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Awareness about Precision Medicine among Dental Students: A Survey

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ABSTRACT

Precision medicine is a method of prevention and treatment which is based on biological databases. Precision medicine has been used in existence for more than a century. More than one million people have contributed their data to precision medicine. This study focuses especially to evaluate the knowledge on characteristics of precision medicine. The aim of this study is to create awareness of Precision medicine among dental students. Based on a cross-sectional study, a survey was conducted among dental students on precision medicine. The questionnaire was distributed through an online survey link (i.e.) google forms. Nearly 150 students participated in it. Data was circulated, results were collected and statistically analysed through spss software. 97.6% of the people are mostly aware of precision medicine, where 47% are male and 53 % are female. 77.1% of the people are aware that the precision medicine treatment is based on DNA and it's genetic variations. 75.3% of people feel that precision medicine is not affordable by everyone. This study was made to improve the awareness and knowledge of precision medicine in dentistry.

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INTRODUCTION

Precision medicine trials aim to provide evidence that targeting specific molecular abnormalities with specific treatment will result in greater effectiveness than current methods (Conley, 2016). While we know of some instances where the tumour type influences the response to these agents, there are other instances where reactions can be seen in different malignancies if they have the same molecular abnormality (Conley, 2016). The Precision Medicine Initiative (PMI), announced on 30 January 2015 by President Obama, aims to advance our understanding of genetic variations within diseases and develop treatments for them, starting with cancer. The principle of precision medicine is the prevention and care approaches taking into account patient variation is not new; for example, blood typing has been used to direct blood transfusions for more than a century. Yet the possibility of broad implementation of this principle has been significantly improved by the recent emergence of large-scale biological databases such as the sequence of the human genome (Collins and Varmus, 2015).

The new plan has two key components: a near-term emphasis on cancers and a longer-term aim of creating information that extends to the entire health

and disease spectrum. Because of developments in basic science, both components are now within our scope, including molecular biology, genomics and bioinformatics. More than one million people have contributed their data for precision medicine in an amazing fact (Ashley, 2016).

In the previous study application of precision medicine has been studied in detail (Ashley, 2016). Promising applications of precision medicine as it currently exists then continue to address the challenges faced by our community in the fields of sequencing technology, algorithm creation and data sharing in order to bring genomics to a clinical level. Genomics applications for genetic disorders such as cystic fibrosis and cancer and pharmacogenomics are promising for the application of genomics to medicine in a broader sense. Genomic and precision medicine encompasses areas as varied as intellectual property, regulation of the Food and Drug Administration (FDA), and coverage of insurance (Rai, 2017). Precision medicine is used by a large number of individuals for epidemiological and other follow up studies for treating a wide number of diseases (Verma, 2017).

Consequences, epigenetic, socioeconomic, and behaviour diversity in different racial and ethnic groups will be critical in developing profiles for personalized, and precision medicine approaches for patients. Pattern recognition which is very useful in the classification of big data, extraction of signals, Biomarkers play an important role in precision medicine (Faintuch and Faintuch, 2020). Accurate, reliable statistical and machine learning tools for diagnosing the treatment in precision medicine (Deigner and Kohl, 2018). The term predictive medicine is replaced as precision medicine (Verma, 2017). Precision medicine has created a potential impact on environmental health (Martin-Sanchez *et al.*, 2020). Furthermore, research has to be done to prove that precision medicine will reduce the rate of mortality.

Previous research on various aspects like nanotechnology (Wu *et al.*, 2019), phytochemistry (Chen *et al.*, 2019; Li *et al.*, 2020), pharmacology (Rengasamy *et al.*, 2016; Shukri *et al.*, 2016), cancer technology (Jainu *et al.*, 2018; Wang *et al.*, 2019; Menon *et al.*, 2016; Ke *et al.*, 2019; Mohan *et al.*, 2015), biotechnology (Rengasamy *et al.*, 2018; Ramya *et al.*, 2018) as well as biochemical and molecular toxicology (Gan *et al.*, 2019; Ponnulakshmi *et al.*, 2019) were conducted by our team.

The researchers also wanted to prove that precision medicine doesn't affect the cost of living. The aim of this study is to create awareness about precision medicine among dental students.

MATERIALS AND METHODS

A descriptive cross-sectional study was done to analyse knowledge, attitude and practice of precision medicine among dental students based. Approval was obtained from the institutional review board to conduct an online survey. The survey was conducted among 150 dental students. A self-administered questionnaire of 15 closed-ended and open questions was prepared and distributed among dental students through online based survey forms "google forms" The questionnaire contained questions on demographic details also. A self-administrated questionnaire was prepared. The method of sampling that is done is simple random sampling. The responses were collected, tabulated in the excel sheet and analysed. Data entered in SPSS, and the results were represented in a Bar graph. Chi square test was used to analyse and compare the educational level of students and their knowledge and awareness of precision medicine. The list of independent variables is age, sex and locality. The list of dependent variables is awareness and knowledge.

RESULTS AND DISCUSSION

97.6% of the people are aware of precision medicine, and 2.4% of the people are not aware of it (Figure 4) out of which 47% of the people are male and 53% of the people are female (Figure 3). Here 2.4 % of the people are under the age group of 17, 6% of the people are in an age group of 18, 13. 3% of the people are in an age group of 19, 12.7% of the people are in the age group of 20, 22.9% are in the age group of 21, 15.1% of the people are in the age group of 22, 27.7% of the people are of the age group of 23 (Figure 1).

13.9 % of the population says that Precision medicine is otherwise known as personalised medicine, 7.8% of the population say that Precision medicine is otherwise known as genomic medicine, 77.7% of the people feel that precision medicine is otherwise known as personalised and genomic medicine 6% of the people disagree to it (Figure 5). 77.1% of people feel that the treatment of precision medicine can be done with the help of DNA. It's treatment, 6% of the population feel that the treatment of precision medicine is based on signs and symptoms, 13.9% of the people say that the treatment of precision medicine is based on both DNA and signs and symptoms and 3% of the people disagree to it. 89.8% of the people were aware that father of precision medicine was Archibald E

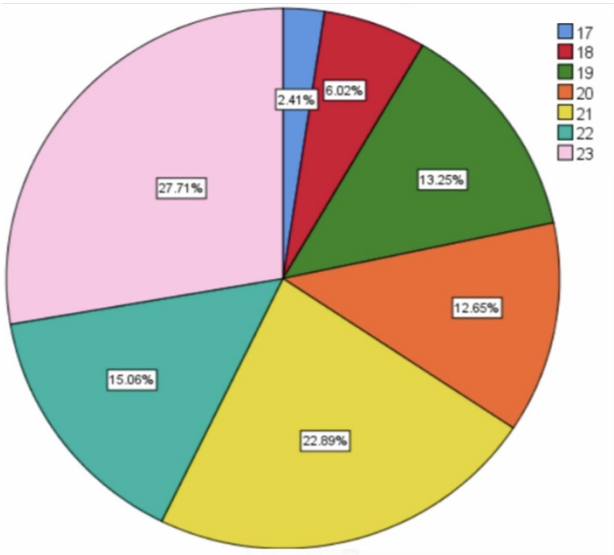

Figure 1: This pie chart represents the percentage distribution of age of the students.

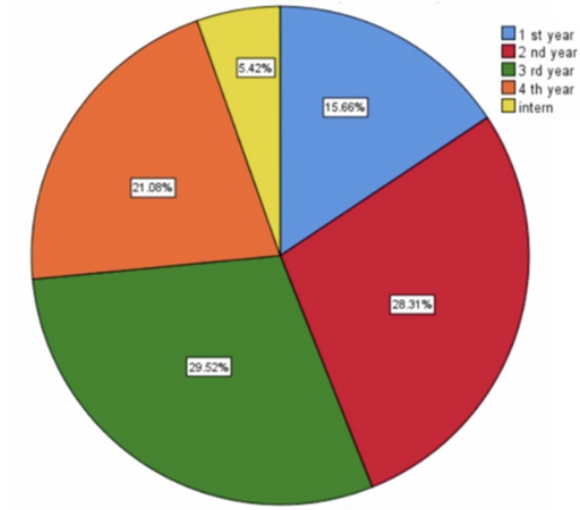

Figure 2: This pie chart represents the percentage distribution of year of study of the students.

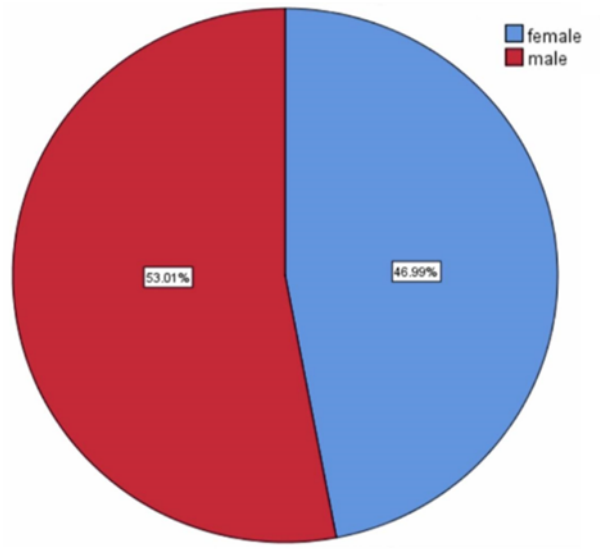

Figure 3: This pie chart represents the percentage distribution of gender of the students.

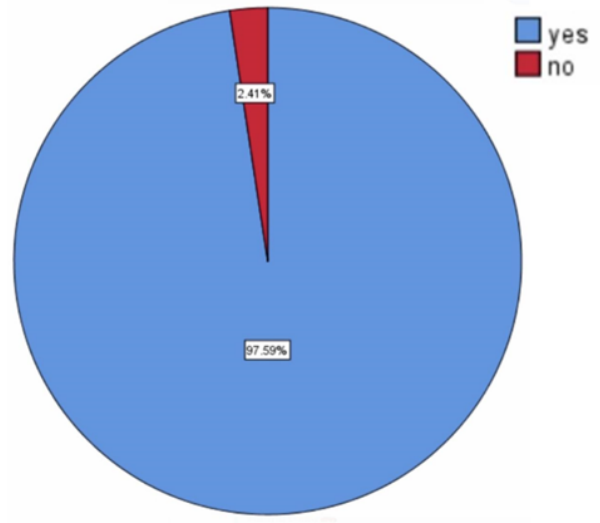

Figure 4: This pie chart represents the percentage distribution of awareness on precision medicine.

Garrod, 7.8% of the people feel that the father of precision medicine is Robert L Perlman, 6% of the population say that the father of precision medicine is Govindaraju and 1.8% of the population disagree to all the above options (Figure 6).

96.4% of the people feel that precision medicine is advantageous to human health and 3.6 % of the people say no to it (Figure 7). 24.7% of the people feel that precision medicine is affordable by everyone, and 75.3% of the people feel that precision medicine is not affordable by everyone (Figure 8). 78.1% of the people feel that precision medicine has no side effects and 21.1% of the people feel that precision medicine has side effects (Figure 9). 87.3% of the people feel that precision medicine is the same as personalised medicine and 12.7% of the people disagree with it (Figure 10). 75. 3% of feel that allopathy is a better method of treatment, 21% of the people feel that precision medicine is a better method of treatment, 1.2% of the people feel that Siddha is a better method for treatment and 2.4% of the people feel that the best methods of treatment are Unani (Figure 11). 85.5 % of the people say that precision medicine varies according to age and sex, and 14.5 % of the people disagree to it. 92.2% of the people agree that precision medicine will enhance their Practice in future and 7.8% of the people dis-

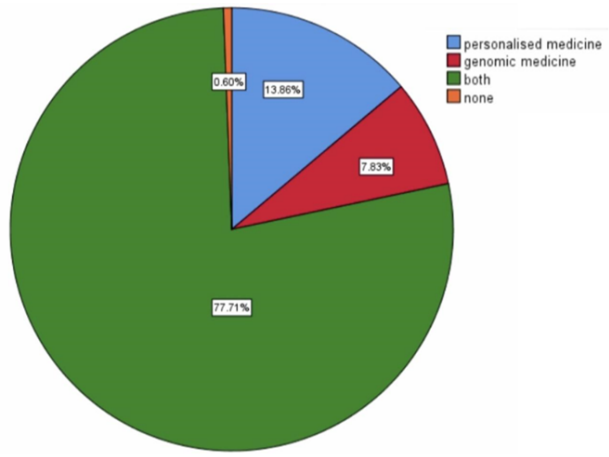

Figure 5: Piechart represents the percentage distribution of awareness on the other names of precision medicine.

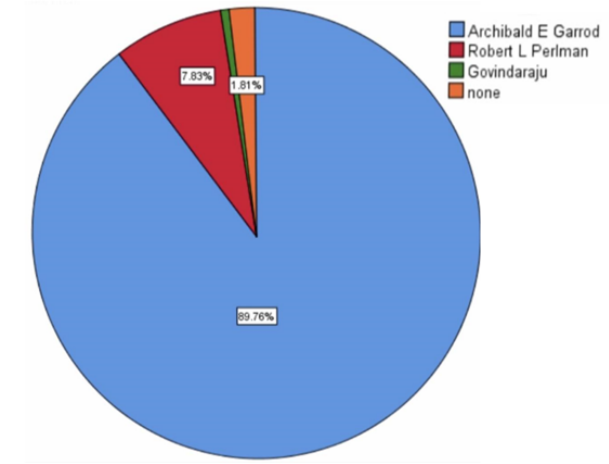

Figure 6: This pie chart represents the percentage distribution of knowledge about father of precision medicine.

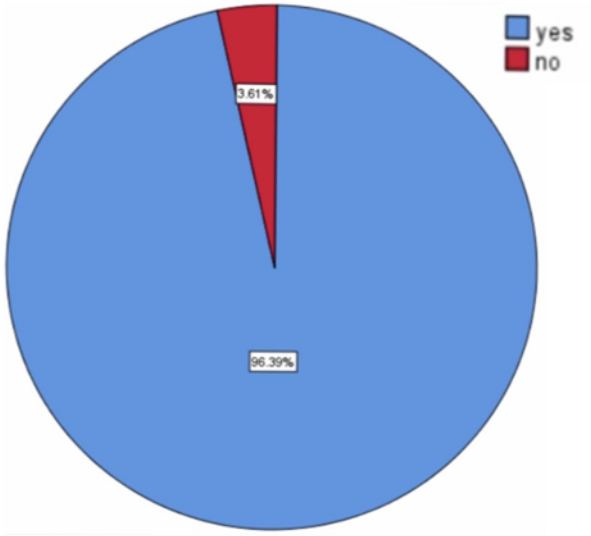

Figure 7: This pie chart represents the percentage distribution of opinion about whether precision medicine is more advantageous to human health.

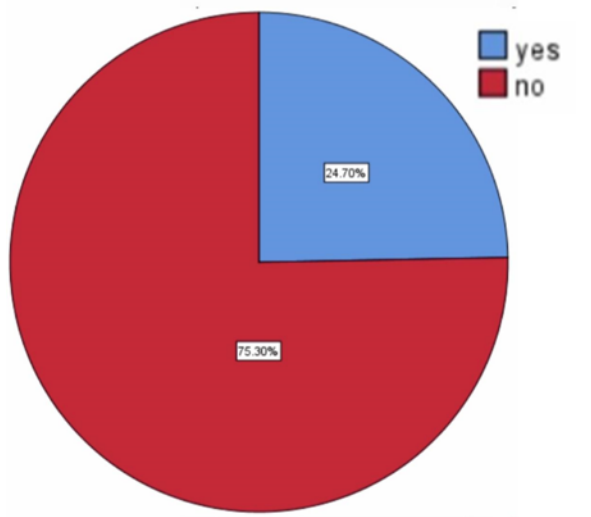

Figure 8: This pie chart represents the percentage distribution of opinion about whether precision medicine is affordable by everyone.

agree with it (Figure 12). 34.4% of the people say that precision medicine will not lead to chronic disease and 65.7% of the people disagree with it (Figure 13). 92.8% of the people feel that teaching precision medicine is worthy among dental students, and 7.2% of the people disagree with it (Figure 14).

This survey was done based on awareness of precision medicine where the P value is 0.329 > 0.05, Which is statistically insignificant (Figure 15). There is an article with similar findings published by J. Bousquet et al. where he has told 69% of the people were aware of it 31% of people are not aware of it There is an opposing article by Agustin Elbe where he says that only 24% of people are aware and 76% of people are unaware the precision medicine will lead to chronic disease. In this survey, the survey was done about awareness of teaching precision medicine is worth among dental students where P value will be 0.656 > 0.05, Which is statistically insignificant (Figure 23). There are two articles which have similar findings were 79% of people were aware and 19% of were unaware of this was published by Caroline Eden (Eden *et al.*, 2016) and 75% of the people were aware of, and 25% of people were unaware this was published by Jieu palvika et al. There is an opposing article for this which is published by Andrej Jopolian where only 43% of the people are aware that teaching Precision medicine is

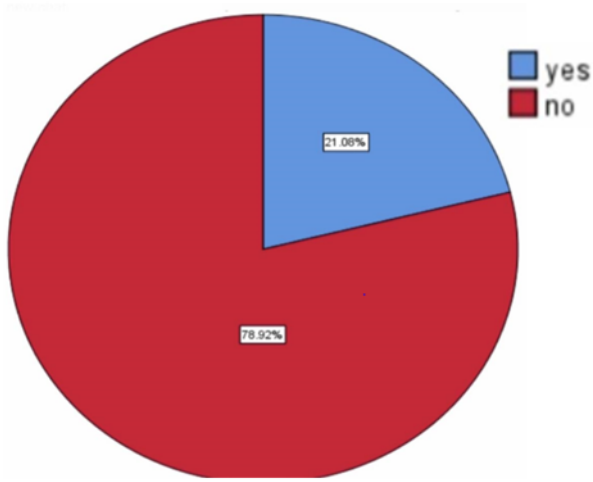

Figure 9: This pie chart represents the percentage distribution of awareness on the side effects of precision medicine.

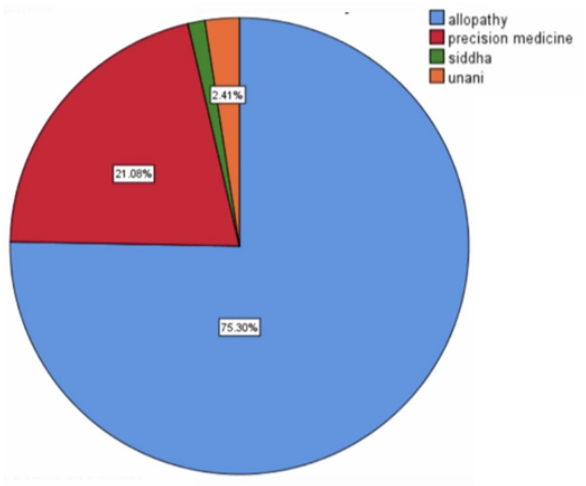

Figure 11: This pie chart represents the percentage distribution of responses to better types of treatment.

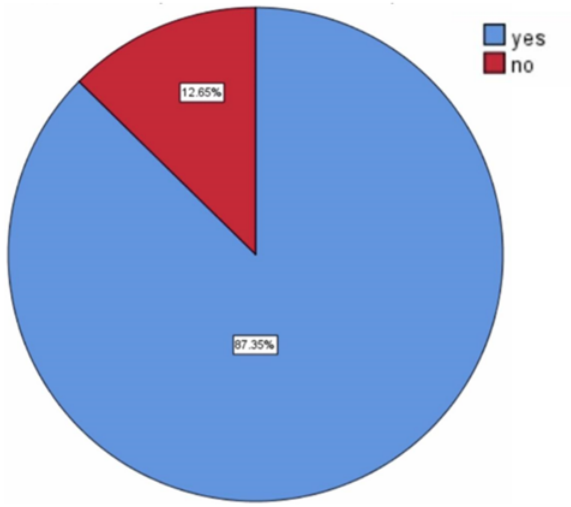

Figure 10: This pie chart represents the percentage distribution of awareness on precision medicine is otherwise known as personalised medicine.

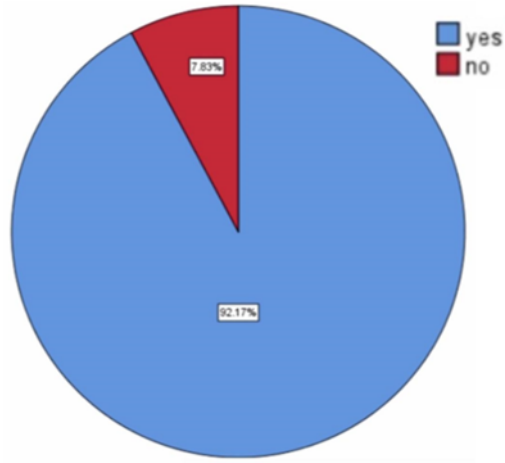

Figure 12: This pie chart represents the percentage distribution of opinion about whether precision medicine would enhance their practice in future.

worth among students and 57% of the people were unaware of it. This present study has a question in the survey based on are precision medicine and personalised medicine same where the P value is 0.145 > 0.05, Which is statistically insignificant (Figure 20). There are two articles which have similar findings, and these are published by Fernando A.L Marson (Marson *et al.*, 2017) where 75% of people knew that precision and personalised medicine were the same and 25% of the people were unaware of it. The other article with a similar was published by Jose D, where 63% were aware of it, and 37% were not aware of it. There is an opposing article published by Carmen, where 56.3% are aware of it, and 44% of people are unaware of it.

Figure 1, Blue color represents the students of 17 years of age, red color represents students of 18 years of age, green color a present student of 19 years of age, orange color represent students of 20 years of age, yellow color represents students of 21years of age, the greenish-blue color represents students of 22 years of age, pink color a present students of 23 years of age. Majority of the students (22.89%) participated in the survey were 21 years of age.

Figure 2, Blue represents first year, red represents second year, the green represents third year, orange represents fourth year, yellow represents

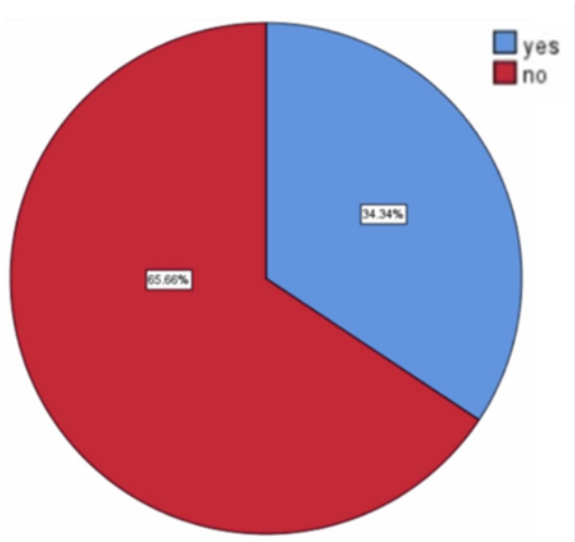

Figure 13: This pie chart represents the percentage distribution of awareness on the side effects of precision medicine.

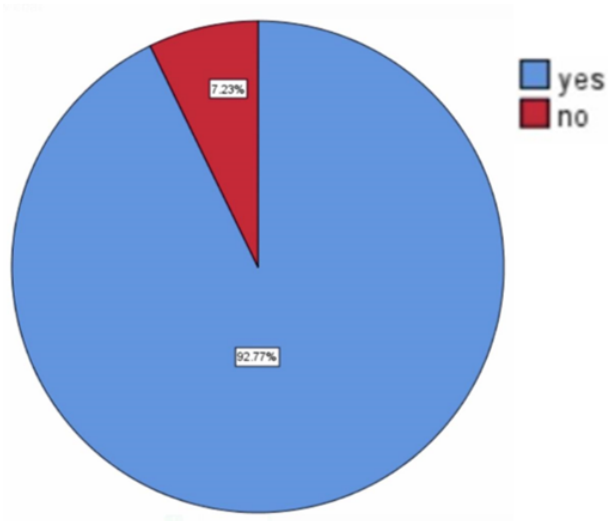

Figure 14: This pie chart represents the percentage distribution of students who felt that teaching precision medicine is worthy among dental students.

interns. Majority of the participants were third years(29.52%).

Figure 3, Blue color represents the female, and the red color represents the male. Majority of the students who participated in the survey were males (53.01%).

Figure 4, Blue color represents yes and the red color represents no. Majority (97.6%) of the dental students were aware about precision medicine.

Figure 5, The color red represents genomic medicine, blue represents personalised medicine green represents both and orange represents none. Majority (77.7%) of the population felt that

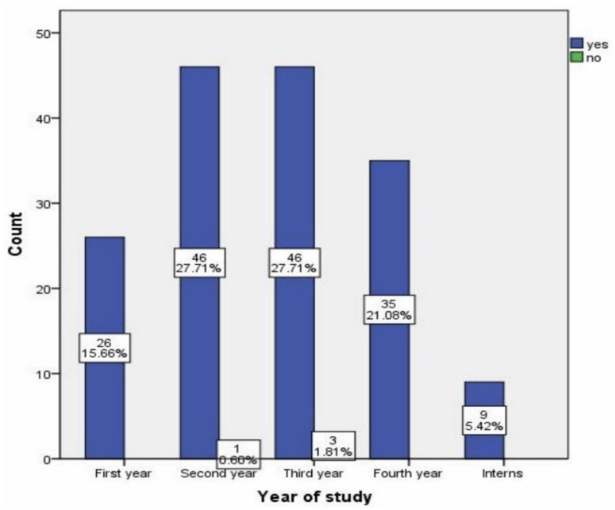

Figure 15: This bar chart represents the association between year of study with the awareness of precision medicine.

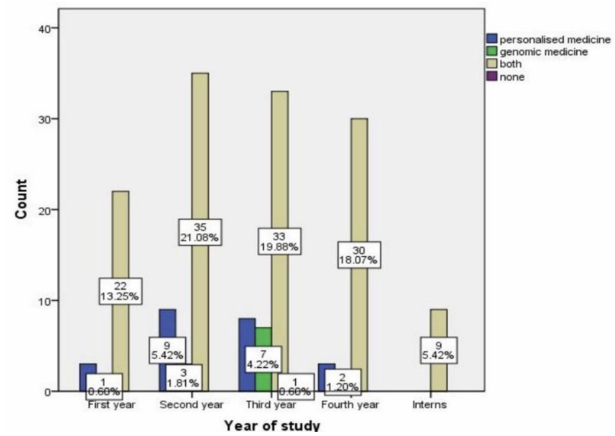

Figure 16: This bar chart represents the association between responses based on year of study with the awareness of other names for precision medicine.

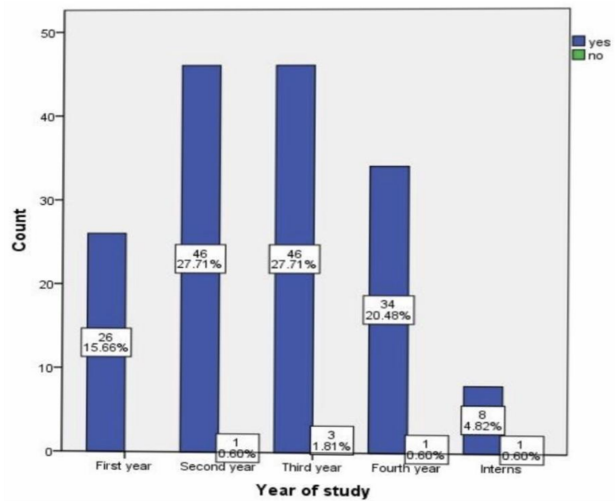

Figure 17: This bar chart represents the association between responses based on year of study with the advantages of precision medicine to human health.

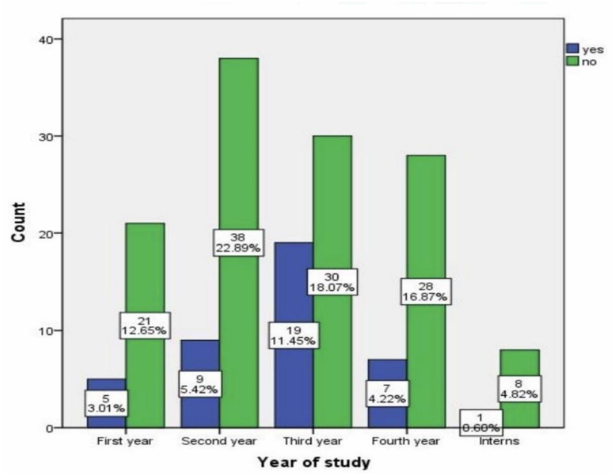

Figure 18: This bar chart represents the association between responses based on year of study with the affordability of precision medicine by common people.

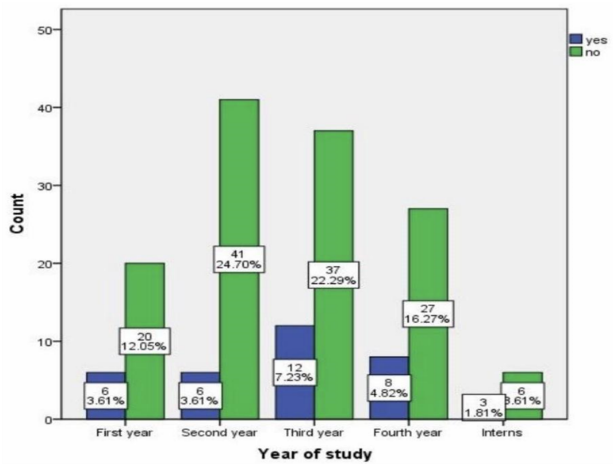

Figure 19: This bar chart represents the association between responses based on year of study with the awareness of whether precision medicine leads to any side-effects.

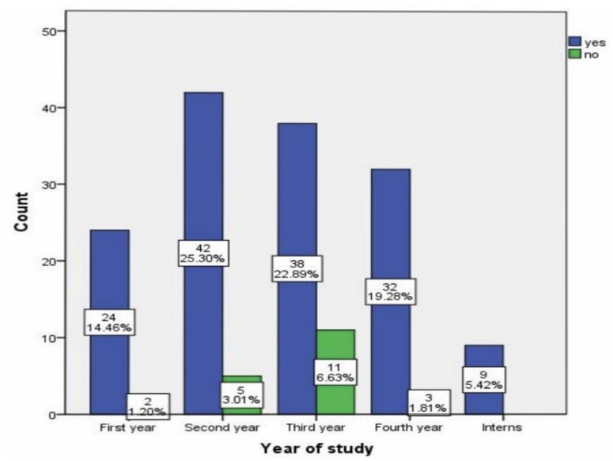

Figure 20: This bar chart represents the association between responses based on year of study with the awareness on precision medicine and personalised medicine are the same.

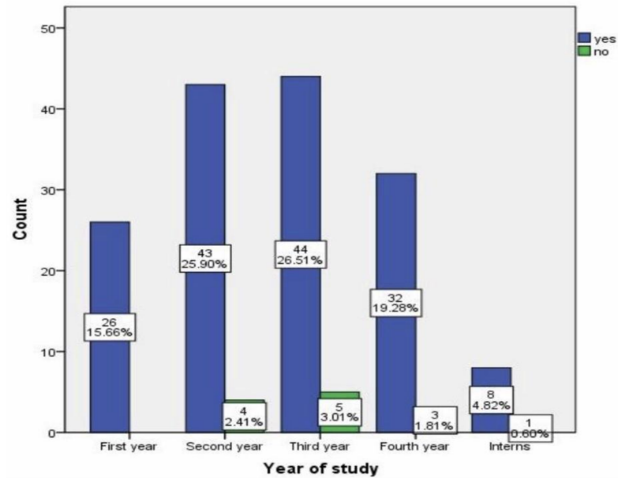

Figure 21: This bar chart represents the association between responses based on year of study with the opinion on precision medicine enhances the future practice in dentistry.

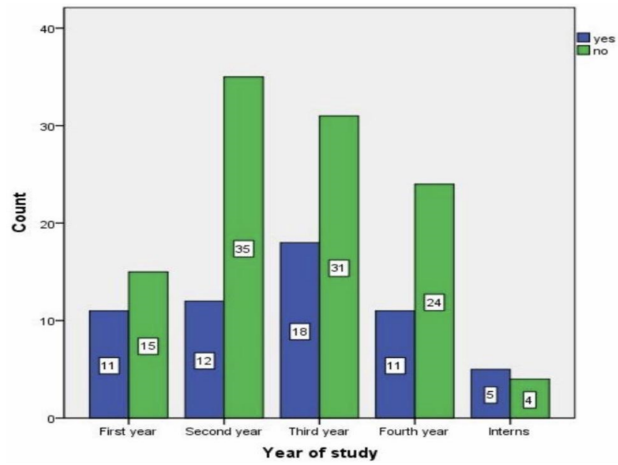

Figure 22: This bar chart represents the association between responses based on year of study with the opinion on whether precision medicine leads to chronic disease.

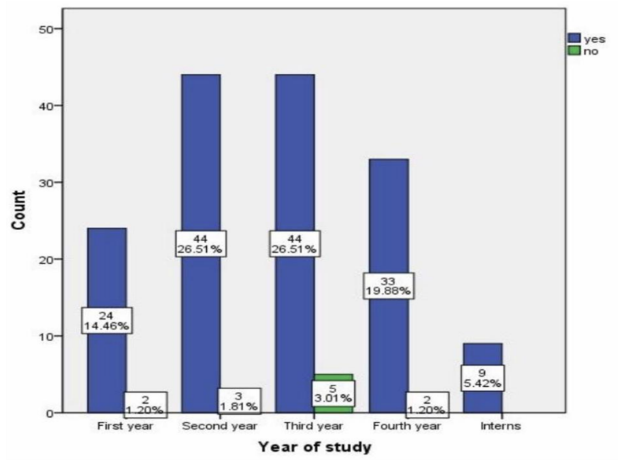

Figure 23: This bar chart represents the association between responses based on year of study with the teaching precision medicine is worth among dental students.

precision medicine is otherwise known as both personalised medicine and genomic medicine.

Figure 6, The color blue represents Archibald E Garrod, red represents Robert L Perlman, green represents Govindaraju, orange represents none. Majority of the population (89.8%) were aware that the father of precision medicine is Archibald E Garrod.

Figure 7, The color blue represents yes and the colour red represents no. Majority of dental students (96.4%) responded that precision medicine is an advantage to human health.

Figure 8, The color red represents no, and the blue represents yes. Majority of the dental students (75.3%) responded that precision medicine is not affordable by everyone.

Figure 9, Red color represents no and blue color represents yes. Majority of the population (78.1%) responded that precision medicine would not lead to any side effects.

Figure 10, The color blue represents yes and red represents no. Majority of the students(87.3%) felt that precision medicine and personalised medicine are the same.

Figure 11, The blue color represents allopathy, red color represents Precision medicine, green color represents Siddha, and orange color represents Unani. Majority of the students (75.3%) responded as Allopathy.

Figure 12, The color blue represents yes and red represents no. The majority of the dental students (92.2%) felt that precision medicine would enhance the dental practice in the future.

Figure 13, The color red represents no and the blue represents yes. The majority of dental students (65.4%) responded that precision medicine will not lead to any side effect.

Figure 14, The color blue represents yes and the color red represents no. The majority of dental students (92.8%) felt that teaching precision medicine is worth it.

Figure 15, X-axis represents the year of study and Y-axis represents the number of responses (Yes-blue, No-green). Majority of the second year and third-year students (46 students in each) were more aware of precision medicine. However, the difference is not statistically significant (Chi-square value-4.617, p-value-0.329 (>0.05) hence not significant).

Figure 16, X-axis represents the year of study and Y-axis represents the number of responses (personalised medicine(blue), genomic medicine(green), both(Sandal), none(purple)). Thirty-five students of the second year were more aware that precision medicine is otherwise known as personalised medicine and genomic medicine. However, the difference is not statistically significant(Chi-square value-11.536, p-value-0.484 (>0.05) hence not significant).

Figure 17, X-axis represents the year of study, and Y-axis represents the number of responses Yes(blue), No(green). The second-year and third-year students (46 participants from each group) were more aware that precision medicine is advantageous to human health. However, the difference is not statistically significant (Chi-square value-3.667, p-value-0.453 (>0.05) hence not significant).

Figure 18, X-axis represents the year of study, and Y-axis represents the number of responses Yes(blue), No(green). Majority of the second-year students (38 participants) were more aware that precision medicine is not affordable by everyone. However, the difference is not statistically significant(Chi-square value-7.726, p-value-0.102 (>0.05) hence not significant).

Figure 19, X-axis represents the year of study and Y-axis represents the number of responses (Yes(blue), No(green)). Majority of the second-year students (41 participants) have the opinion that precision medicine will not lead to any side-effects. However, the difference is not statistically significant(Chi-square value-3.236, p-value-0.519 (>0.05) hence not significant).

Figure 20, X-axis represents the year of study and Y-axis represents the number of responses. Yes(blue), No(green). Majority of the second-year students (42 participants) were more aware that precision medicine is the same as personalised medicine. However, the difference is not statistically significant (Chi-square value-6.838, p-value-0.145 (>0.05) hence not significant).

Figure 21, X-axis represents the year of study and Y-axis represents the number of responses Yes(blue), No(green). Majority of the third-year students (44 participants) were more aware that precision medicine will enhance future practice in dentistry. However, the difference is not statistically significant (Chi-square value-2.782, p-value-0.595 (>0.05) hence not significant).

Figure 22, X-axis represents the year of study and Y-axis represents the number of responses to precision medicine leading to chronic disease. Majority of the second year (35 participants) students felt that precision medicine would not lead to chronic disease. However, the difference is not statistically significant (Chi-square value-4.402, p-value-0.345

(>0.05) hence not significant).

Figure 23, X-axis represents the year of study and Y-axis represents the number of responses Yes(blue), No(green). 28 males from the second year and 44 second-year students followed by 44 third-year students were more aware that teaching precision medicine is worth. However, the difference is not statistically significant (Chi-square value-1.526, p-value-0.656 (>0.05) hence not significant).

The limitations of this study was minimum sample size where results may vary with other researchers and may not be accurate. This study has only a selected population inhomogenous. Furthermore, study can be done, and population size can be increased among dental students, and more aware awareness can be created about precision medicine. The limitation can be explored and sorted out.

CONCLUSION

This present study showed that the awareness of precision medicine among dental students was quite good. The chi square analysis showed that awareness among second year and third-year students is more compared to other students.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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The authors declare that they have no funding support for this study.

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