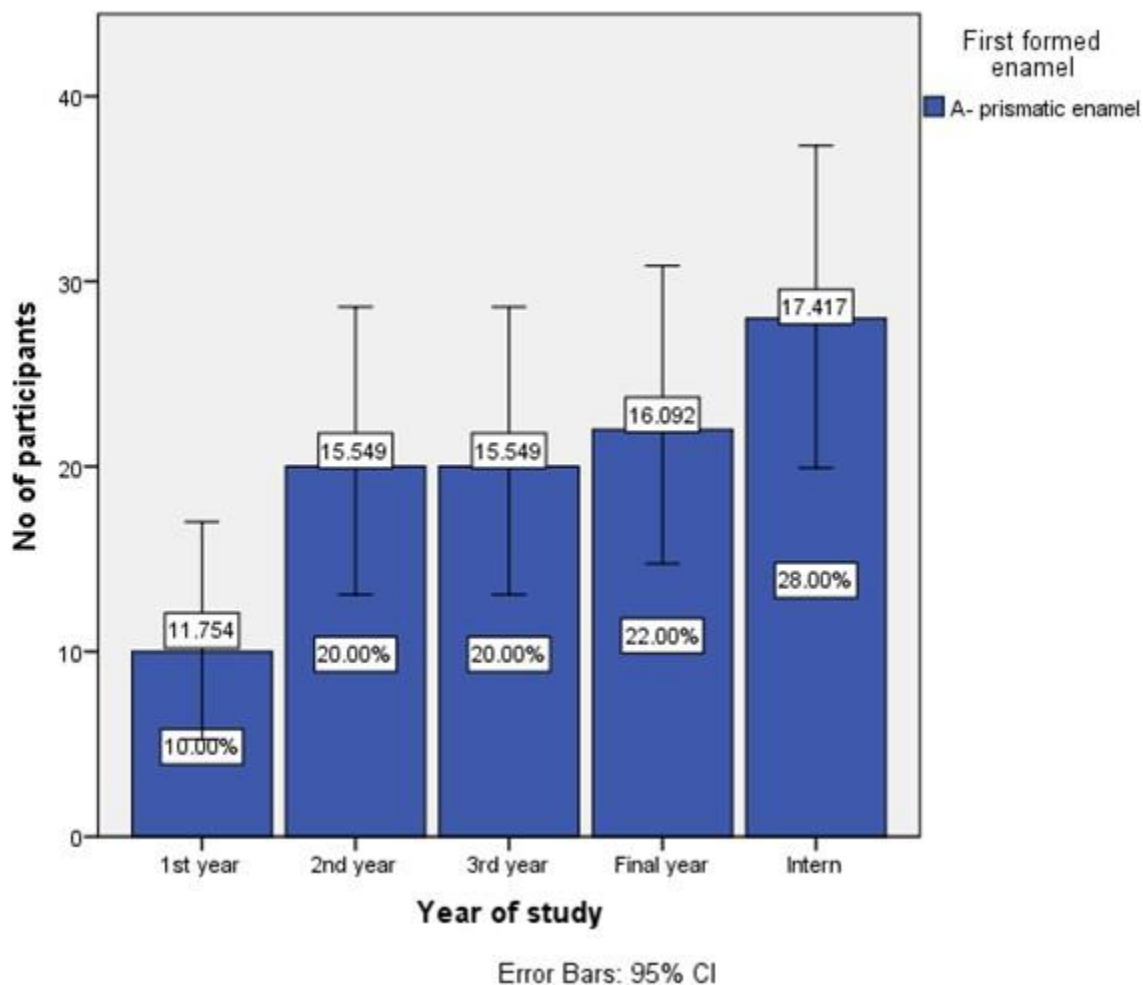


Figure 14- Bar graph representing the association between year of study and cells' aprismatic enamel. X-axis represents the year and the Y-axis represents the no of participants, of which blue indicates aprismaticenamel.From this question we can associate the inference that 10-28% students of each year answered rightly for this questions and they were well knowledgeable about this topic.The difference was statistically significant.{Pearson's Chi square value :101.000^a, p value - 0.01 (p<0.05)}.

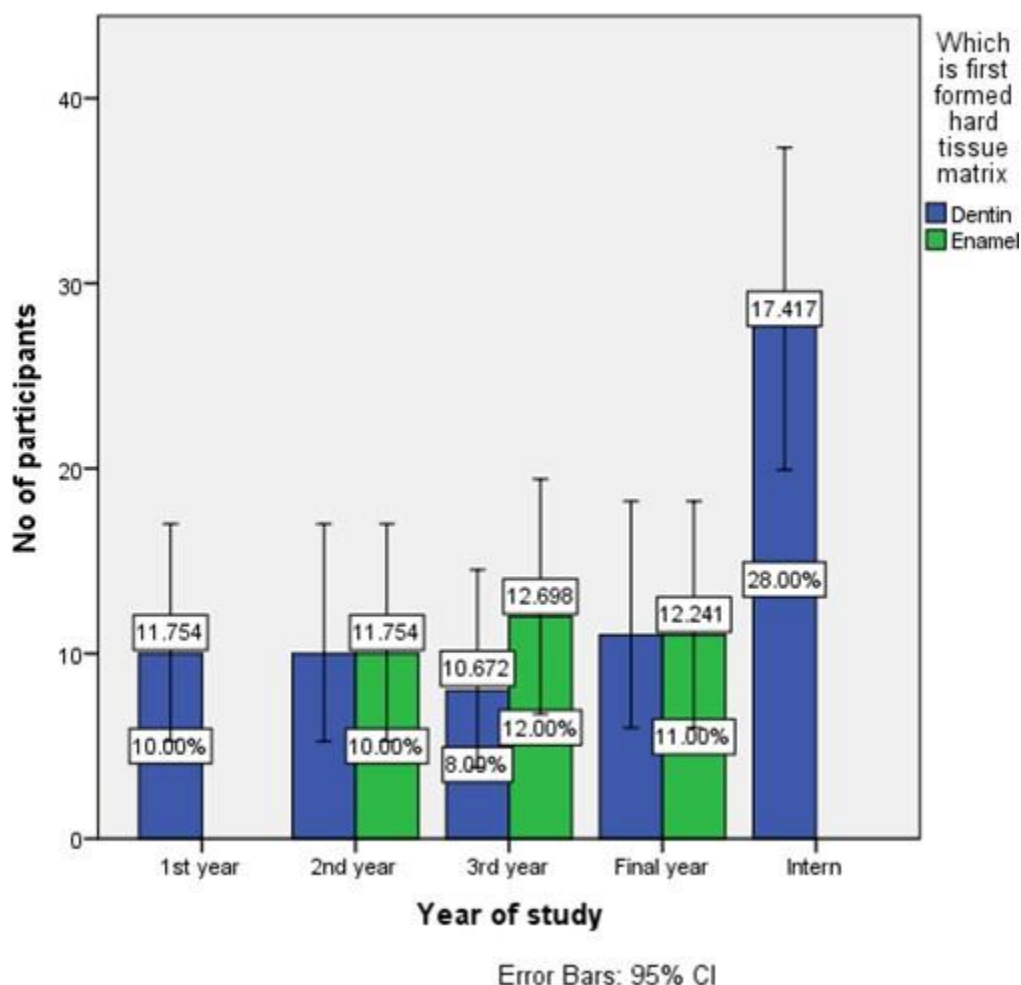


Figure 15- Bar graph representing the association between year of study and first formed hard tissue. X-axis represents the year and the Y-axis represents the no of participants, of which green indicates enamel and blue indicates dentin. From this question we can associate the inference that 10-12% students of 2nd year, 3rd year and final year answered rightly for this questions and they were well knowledgeable about this topic. The difference was statistically significant {Pearson's Chi square value :132.109^a, p value - 0.01 (p<0.05)}.

Results:

29.70% of the age group between 26-30 (beige); 9.90% of the age group between 17-20 (blue); 19.80% of the age group between 21-25 (green); 18.81% of the age group between 31-35 (pink); 20.79% of the age group more than 35 attended this survey (red) (fig 1). 9.90% of the 1st years (blue), 19.80% of the 2nd years (green) and 3rd years (beige), 21.78% of the final years (pink) and 27.72% of the interns (yellow) attended this survey (fig 2). This questionnaire survey consisted of 15 questions which were based on

knowledge, attitude and awareness.99.01% of the all undergraduate students were aware of the different stages of amelogenesis(green) from this question (fig 3).58.42% answered that ameloblast is seen in apical secretory end(blue) and the rest 40.59% respond distal secretory end(green) (fig 5).86.14% answered yes(beige) and 12.87% answered no(blue) (fig 6).28.71% answered reversal of nutrition(beige),30.69% responded reversal of polarity(pink) and 39.60% answered all of the above(blue) (fig 7).99.01% answered a prismatic enamel (blue) (fig 8).30.69% answered 60mu m in height &7-9 mu m in width(green) , 48.51% 60mu m in height &2-4 mu m in width(blue) and 19.80 % 80mu m in height & 3-5 mu m in width(beige) (fig 9). 66.34% answered dentin(blue), 32.67% answered enamel(green) (fig10).Bar graph representing the association between year of study and cells producing enamel. X- axis represents the year and the Y-axis represents the population distribution, of which green indicates cementoblast,blue indicates ameloblast and beige indicates odontoblast.From this question we can associate the inference that 10-11% students of 1st year,final year and internship answered rightly for this questions and they were well knowledgeable about this topic(fig 11);Bar graph representing the association between year of study and the presence of the tomes process in ameloblast . The X- axis represents the year and the Y-axis represents the population distribution, of which blue indicates apical secretory end and green indicates distal secretory end. From this question we can associate the inference that 8-11% students of each year answered correctly for these questions and they were well knowledgeable about this topic(fig 12);Bar graph representing the association between year of study and Tomes process. X- axis represents the year and the Y-axis represents the population distribution, of which green indicates yes,blue indicates no.From this question we can associate the inference that majority of 12% students of 3rd year answered rightly for this questions and they were well knowledgeable about this topic(fig 13);Bar graph representing the association between year of study and cells' aprismatic enamel. X- axis represents the year and the Y-axis represents the population distribution, of which blue indicates aprismaticenamel.From this question we can associate the inference that 10-28% students of each year answered rightly for this questions and they were well knowledgeable about this topic(fig 14);Bar graph representing the association between year of study and first formed hard tissue. X- axis represents the year and the Y-axis represents the population distribution, of which green indicates enamel and blue indicates dentin.From this question we can associate the inference that 10-12% students of 2nd year,3rd year and final year answered rightly for this questions and they were well knowledgeable about this topic(fig 15).From the results we can assume that the majority of the undergraduate students are well aware and have an excellent platform about this topic.

Discussion:

Enamel, the hardest human tissue, provides the outer protective covering for teeth. It's composed primarily of carbonate substituted hydroxyapatite crystallites. The method of enamel development is termed amelogenesis and therefore the cells that make enamel, the ameloblasts, are derived from oral ectoderm. The ameloblasts are liable for controlling the complex processes necessary to make this tissue. Ameloblasts express thousands of genes during enamel development thereby orchestrating and controlling amelogenesis during a highly regulated manner. Ameloblasts secrete an extracellular matrix that's organized round the developing enamel crystallites. This matrix is processed in an orderly manner helping control the expansion and directionality of the enamel crystals. A comprehensive review on enamel development is out there providing readers with information on the cellular functions, extracellular matrix and mineralization of enamel. Enamel is one among the foremost important structures of the tooth, both from a functional and esthetic point of view. Primary enamel carries registered information regarding metabolic and physiological events that occurred during the period around birth and also the first year of life. Detailed knowledge of normal development and therefore the structure of enamel is vital for the assessment of mineralization defects.

The present study was conducted among undergraduate students of Saveetha dental college and hospitals. All the students were aware of different stages of amelogenesis. In our study, it was observed that interns and final year's are more aware about this topic when compared to first years (27). This may be due to years of experience and academic reinforcement on the topic. Genetic and environmental factors have marked influence on these processes; consequently, may result in developmental enamel defects (DED) from any event disturbing these phases (27,28). To diagnose developmental defects like amelogenesis imperfecta the knowledge of amelogenesis is important (29). More teaching and didactic lectures should be incorporated in the undergraduate curriculum to have more knowledge about amelogenesis (29,30). As we discussed with previous study, our study explains the knowledge about different stages of amelogenesis among undergraduate whereas previous study describes about the stages of amelogenesis in molar teeth of young rats (31) same way other previous study explains about the effects of chronic fluoride exposure on morphometric parameters defining the stages of amelogenesis and ameloblast modulation in rat incisors (32,33). In our study, create an awareness among undergraduate students but the previous are tested with animals, no study create knowledge and awareness among undergraduate students.

Conclusion:

From our study, we can understand that this study helps to create awareness among undergraduate students and more knowledge about amelogenesis which helps the undergraduate students in forthcoming examinations like NEET exam and so on. One of the important clinical disorder about amelogenesis is amelogenesis imperfecta. Amelogenesis imperfecta (AI) is the name given to a heterogeneous group of conditions characterized by inherited developmental enamel defects. So from this survey we can conclude that undergraduate students are aware of amelogenesis and have moderate knowledge on it.

Limitations:

Limitations of the study was that it was conducted among undergraduates of one particular college.

Future scope:

It can be conducted in bigger populations including undergraduate students of other dental colleges too to assess their awareness levels.

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Conflict of interest:

Nil

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- Saveetha Dental College and Hospitals
- Saveetha University
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