

Knowledge On Dentin Defects - A Cross-Sectional Survey Among Preclinical Undergraduates

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ABSTRACT

Aim: To assess knowledge about dentin defects among undergraduate students of private dental college.

Background: Dentin is a mineralised, elastic, yellowish-white, a vascular tissue enclosing the central pulp chamber. Dentinal defects include Dentinogenesis imperfecta, Dentin dysplasia and Regional odontodysplasia.

Materials and methods: This is a questionnaire based cross sectional study conducted among preclinical UG students in a private dental college. Random sampling is used to minimize the sampling bias. A questionnaire consisting of 10 questions about dentin defects were circulated through the online survey mode undergraduates. The collected data were analysed using spss software version 23.

Result: It is found that second year UG have more knowledge about dentin defects than the first year UG. In our study, 35.54% were aware of DI and 86.21% of respondents were aware of regional odontodysplasia. There exists an association between year of study and response for thistle tube deformity and the p value was found to be 0.000(p<0.05). Hence it is statistically significant.

Conclusion: From the present study, we found that second year UG have more knowledge about dentin defects than the first year UG.

Keywords : Dentin, Dentinogenesis imperfecta, Dentin dysplasia, Regional odontodysplasia, innovative.

INTRODUCTION

Dentin is bulk tissue that is found abundant in teeth, produced by odontoblasts which differentiate from mesenchymal cells of dental papilla. Dentinogenesis is a highly controlled process that results in the conversion of unmineralized predentin to mineralized dentin. The types of dentin are primary, secondary and tertiary dentin. Primary dentin is the most prominent dentin in the tooth . Secondary dentin is formed after tooth formation is complete. Tertiary dentin, also called reparative dentin is formed as an action of external insult such as caries.(1)

DI is an autosomal dominant genetic disorder associated with Osteogenesis Imperfecta (OI). It affects both primary and permanent teeth and appears blue gray or amber and opalescent. Dentinogenesis imperfecta type III is characterized by rapid erosion of the crowns in baby and permanent teeth. Dental pulp inside several teeth may be exposed. This pulp may be opalescent, smooth, and amber colored.(14)

In DD, permanent teeth are normal but pulp chambers are obliterated by abnormal dentin. DD type I is the rarest of the human dentin disorders, with an estimated incidence of 1 in 100,000.(13) In DD type I, the crowns of deciduous and permanent teeth are normal in shape, form and color, but have short roots with high mobility leading to early exfoliation. Dentin dysplasia type II is a dental abnormality characterized by abnormal development of dentin.(15) Within the interior of a tooth is pulp, a specialized tissue that contains nerves, blood vessels, and lymphatic vessels(2). Thus, it is important for the students to understand the subject in depth for better diagnosis and management. Our team has extensive knowledge and research experience that has translated into high quality publications(3-22). The main aim of this study is to assess the knowledge about dentinal defects among preclinical UG students.

MATERIALS AND METHODS

The present cross-sectional study was conducted using an online questionnaire. Questionnaire comprised 13 questions. A total of 100 students participated in the survey. Data was entered and analyzed using a software program called SPSS Statistics version 23. Only preclinical UG students were

asked to fill the questionnaire whereas dental staff, PG students and third and fourth year UG students were excluded. Chi square test was used to analyze and comparative bar graphs were plotted and it is statistically significant only if the p value is less than 0.05.

The questionnaire comprised of the following questions:

QUESTIONS	OPTIONS
1.Which of the following gene do you think causes dentinogenesis imperfecta?	A.DSPP B.TP53 C.TNF
2.Which of the following picture denotes dentinogenesis imperfecta?	A.Option 1 B.Option 2 C.Option 3
3. Which of the following is another name for regional odontodysplasia?	A.Capdepont's teeth B.Ghost teeth C.Shell teeth
4.DI is _____	A.Autosomal dominant B.Autosomal recessive C. X-linked recessive
5.In which of the following Crescent shaped pulpal remnants surrounding islands of dentin is found?	A.DDIa B.DDIb C.DDIc

<p>6. In which of the following Appearance of roots like "stream flowing around boulders" is found?</p>	<p>A. DD I B. DD II C. Regional odontodysplasia</p>
<p>7. Who first described shell teeth?</p>	<p>A. Rushton B. Louis Pasteur C. Joseph lister</p>
<p>8. In which of the following thistle-tube deformity is commonly seen ?</p>	<p>A. DD type II B. DD type III C. DI type I</p>
<p>9. Which one of the following is referred to as rootless teeth?</p>	<p>A. DD 1 B. DD 2 C. DI</p>

RESULTS

The present study observed that 73% of respondents were first year students and 27% were second years (**figure 1**). In our present study, 60% of respondents were male and 40% of respondents were female (**figure 2**). 35.34% of respondents were aware that DSPP gene mutation causes dentinogenesis imperfecta (**figure 3**). Only 56.90% were aware of the clinical picture of dentinogenesis imperfecta whereas 32.76% (mild fluorosis) and 10.34% (extrinsic stain) were unaware (**figure 4**). Only 5.17% were aware that it is present in DD 1 were aware whereas the majority (70.69%) (regional odontodysplasia) and 24.14% (DD 2) were unaware (**figure 5**). 41.36% of respondents were aware that DI is autosomal dominant whereas 55.17% responded DI is X-linked recessive and 3.45% responded DI is autosomal recessive (**figure 6**). Only 43.97% were aware that thistle tube deformity is found in DDId whereas 56.03% (DDIa) were unaware (**figure 7**). Only 5.17% were aware that it is present in DD 1 were aware whereas the majority (70.69%) (regional odontodysplasia) and 24.14% (DD 2) were

unaware(**figure 8**). 48.51% of respondents were aware that shell tooth was first described by Rushton(p value was found to be 0.000). 86.21% were aware that ghost teeth is another name for regional odontodysplasia. 68% of respondents were aware that rootless teeth are present in DD I (**figure 9**). The Pearson chi square test was used to determine association between year of study and number of respondents who were aware about thistle tube deformity and 12.93% of second year students followed by 11.21% of first year students were aware about it. The p value was found to be 0.000($p<0.05$). Hence it is statistically significant (**figure 10**). There exists an association between year of study and response for the question “who described shell teeth” with p value of 0.000($p<0.05$). 25% of students who responded correctly were first years when compared to second years. Hence it is statistically significant (**figure 11**).

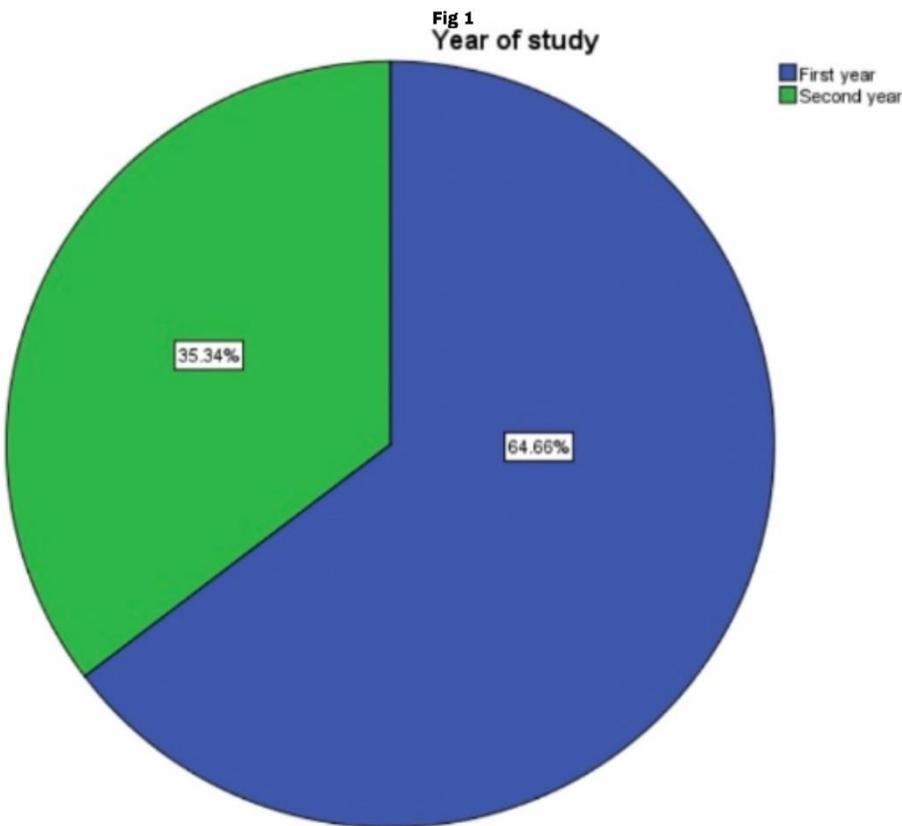


Fig 1: The pie chart represents the percentage of responses for the year of study of respondents. Here Blue denotes first year and Red denotes second year. Majority (65%) were first year students and 35% were second year students.

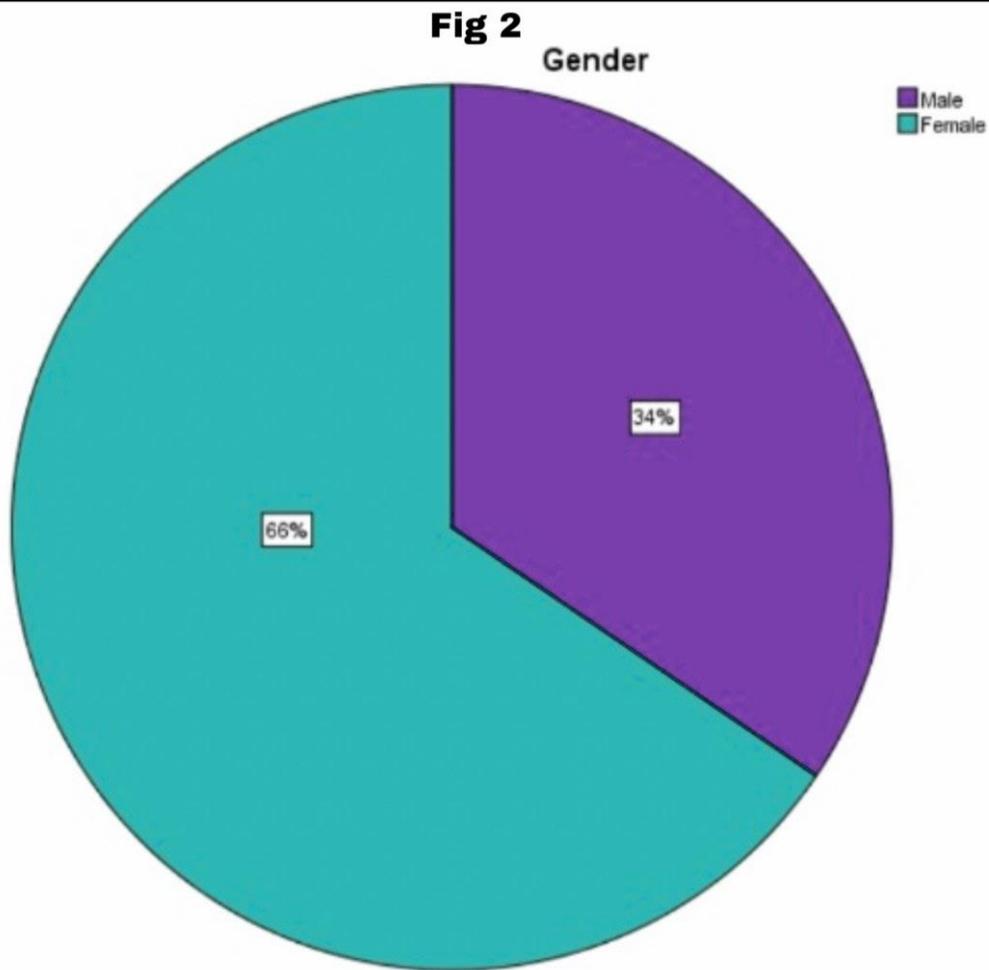


Fig 2: The pie chart shows the percentage of responses for gender. Purple denotes male and the light blue denotes female. Majority (66%) of respondents were female and 34% were male.

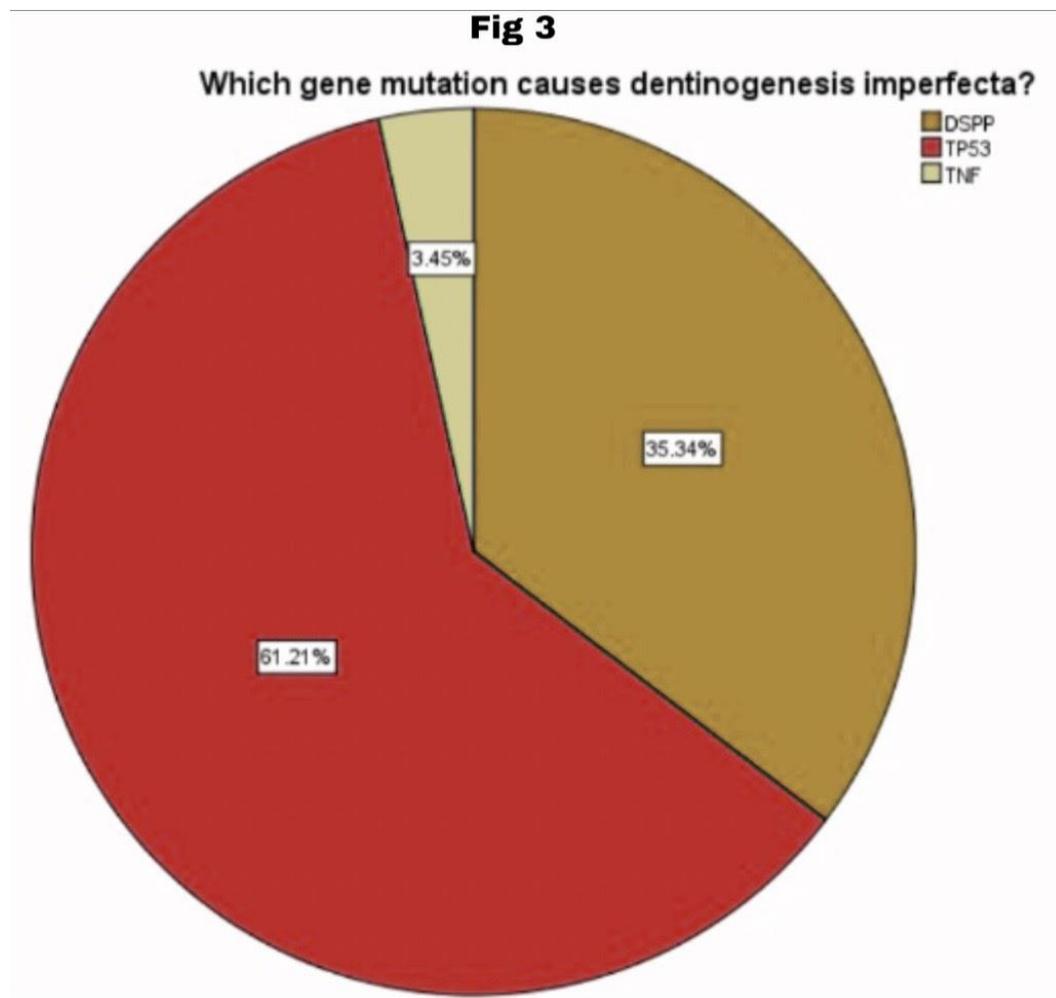


Fig 3: The pie chart shows the percentage of responses to the gene that causes DI. Brown denotes DSPP and red denotes TP53 and light brown denotes TNF. Only 35.34% were aware that DSPP causes dentinogenesis imperfecta whereas 61.21%(TP53) and 3.45%(TNF) were unaware.

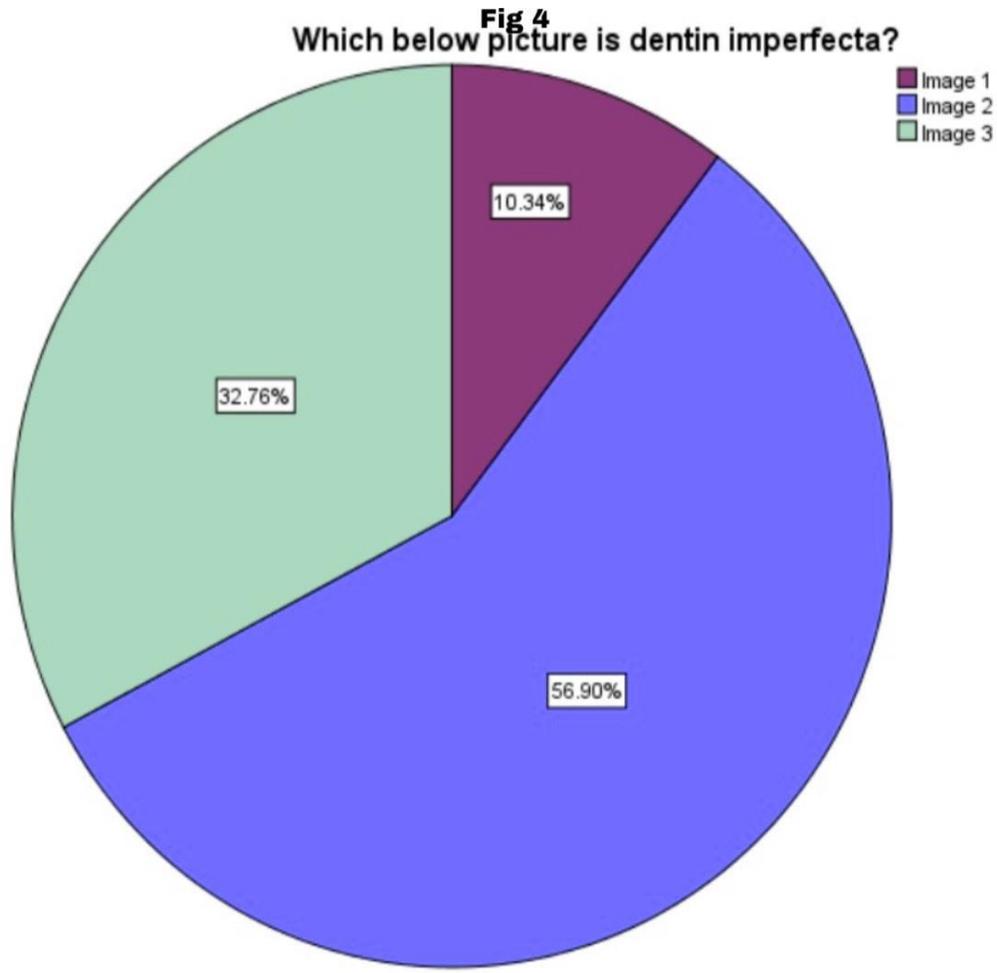


Fig 4: The pie chart shows the percentage of responses for picture of dentinogenesis imperfecta. Blue represents the picture of DI, purple denotes extrinsic stain and light green denotes mild fluorosis. Majority (56.90%) were aware of the clinical picture of dentinogenesis imperfecta whereas 32.76%(mild fluorosis) and 10.34%(extrinsic stain) were unaware.

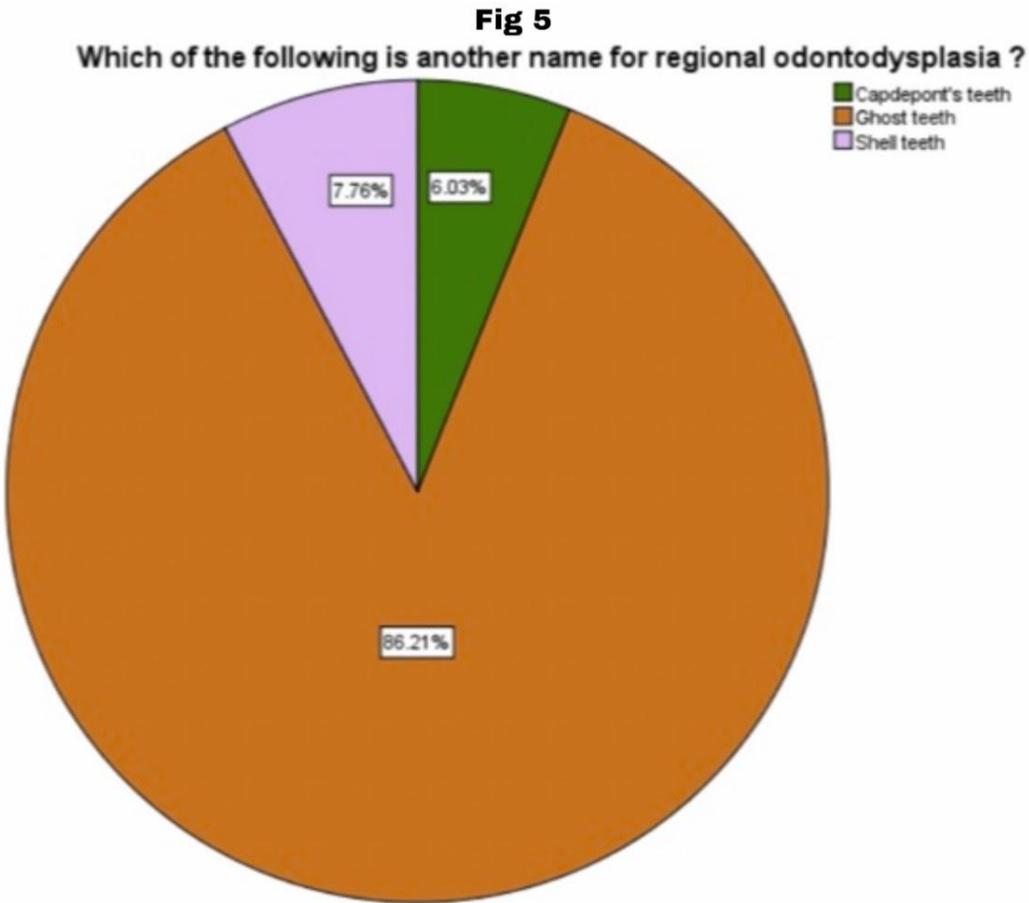


Fig 5: The pie chart shows the percentage of responses who were aware of the other name of regional odontodysplasia. Brown denotes ghost teeth, pink denotes shell teeth and dark green denotes capedont'steeth .Majority (86.21%) of respondents were aware that the other name of regional odontodysplasia is ghost teeth whereas 7.76%(shell teeth) and 6.03% were unaware of them .

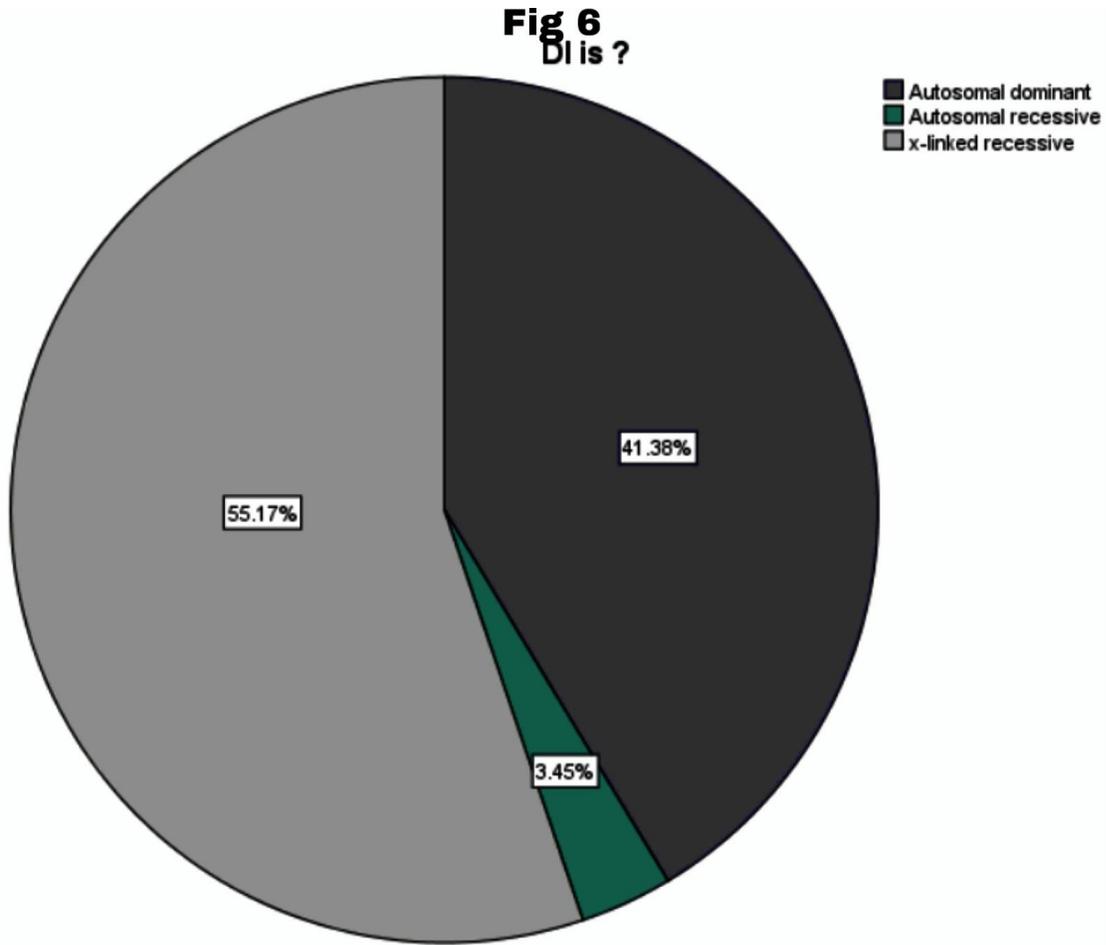


Fig 6: The pie chart shows the percentage of responses for what DI is. Black denotes autosomal dominant, gray denotes x-linked recessive and green represents autosomal recessive. Only 41.36% were aware that DI is autosomal dominant whereas 55.17% (x-linked recessive) and 3.45% (autosomal recessive) were unaware.

Fig 7
Crescent shaped pulpal remnants surrounding islands of dentin present in ?

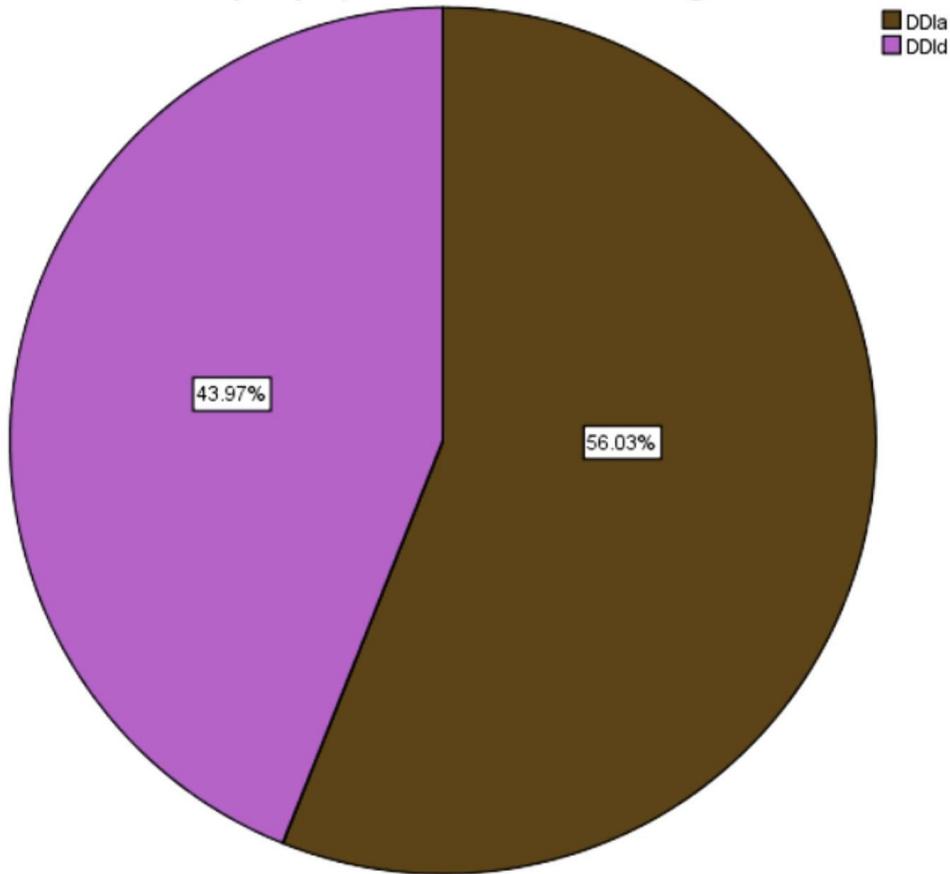


Fig 7: The pie chart shows the percentage of responses for crescent shaped remnants around dentin. Pink denotes DD1d and brown denotes DD1a. Only 43.97% were aware that it is found in DD1d whereas 56.03% (DD1a) were unaware.

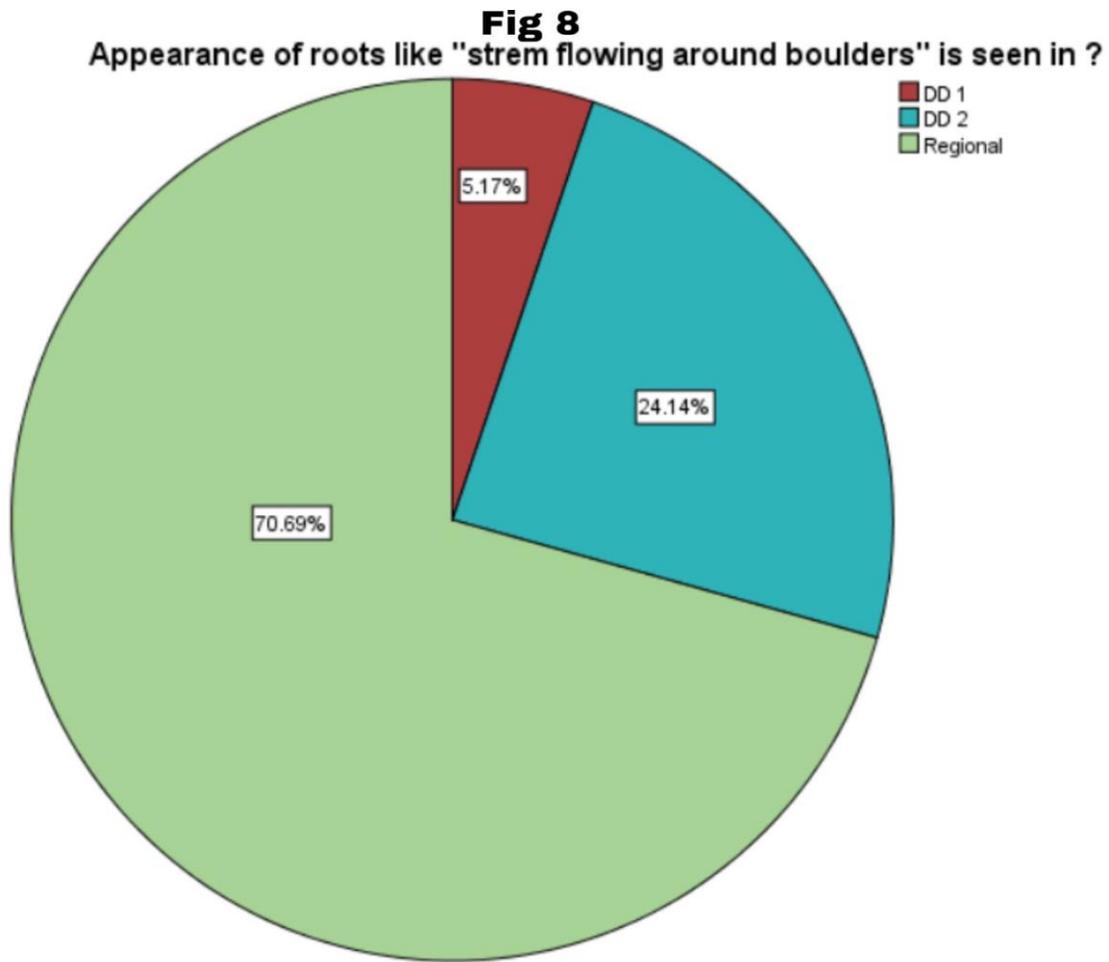


Fig 8: The pie chart shows the percentage of responses for stream-like boulders. Green denotes regional odontodysplasia, cyan denotes DD 2 and red denotes DD1. Only 5.17% were aware that it is present in DD 1 were aware whereas the majority (70.69%) (regional odontodysplasia) and 24.14% (DD 2) were unaware.

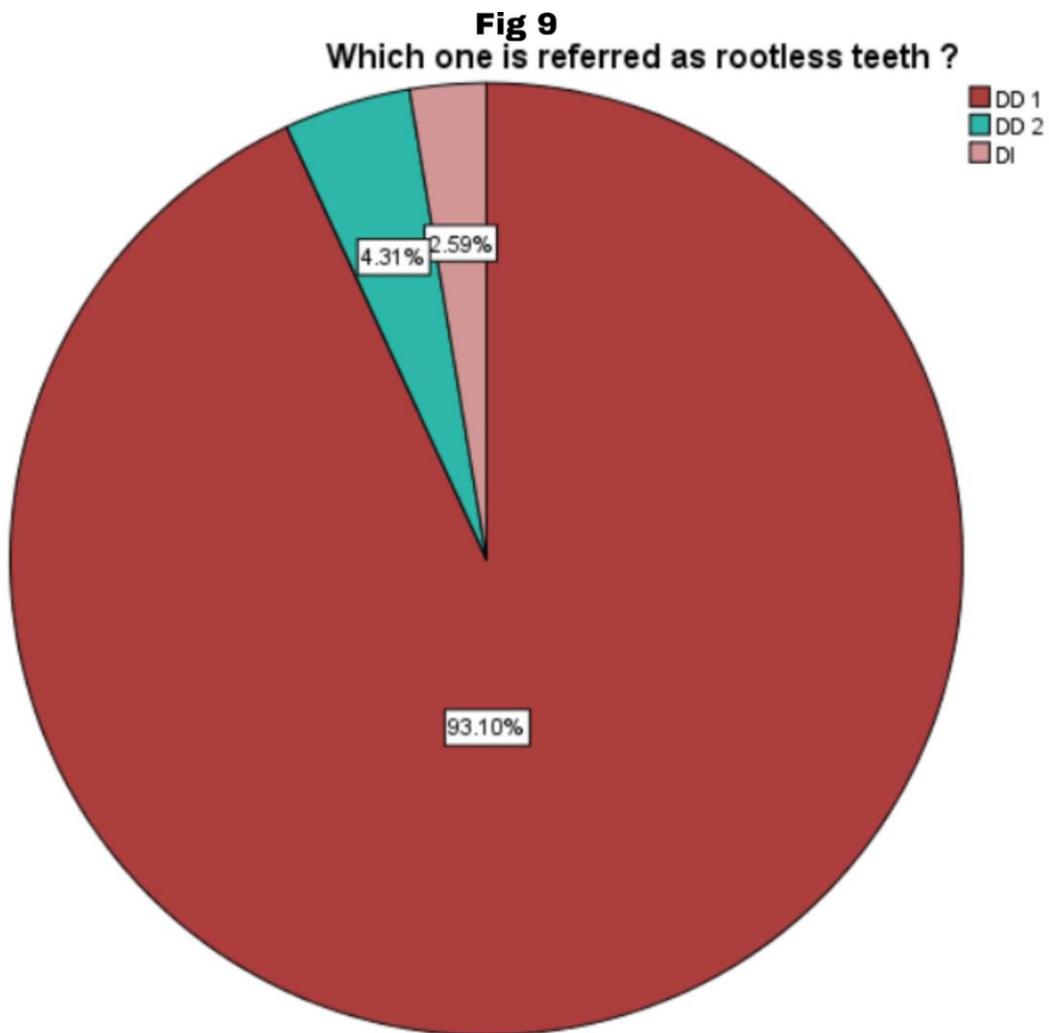


Fig 9: The pie chart shows the percentage of responses for rootless teeth. Pale pink denotes DI, cyan denotes DD 2 and red denotes DD1. Majority (93.10%) were aware that DD1 is referred to as rootless teeth whereas 4.31% (DD2) and 2.59% (DI) were unaware.

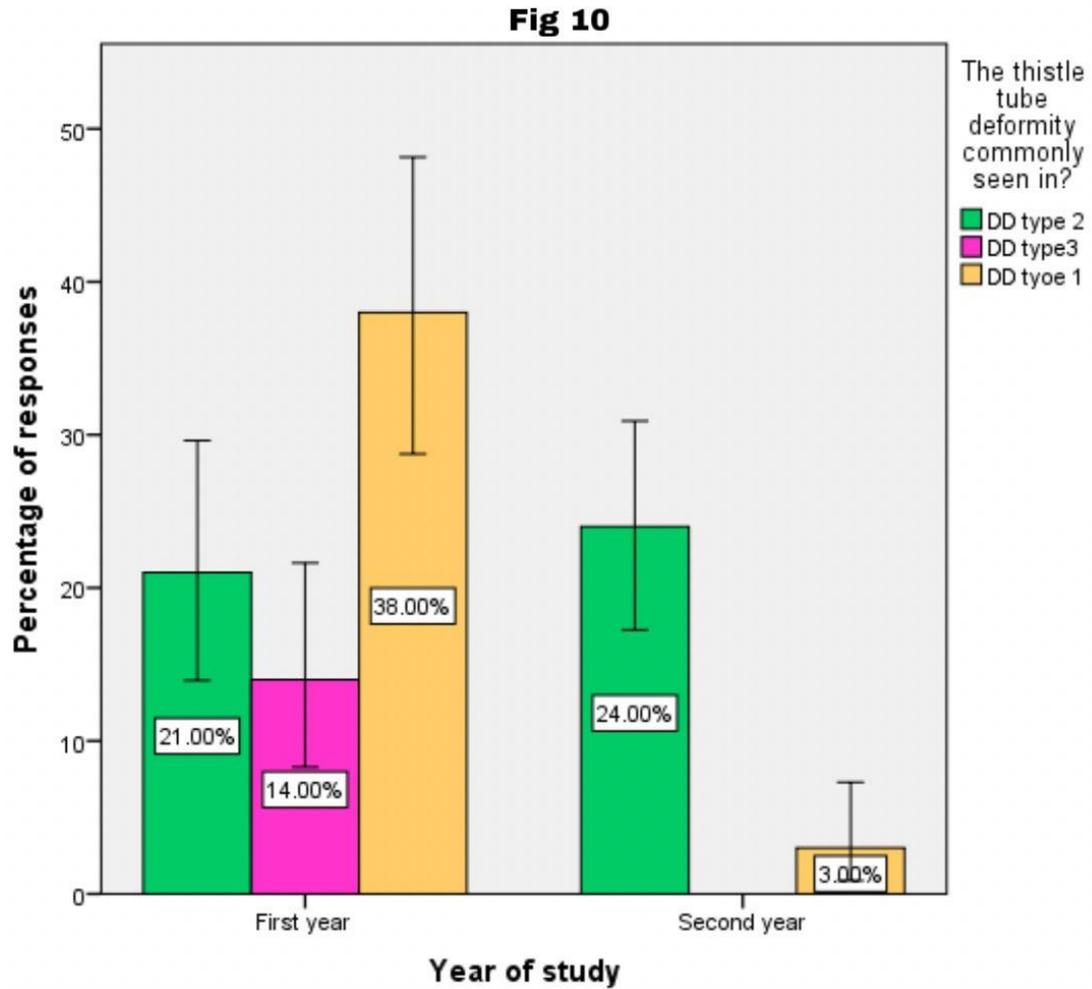


Fig 10: The bar graph represents the association between the year of study and response for thistle tube deformity. X axis represents the year of study and Y axis represents the percentage of responses. Cyan denotes DD type 2, dark purple denotes DD type 3 and pale pink denotes DI type 1. Majority(24%) of second years were aware about thistle tube deformity when compared to first years (21%). Pearson chi square value was found 0.000($p < 0.05$). Hence, it is statistically significant.

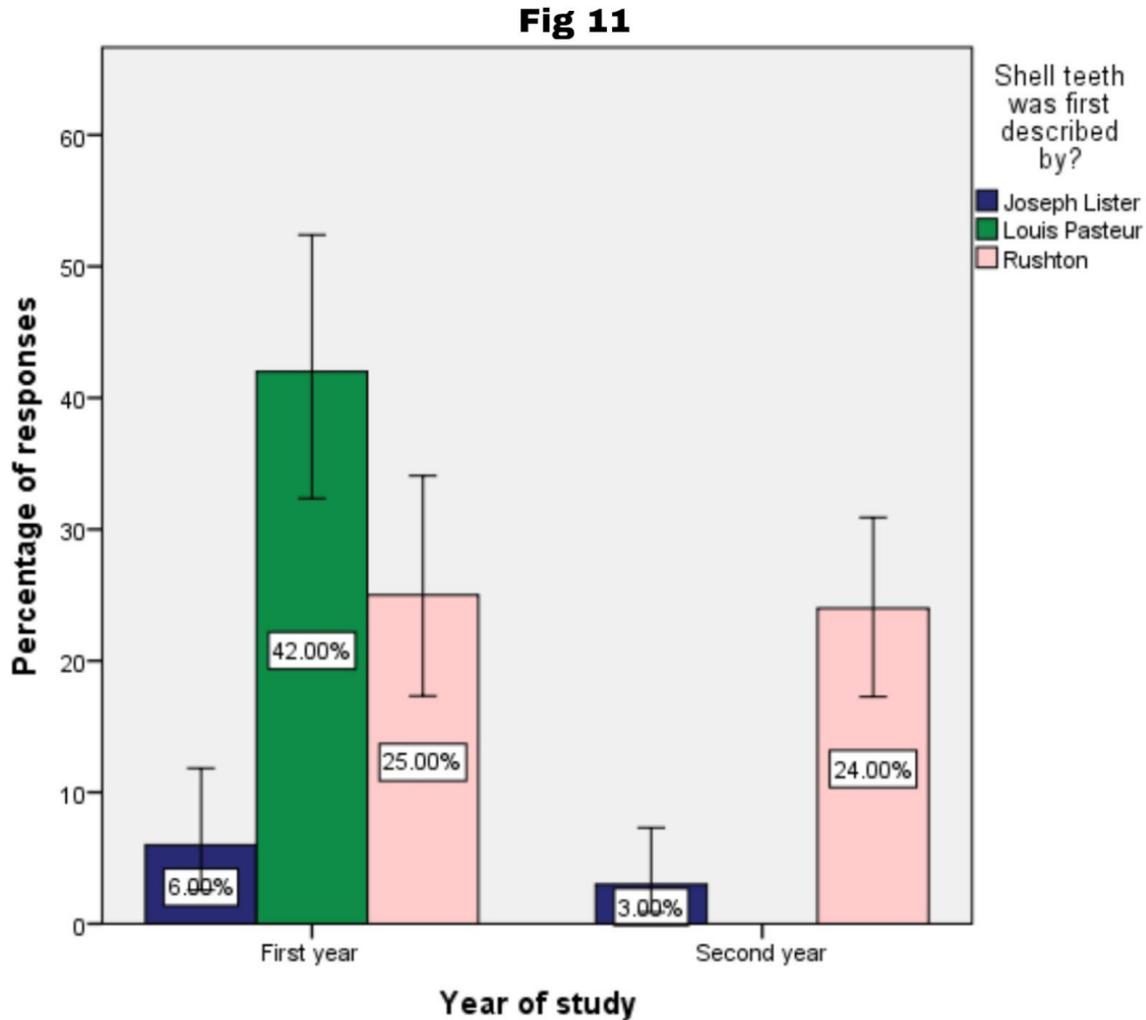


Fig 11: The bar graph represents the association between the year of study and the person who discovered shell teeth. X axis represents the year of study and Y axis represents the percentage of responses. Pink denotes Rushton, dark blue denotes Joseph Lister and dark green denotes Pasteur. Majority(25%) of students who responded correctly were first years when compared to second years(24%). Pearson chi square value was found 0.000 ($p < 0.05$). Hence, it is statistically significant.

DISCUSSION

In our present study, 12.93% of second year students were aware that thistle tube deformity is seen in dentin dysplasia type II. 12.07% of second year students were aware that Rushton was the first to describe shell teeth. Thus our study concludes that second year students have more knowledge about dentin defects than first year students.

DI is an autosomal dominant. The DSPP gene provides instructions for making a protein called dentin sialophosphoprotein. In our study, 55% of respondents were aware that DI is autosomal dominant and 41% of respondents said it is x-linked recessive. In our present study, 54% of respondents were aware that DSPP causes dentinogenesis imperfecta and 45% of respondents think it is caused by TP53. It is a rare anomaly of unknown etiology that affects approximately one patient in every 100,000(9) 58% of respondents said crescent shaped pulpal remnants surrounding islands of dentin present in DDId and 42% said it is present in DDiA. None of them were aware that it is present in DDiC. (23). Orthodontic treatment has been successfully performed in patients with different degrees of dentinogenesis imperfecta. Steel crowns used to prevent attrition of the dental structure can be used in deciduous teeth and in young permanent posterior teeth, where esthetics is not an issue.(8)

Dentin dysplasia is a rare genetic developmental disorder that affects dentin production of the teeth, commonly exhibiting an autosomal dominant inheritance that causes malformation of the root. 53% of respondents were aware that Amber to brown translucence is the symptom of dentin dysplasia but 47% said bimodal peak is the symptom. The roots may appear to be darker or radiolucent/pointy and short with apical constriction.(10)(11) Dentine is laid down abnormally and causes excessive growth within the pulp chamber. Only 13% were aware that Appearance of roots like "stream flowing around boulders" is seen in DDI. 45% of respondents were aware thistle tube deformity is present in DD type II, 41% said it is present in DI and 14% of respondents said it is seen in DD type III. 68% of respondents were aware rootless teeth are present in DD I. DD I is characterized by short or total absence of roots, obliterated pulp chambers, and periapical radiolucencies. 49% of respondents were aware that shell teeth was first described by Rushton, 42% responded it was described by Joseph Lister. (24)(12)

Regional odontodysplasia is a rare, nonhereditary developmental dental anomaly characterized by defects in the epidermal and mesenchymal tissues involved in tooth development (5). Females are more likely to get regional odontodysplasia.(6,7). In our study, 83% were aware that ghost teeth is the other name of regional odontodysplasia and 17% of respondents said it is shell teeth.

This study was done on a small scale population, in future such studies should be done on a larger scale population to yield much accurate results.

CONCLUSION:

The present study records good awareness levels of second year dental students on dentinal defects. Further reinforcement of the knowledge in the subject can be established through training programs and clinical exposure.

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CONFLICT OF INTEREST:

All the authors declare that there was no conflict of interest in present study.

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