

Knowledge On Radiographs Among Undergraduate Students - A Cross Sectional Survey

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ABSTRACT :

Background : Radiographs is a diagnostic tool, which is used in the clinical examination of dental diseases. Periapical X-rays, computed tomography, cone beam computed tomography, magnetic resonance imaging and ultrasound scan have also been found in modern dentistry.

Aim : The aim of this study is to assess the knowledge of radiographs identification among 1st year undergraduates.

Materials and Methods : This study is a questionnaire based survey to evaluate the knowledge about Radiography among 1st year undergraduates. The data collected through google forms and analysed using SPSS software version 23.

Results : The present study has observed 100 study participants. Among them, 33% of the participants are male and 67% of the participants are female. According to this study, the majority (67%) of them are females who were aware about Lateral Cephalometric radiography when compared to male (33%). Pearson chi square test was done and the p value is 0.246 (p value > 0.05). Hence, it is statistically not significant .

Conclusion : From the present study, it is concluded that females were more aware about Radiographs than male. This knowledge gap can be minimised by conducting more pictorial lectures and more workshops on Radiographs for the students to make them understand the subject in depth.

Key Words : Radiographs; Modern Dentistry; Knowledge; Awareness; Novel method

INTRODUCTION :

Dental imaging has seen enormous progress and its applications in several fields of dentistry. The three-dimensional imaging has made the complex cranio-facial structures for the examination and accurate diagnosis of deep seated lesions⁽¹⁾⁽²⁾. The imaging techniques used in Dentistry can be categorized as follows: intraoral and extraoral, analogue and digital, ionizing and non-ionizing imaging, and two-dimensional and three-dimensional imaging^{(3,4)(5)}

Intraoral radiographic examination is otherwise known as the backbone of imaging for the general dental practitioner. It comprises three categories. They are periapical, bitewing and occlusal projections. The periapical radiograph gives detailed information about the teeth and the surrounding tissues. It is mainly utilized for assessment of pulp and root canal morphology, detection of periapical pathology, root and crown fractures. It is especially useful for endodontic treatment of roots and root canal morphology, curvatures, periapical lesions, and extent of root canal obturation and observing healing after treatment^(6–8). Bitewing films are valuable for detecting interproximal caries in the early stages of development before they manifest clinically and evaluate the interproximal bone condition⁽⁹⁾⁽¹⁰⁾

An occlusal radiograph shows a large segment of a dental arch which cannot be viewed on periapical radiograph, such as a cyst. It helps to locate impacted teeth and foreign bodies in the jaws and stones in the ducts of submandibular glands^(11–13). Lateral cephalometric radiograph is a widespread diagnostic tool used for orthodontic treatment planning. It is an x-ray which is taken on the side of the face with very precise positioning so that various measurements can be taken to determine the current and future relationship of the top and bottom jaw (maxilla and mandible) and assess the nature of a patient's bite. It is also used in the classification of skeletal and dental abnormalities^{(14)(15–17)}. Radiographs are a diagnostic tool, which is used in clinical examination in the diagnosis of dental diseases. Hence, it is mandatory for the dental students to know about radiographs which will be useful for them in day-to-day practice^(18,19). The aim of this study is to assess knowledge about radiographs among first year undergraduates.

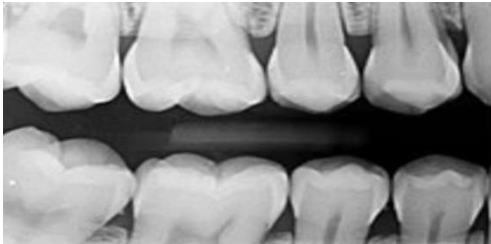
MATERIALS AND METHODS :

This cross-sectional study was conducted in a private medical college among undergraduates in Chennai, from January 2021 to February 2021. 100 participants were included in this study. The participants were

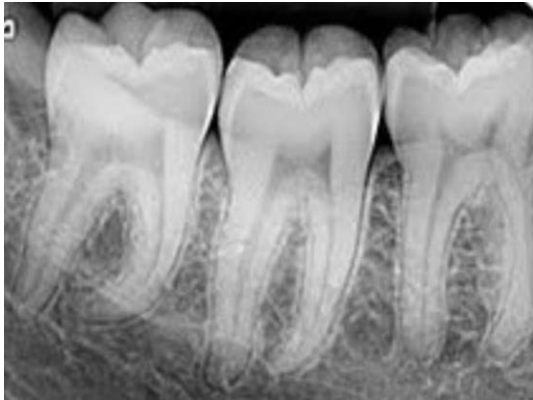
among first year undergraduates. A set of questionnaires was circulated among undergraduates through online surveys. Chi square tests were used to analyse and comparative bar graphs were plotted and it is statistically significant only if the p value is less than 0.05.

A questionnaire consisting of 10 questions about Radiographs are :

1. Do you know the image which is given below?



2. Do you know the image which is given below?



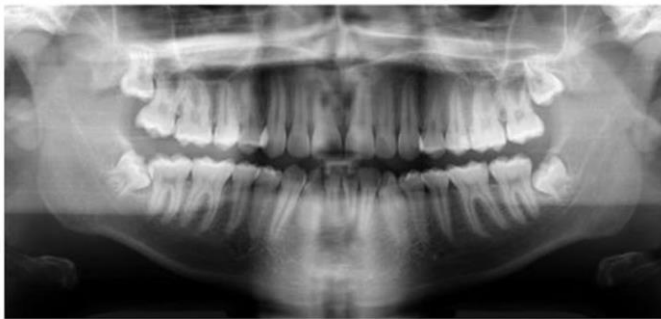
3. Do you know the image which is given below?



4. Do you know the picture which is given below?

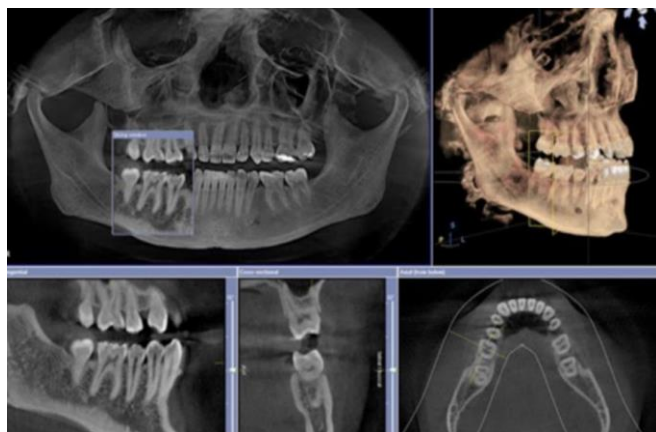


5. Do you know the image which is given below?



6. Which of the following radiography do you think is a standardised, reproducible radiograph used primarily for orthodontic diagnosis and treatment planning?

7. Do you know the image which is given below?



8. Which of the following radiographs do you think displays all the teeth of the upper and lower jaw on a single film?
9. Which of the following do you think is used to detect diseases or abnormalities throughout the body like brain tumours and used as a second look if other imaging scans provide inconclusive results?
10. Which of the following X - ray do you think shows small sections of upper and lower teeth and used to detect unusual changes in the roof and surrounding bone structure?

RESULTS :

The present study has observed 100 study participants. Among them, 33% of the participants are male and 67% of the participants are female (**fig 1**). Majority of the participants were in the age group of 19 years (62%). 8% of the population belong to the age group of 18 and 30% of the population belong to the age group of 20 (**fig 2**). The present study revealed that Majority (64%) of the population are aware of Bitewing radiography (**fig 3**). According to the present study, Majority (68%) of the population are aware of Periapical radiography (**fig 4**) and Only 25% of the population are aware of Periapical x-ray which is used to detect any unusual changes in the roof and surrounding bone structure (**fig 12**). In the present study, Majority (71%) of the population are aware of Sialography (**fig 5**). According to the study, Majority (78%) of the population are aware of Lateral Cephalometric radiography (**fig 6**) and Only (45%) of the population are aware of Lateral Cephalometric radiography which is used for orthodontic diagnosis and treatment planning (**fig 8**). In the present study, Majority (73%) of the population are aware of Periapical x-ray (**fig 7**). According to the study, Majority (50%) of the population are aware of IOPA (**fig 9**). In the present study, Only (27%) of the population are aware of OPG radiographs which display all the teeth of the upper and lower jaw on a single film (**fig 10**). According to the present study, Majority (71%) of the population are aware of MRI scans (**fig 11**). Finally, in this research, The Pearson chi-square test was used to determine the relationship between Gender and the number of respondents

who were aware of Radiographs and then the percentage observed that Lateral Cephalometric radiography was most commonly marked by all female participants. In the present study, Majority (31%) of them are females who were aware about the Lateral Cephalometric radiography which is used for orthodontic diagnosis and treatment planning when compared to male (14%). Pearson chi square test was done and the p value is 0.246 (p value > 0.05). Hence, it is statistically not significant (**fig 13**). According to the present study, Majority (55%) of them are females who are aware that the given picture is Lateral Cephalometric radiography when compared to male (23%). Pearson chi square test was done. The p value is 1.979 (p value > 0.05). Hence, it is statistically not significant (**fig 14**). Majority (53%) of them are females who are aware that the given picture is Periapical x-ray when compared to male (20%). Pearson chi square test was done. The p value is 0.099 (p value > 0.05). Hence, it is statistically not significant (**fig 15**).

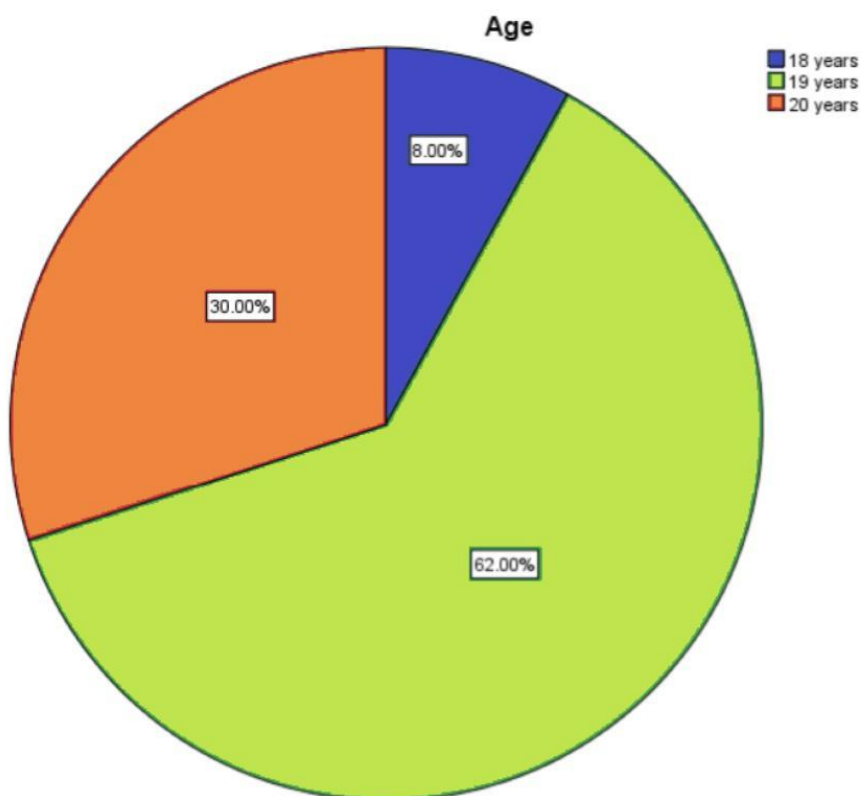


Figure 1 : Pie chart shows the percentage of response for distribution of the participants based on their age group. Indigo colour denotes age group 18 years, Lime colour denotes age group 19 years and Orange colour denotes age group 20 years. Majority of the participants were in the age group of 19 years (62%) whereas 30% of the population belong to the age group of 20 and 8% of the population belong to the age group of 18.

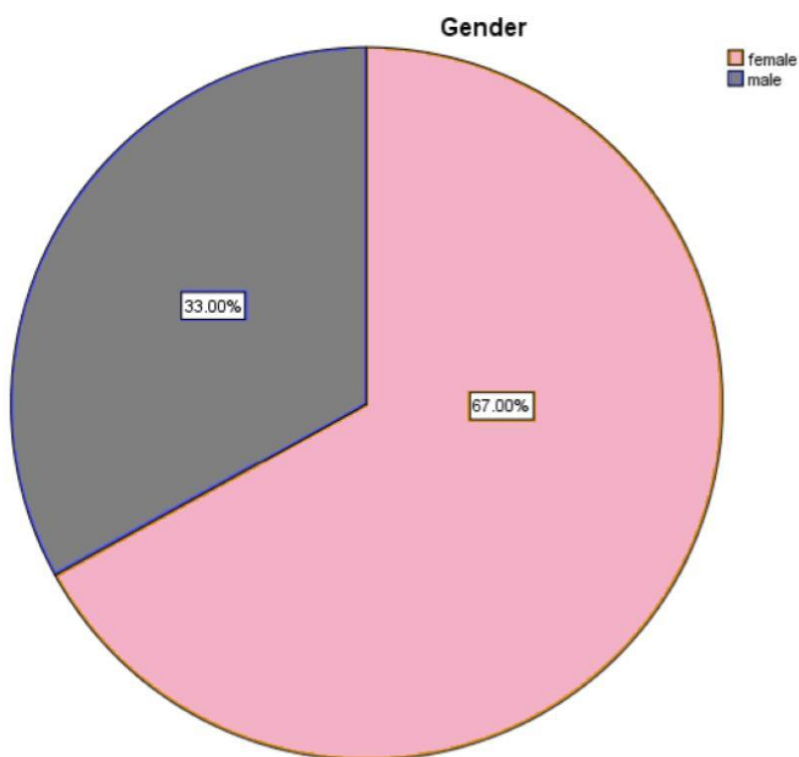


Figure 2 : Pie chart shows the percentage of response for distribution of the participants based on their gender. Rose colour denotes Female and Grey colour denotes Male. Majority of the study participants were Female (67%) when compared to Male (33%).

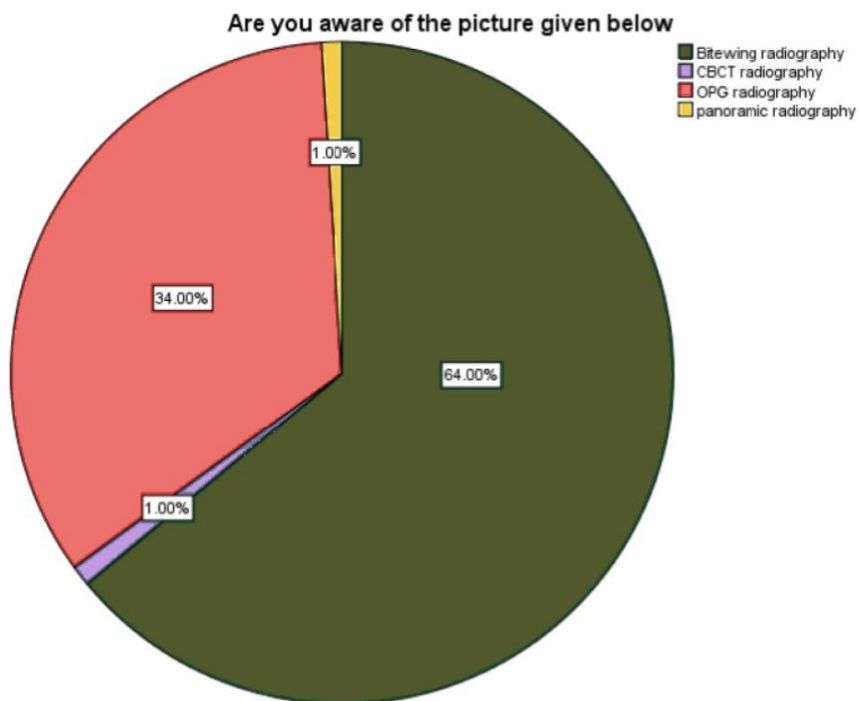


Figure 3 : Pie chart shows the percentage of responses for the given image. Here, Dark Green colour indicates Bitewing radiography, Lavender colour indicates CBCT radiography, Dark Rose colour indicates OPG radiography and Gold colour indicates Panoramic radiography. Majority (64%) of the population are aware that the given picture is Bitewing radiography whereas 34% (OPG radiography) and 1% (Panoramic and CBCT radiography) were unaware about the given image.

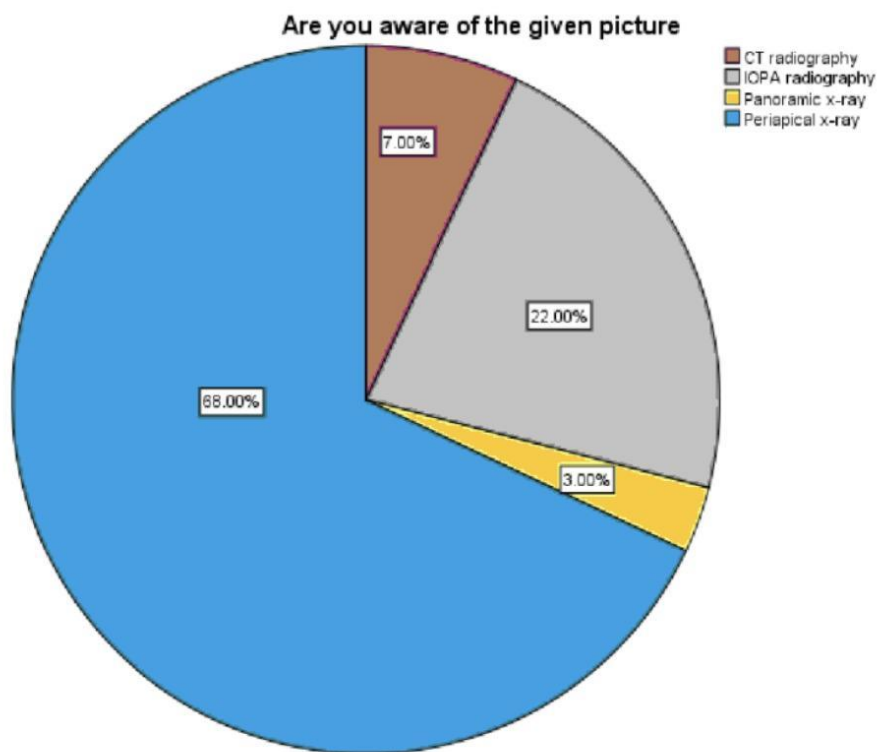


Figure 4 : Pie chart shows the percentage distribution of the responses for the given image. Here, Brown colour indicates CT radiography, Light Grey colour indicates IOPA radiography, Gold colour indicates Panoramic radiography and Turquoise colour indicates Periapical radiography. Majority (68%) of the population are aware that the given picture is Periapical radiography whereas 22% (IOPA radiography), 7% (CT radiography) and 3% (Panoramic radiography) were unaware about the given image.

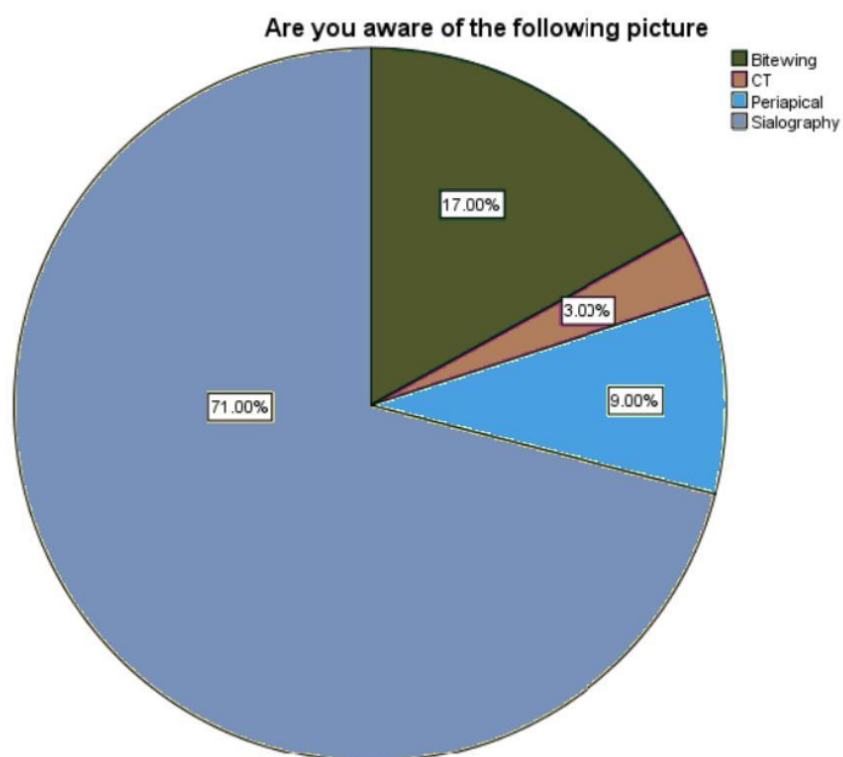


Figure 5 : Pie chart shows the percentage distribution of the responses for the given picture. Here, Dark Green colour indicates Bitewing radiography, Brown colour indicates CT radiography, Turquoise colour indicates Periapical radiography and Blue grey colour indicates Sialography. Majority (71%) of the population are aware that the given picture is Sialography whereas 17% (Bitewing radiography), 9% (Periapical radiography) and 3% (CT radiography) were unaware about the given picture.

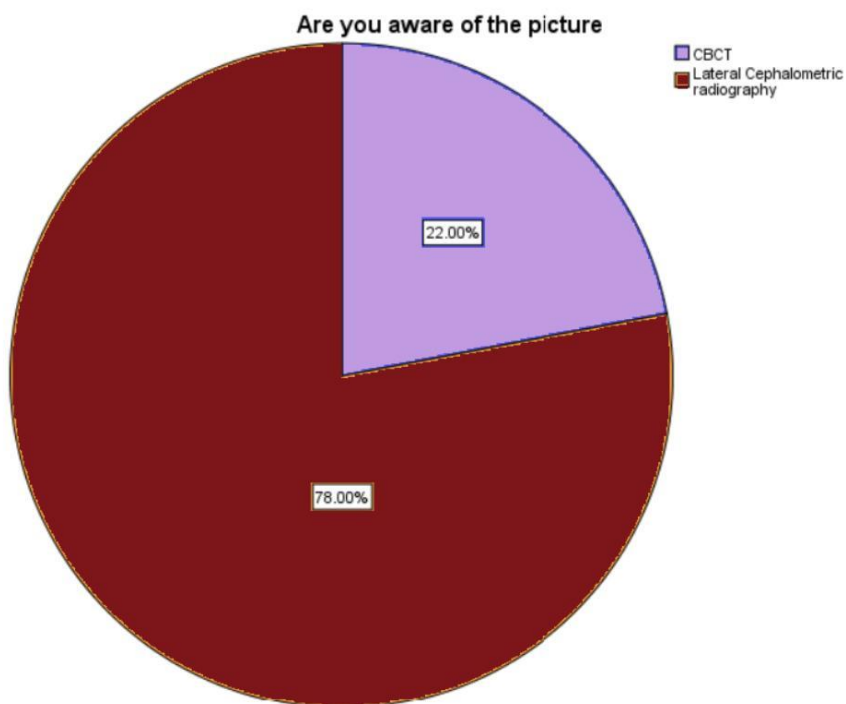


Figure 6 : Pie chart shows the percentage distribution of the responses for the given picture. Here, Lavender colour indicates CBCT radiography and Dark Red colour indicates Lateral Cephalometric radiography. Majority (78%) of the population are aware that the given picture is Lateral Cephalometric radiography whereas 22% (CBCT radiography) were unaware about the given picture.

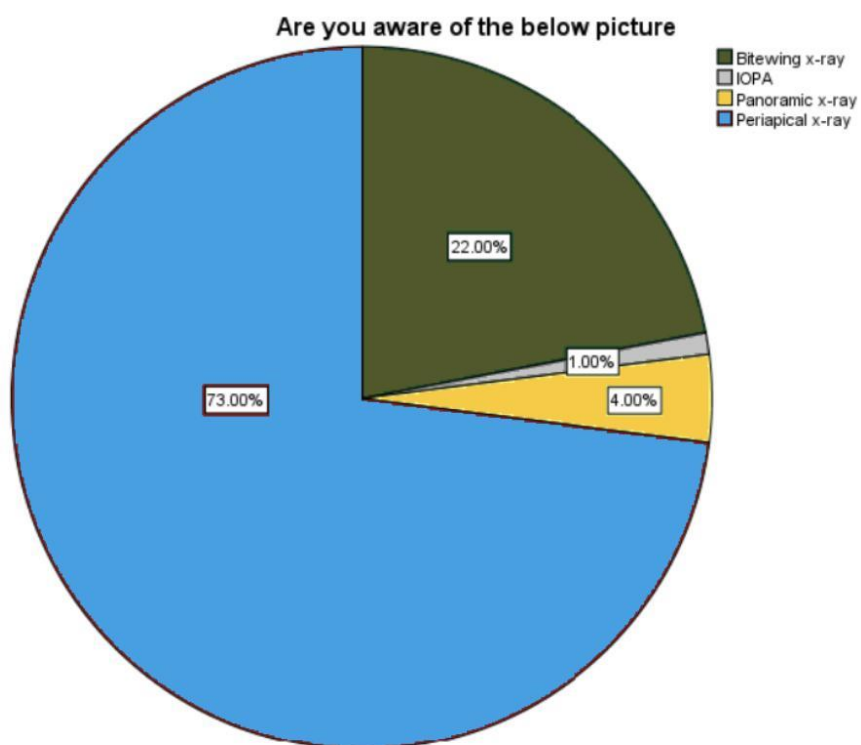


Figure 7 : Pie chart shows the percentage distribution of the responses for the given picture. Here, Dark Green colour indicates Bitewing x-ray, Light Grey colour indicates IOPA, Gold colour indicates Panoramic x-ray and Turquoise colour indicates Periapical x-ray. Only 4% of the population are aware that the given picture is Panoramic x-ray whereas 73% (Periapical x-ray), 22% (Bitewing x-ray) and 1% (IOPA) were unaware about the given picture.

Which of the following do you think is a standardised reproducible radiograph used primarily for orthodontics diagnosis and treatment planning

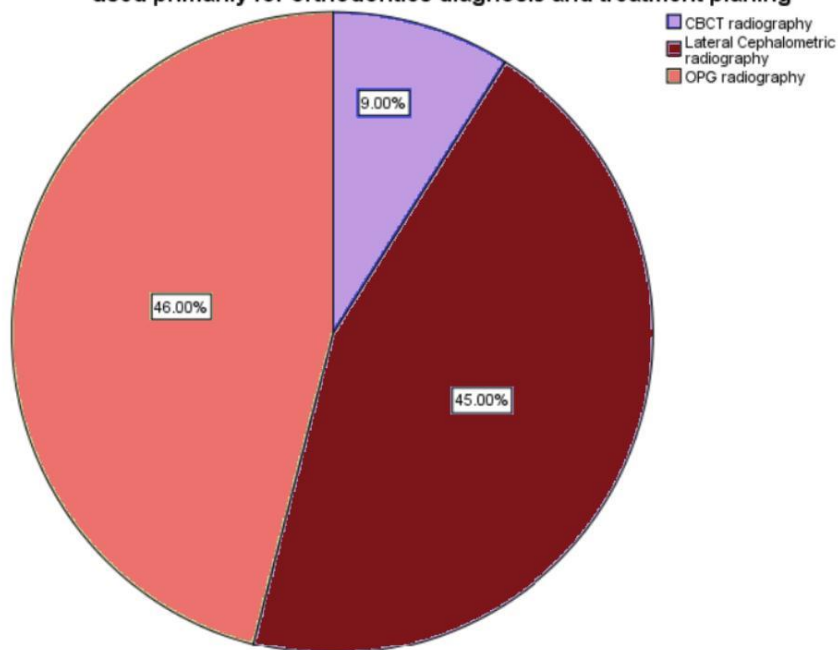


Figure 8 : Pie chart shows the percentage of responses for the identification of radiograph for orthodontic treatment planning. Here, Lavender colour indicates CBCT radiography, Dark Red colour indicates Lateral Cephalometric radiography and Dark rose colour indicates OPG radiography. Only (45%) of the population are aware of Lateral Cephalometric radiography which is used for orthodontic diagnosis and treatment planning whereas 46% (OPG radiography) and 9% (CBCT radiography) were unaware about the given radiograph.

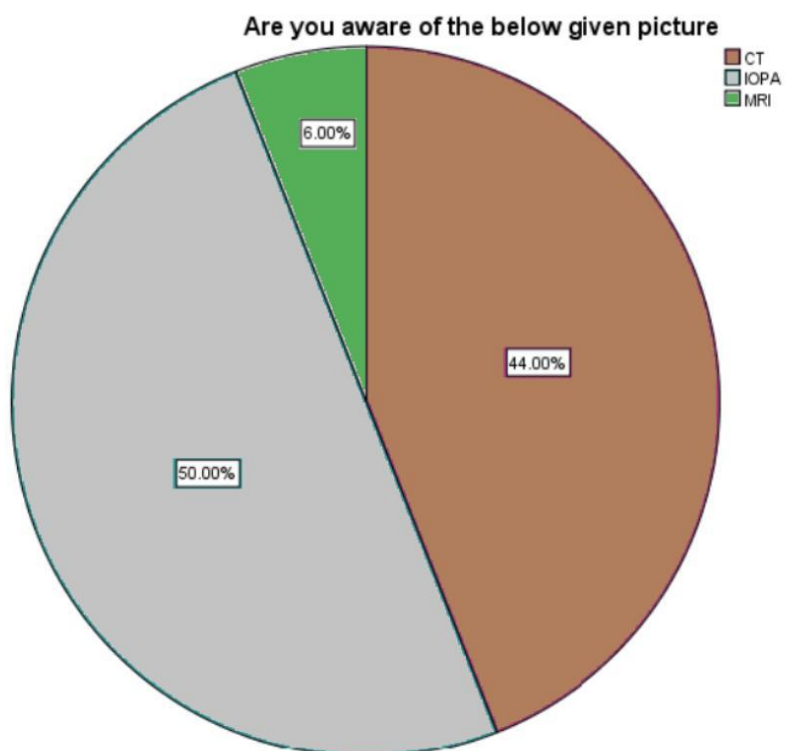


Figure 9 : Pie chart shows the percentage of the responses for the given picture. Here, Brown colour indicates CT scan, Light Grey colour indicates IOPA and Green colour indicates MRI scan. Majority (50%) of the population are aware that the given picture is IOPA whereas 44% (CT scan) and 6% (MRI scan) were unaware about the given picture.

Which of the following radiograph do you think displace all the teeth of th upper and lower jaw on a single film

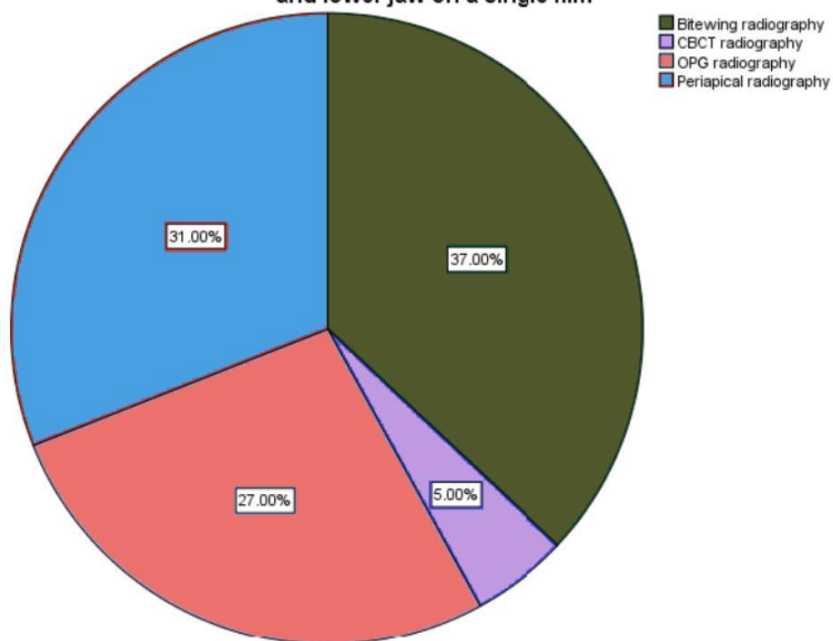


Figure 10 : Pie chart shows the percentage of response for identification of radiograph which displays all teeth. Here, Dark Green colour indicates Bitewing radiography, Lavender colour indicates CBCT radiography, Dark Rose colour indicates OPG radiography and Turquoise colour indicates Periapical radiography. Only (27%) of the population were aware of OPG radiograph which displays all the teeth of the upper and lower jaw on a single film whereas 37% (Bitewing radiography), 31% (Periapical radiography) and 5% (CBCT radiography) were unaware about the given radiograph.

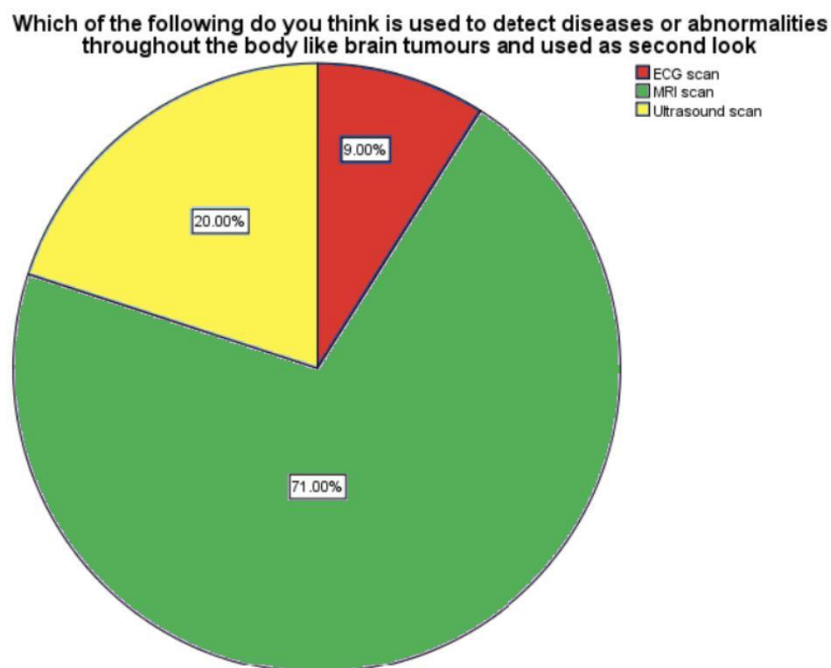


Figure 11: Pie chart shows the percentage of responses for the identification of radiograph which is used to detect diseases or abnormalities throughout the body. Here, Red colour indicates ECG scan, Green colour indicates MRI scan and Yellow colour indicates Ultrasound scan. Majority (71%) of the population are aware of MRI scans which are used to detect diseases or abnormalities throughout the body and used as a second look whereas 20% (Ultrasound scan) and 9% (ECG scan) were unaware about the given radiograph.

Which of the following X-Rays do you think shows small section of upper and lower teeth used to detect unusual changes in the roof and surrounding bone structure

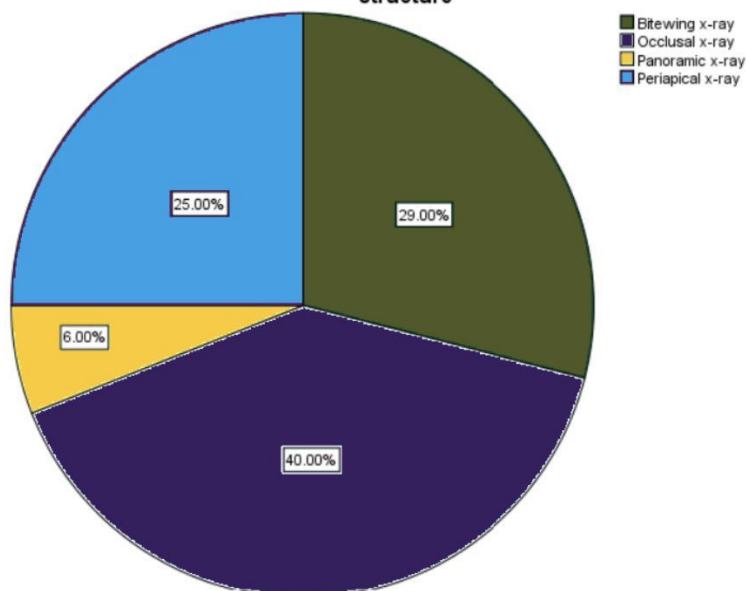


Figure 12 : Pie chart shows the percentage distribution of the responses for the identification of X-ray that shows a small section of upper and lower teeth. Here, Dark Green colour indicates Bitewing x-ray, Dark Purple colour indicates occlusal x-ray, Gold colour indicates Panoramic x-ray and Turquoise colour indicates Periapical x-ray. Only 25% of the population are aware of Periapical x-ray which is used to detect any unusual changes in the roof and surrounding bone structure whereas 40% (Occlusal x-ray), 29% (Bitewing x-ray) and 6% (Panoramic x-ray) were unaware about the given radiograph.

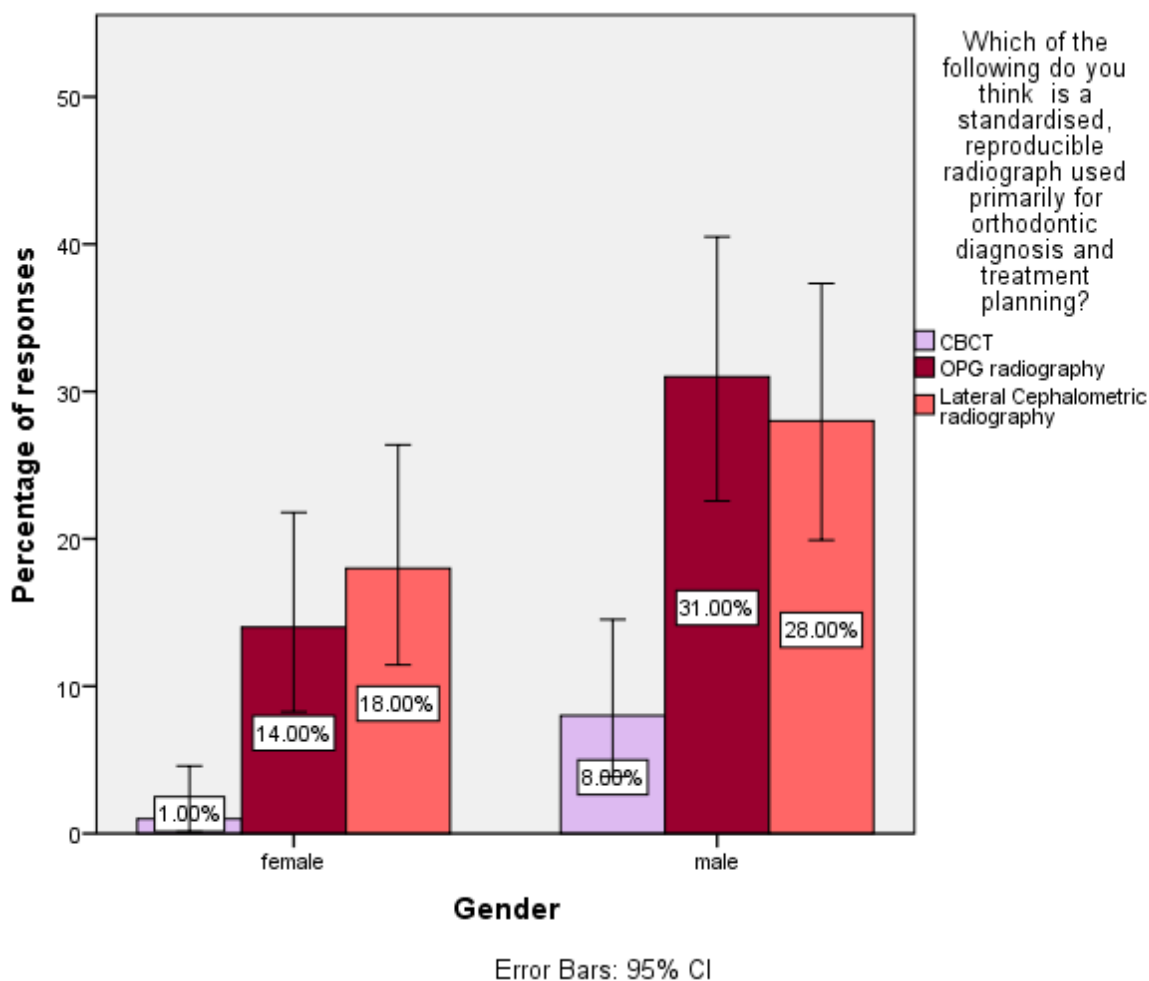


Figure 13 : Bar graph represents the association between gender and the respondents who were aware about the Lateral Cephalometric radiography. X-axis represents gender and the Y-axis represents the percentage of responses overall. Here, Lavender colour denotes CBCT radiography, Dark Red colour denotes Lateral cephalometric radiography and Dark Rose colour denotes OPG radiography. Lateral Cephalometric radiography was most commonly marked by all female participants. Majority (31%) of them are females who were aware about the Lateral Cephalometric radiography which is used for orthodontic diagnosis and treatment planning when compared to male (14%). Pearson chi square test was done and the p value is 0.246 (p value > 0.05). Hence, it is statistically not significant.

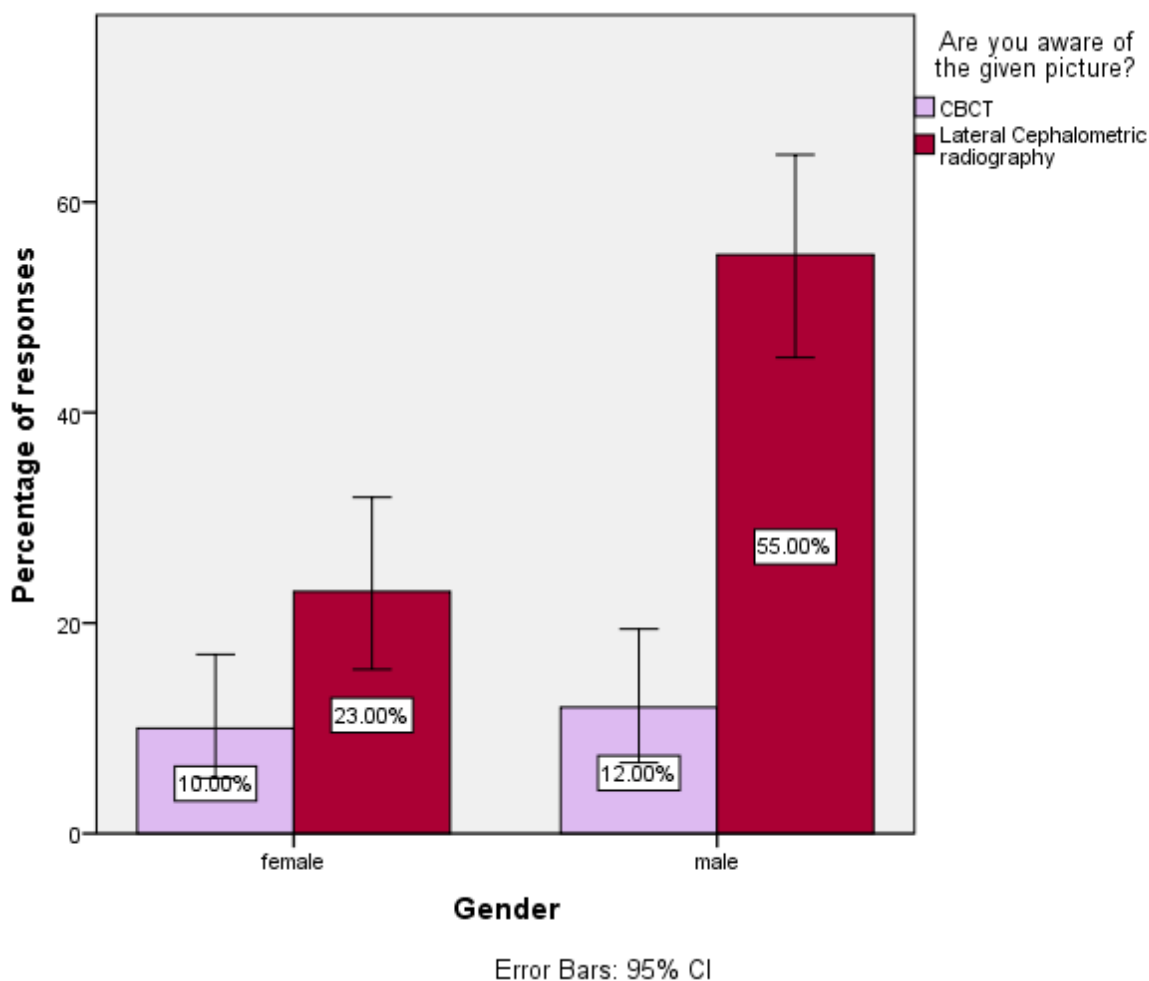


Figure 14 : Bar graph represents the association between gender and the respondents who were aware about the Lateral Cephalometric radiography. X-axis represents gender and the Y-axis represents the percentage of responses overall. Here, Lavender colour denotes CBCT and Dark Red colour denotes Lateral Cephalometric radiography. Lateral Cephalometric radiography was most commonly marked by all male and female participants. Majority (55%) of them are females who are aware that the given picture is Lateral Cephalometric radiography when compared to male (23%). Pearson chi square test was done. The p value is 1.979 (p value > 0.05). Hence, it is statistically not significant.

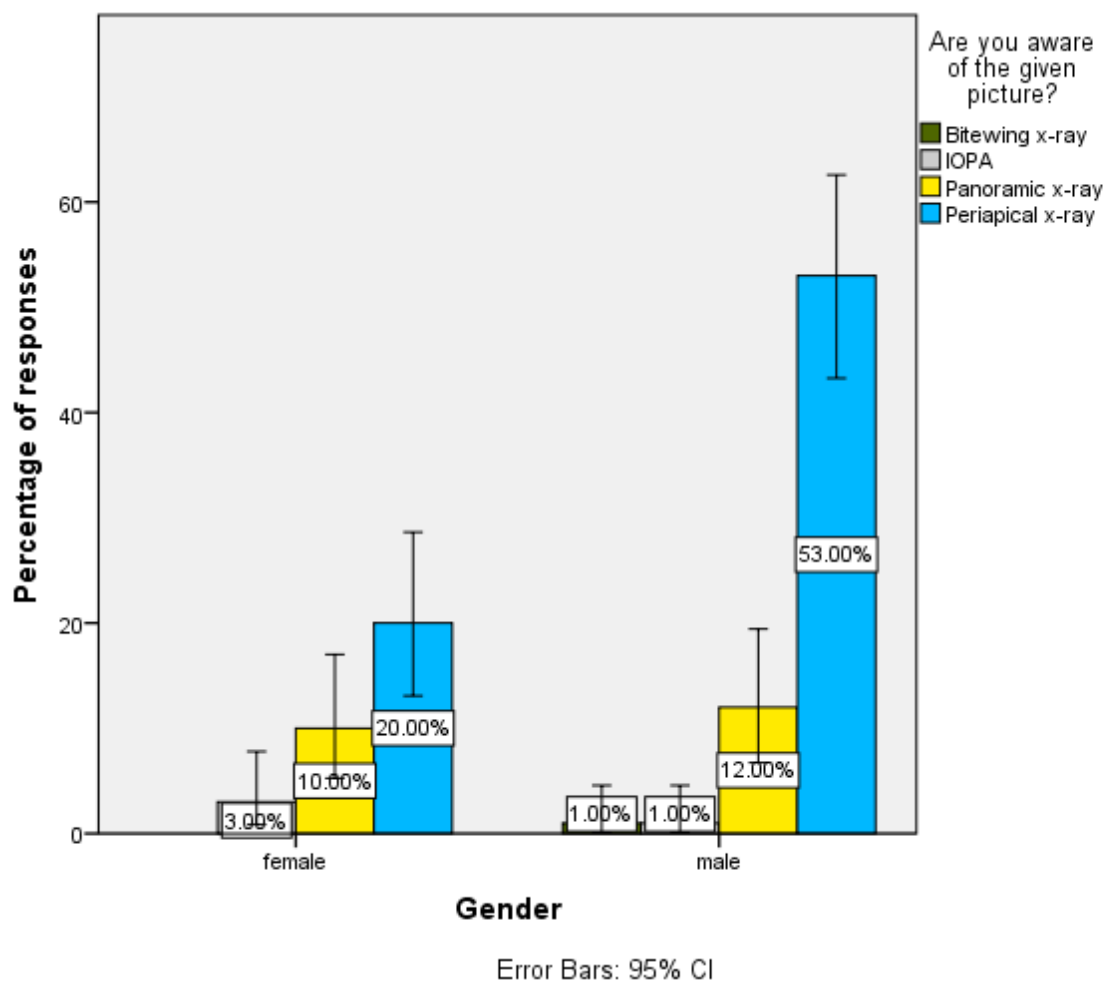


Figure 15 : Bar graph represents the association between gender and the respondents who were aware about the Periapical x-ray. X-axis represents gender and the Y-axis represents the percentage of responses overall. Here, Dark Green colour denotes Bitewing x-ray, Light Grey colour denotes IOPA, Gold colour denotes Panoramic x-ray and Turquoise colour denotes periapical x-ray. Periapical x-ray was most commonly marked by all male and female participants. Majority (53%) of them are females who are aware that the given picture is Periapical x-ray when compared to male (20%). Pearson chi square test was done. The p value is 0.099 (p value > 0.05). Hence, it is statistically not significant.

DISCUSSION :

This study is done to know whether the 1st year undergraduates are aware of radiographs. This study is somewhat creative and as such, there are few other studies in the literature which compare the knowledge of dental students about the radiographs(1,3,4,9). In our present study, the majority of the responses were from females. This study found that 32% of female students were aware of Lateral

Cephalometric radiography followed by 14% of male students. As a result of the current study, it is evident that female students are more aware of Radiographs.

Lateral cephalometric radiograph is a widespread diagnostic tool used for orthodontic treatment planning. It is an x-ray which is taken on the side of the face with very precise positioning so that various measurements can be taken to determine the current and future relationship of the top and bottom jaw (maxilla and mandible) and assess the nature of a patient's bite. It is also used in the classification of skeletal and dental abnormalities(20,21). In the previous study, they have concluded that Lateral Cephalometric radiograph is a diagnostic tool which is used in the orthodontic diagnosis and treatment of planning. From the results obtained (fig 6), we came to know that Majority (78%) of the population are aware that the given picture is Lateral Cephalometric radiograph and from (fig 8), we came to know that only 45% of the population are aware that Lateral Cephalometric radiography is used for orthodontic diagnosis and treatment planning(14).

Bitewing radiographs are done to evaluate the inter-proximal surfaces of 3-4 upper and lower teeth simultaneously. The Bitewing film has a flap in which the patient who all comes for treatment bites it to keep the film in place against the crowns of upper and lower teeth simultaneously. That's why it is called a Bite-wing radiograph. Bitewing films are valuable for detecting interproximal caries in the early stages of development before they manifest clinically and it evaluates the interproximal bone condition. In the previous study, they have concluded that bitewing radiographs help to detect more lesions. From the results obtained (fig 3), we came to know that the Majority (64%) of the population are aware that the given picture is Bitewing Radiographs and from (fig 10), we came to know that the Majority (37%) of the population are aware of Bitewing radiography which displays all the teeth of the upper and lower jaw on a single film(10).

Occlusal radiograph is used to examine large areas of the upper and lower jaw and the palate and floor of the mouth may also be examined. Occlusal x-rays help to track the development and placement of a section or entire arch of teeth in the upper or lower jaw and are mostly used by pediatric dentists(11). An occlusal radiograph shows a large segment of a dental arch which cannot be viewed on periapical radiograph, such as a cyst. It helps to locate impacted teeth and foreign bodies in the jaws and stones in the ducts of submandibular glands. In the previous study, they have concluded that it is an important diagnostic tool to diagnose the positions and alignments. From the results obtained (fig 12), we came to know that Majority (40%) of the population are aware of Occlusal x-ray which is used to

detect any unusual changes in the roof and surrounding bone structure(22)(23)

The present study results show a variable level of knowledge about the radiation and radiographs among the 1st year undergraduates. In this study, some of the 1st year undergraduates were successful in identifying the radiographs but still, they need to get knowledge and know more about the radiographs and radiographic techniques. The study has to be conducted in a larger population to get more accurate information. The survey can be conducted in offline mode rather than online so that the knowledge of the subjects could be analysed accurately.

CONCLUSION : From the present study, it is concluded that female students were more aware about Radiographs than male. This knowledge gap can be minimised by conducting more pictorial lectures and giving innovative handworks on Radiographs for the students to make them understand the subject in depth. The sample size was small and more sample size would be beneficial to assess the knowledge about Radiographs more accurately.

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CONFLICTS OF INTEREST :

The authors declare that there are no conflicts of interest in the study.

AUTHORS CONTRIBUTION :

Sujitha S : literature search, data collection, analysis, manuscript drafting.

Dr.R.Priyadarshini and Dr.P.Suganya : Data verification, manuscript drafting.

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