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Awareness of Precision Medicine Among Medical Students

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ABSTRACT

Precision medicine is a medical model that proposes the customisation of health care, with medical decisions, treatments, practices, or products being tailored to the individual patient, instead of a one-drug-fits-all model. In precision medicine, diagnostic testing is often employed for selecting appropriate and optimal therapies based on the context of a patient's genetic content or other molecular or cellular analysis. Tools employed in precision medicine can include molecular diagnostics, imaging, and analytics. The main aim of the study is to create awareness of precision medicine among medical students. The survey was conducted through an online platform, Google forms. A self-administered questionnaire of close-ended and yes or no questions were prepared and circulated among the medical students. The analysis of data was done by using the SPSS software version 20. The Pearson Chi-square analysis was done in comparison with the gender of the respondents.The results showed that 56.9 % of the students are familiar with the word precision medicine. 57% of the students felt that including precision medicine in their curriculum is worth, and 81.1% responded that precision medicine enhances their practice in future. The Pearson chi-square analysis showed that there is no correlation between the gender of the students and awareness of precision medicine. To conclude, the study showed that the awareness of precision medicine among medical students is moderate.

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INTRODUCTION

The term "Precision Medicine"has become very popular in recent years by scientific as well as political perspectives. Precision medicine is an approach to patient care that allows the doctors to select treatments that are most likely to help patients based on the genetic understanding of their disease; this may also be called personalised medicine (Masood and Malik, 2020). The benefits of precision medicine shift the emphasis in medicine from reaction to prevention, predict susceptibility in disease,improve disease detection and prescribe a more effective drug (Gehlert, 2016). The advent of precision medicine is moving closer to precise, predictable

and powerful health care that is customised for the individual patients (Ciardiello, 2016). Tailoring healthcare to each person's unique genetic makeup that's the promising idea behind precision medicine also variously known as individualised medicine, personalised medicine or genomic medicine (Jameson and Longo, 2015). The precision medicine initiative is a long-term research endeavour, involving the national institutes and multiple other research centres which aim to understand how a person's genetics environment and lifestyle can help to determine the best approach to prevent or treat disease (Araujo *et al.*, 2016). Side effects of precision medicine depend on the targeted therapy drug a patient is taking. Common side-effects include skin problems, including hives and intense itching, allergic reactions including trouble breathing tightness in the chest or throat, dizziness and swelling in the lips or tongue (Agache and Hellings, 2018). Precision genomics is a robust part of these innovative approaches, holding tremendous promise for cancer patients around the world.
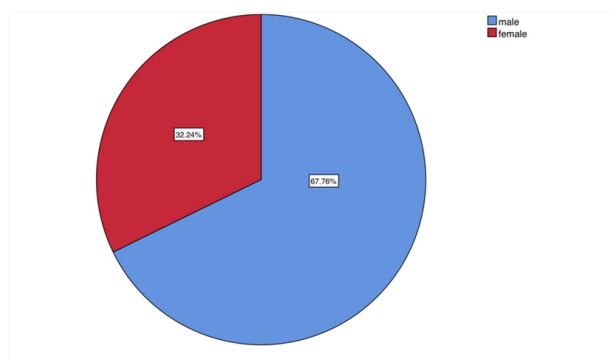

Figure 3: Piechart representing the percentage distribution of awareness on the word precision medicine

Figure 1: Pie chart representing the percentage distribution of gender of the respondent's

Figure 4: Piechart representing the percentage distribution of responses regarding whether precision medicine develops any chronic diseases
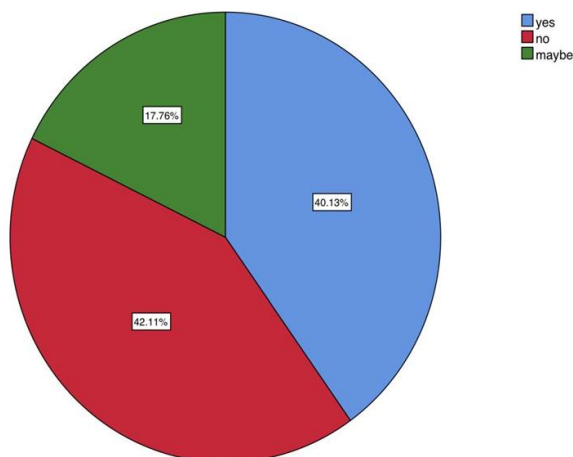

Figure 2: Piechart representing the percentage distribution of awareness on whether precision medicine and personalised medicine are the same
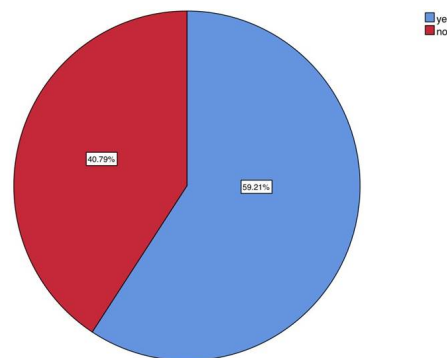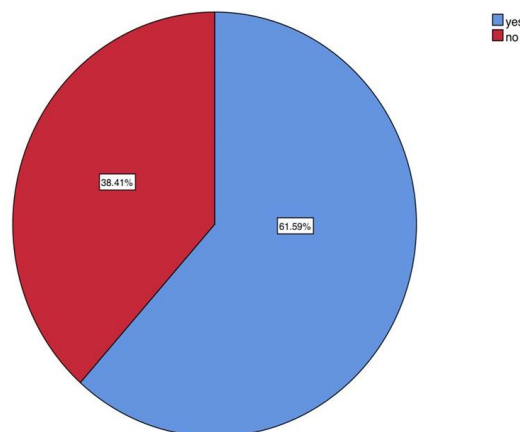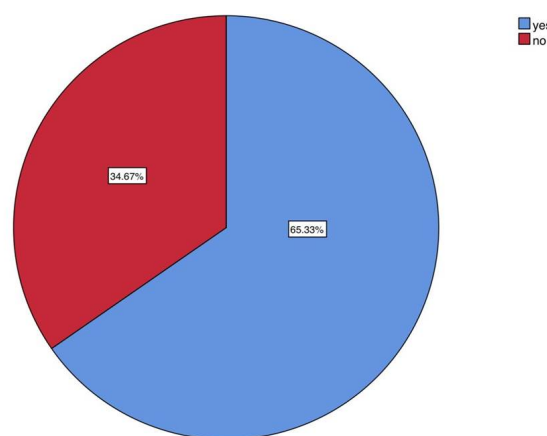

Figure 5: Piechart representing the percentage distribution of responses regarding whether teaching precision medicine in the MBBS curriculum is worth
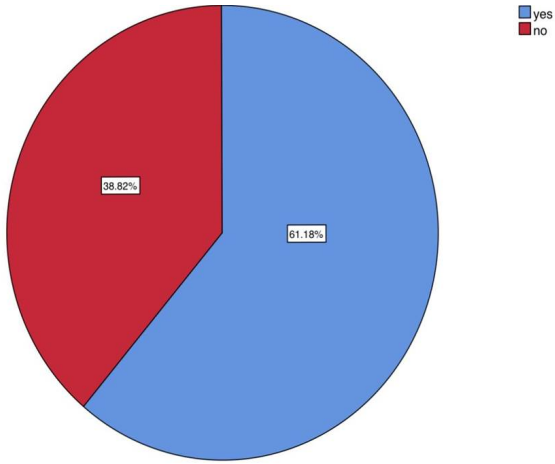
Figure 6: Piechart representing the percentage distribution of awareness on whether precision medicine varies according to age or gender
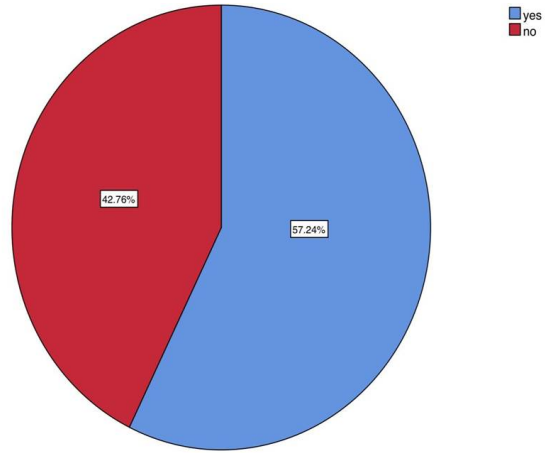

Figure 9: Piechart representing the percentage distribution of awareness of the students regarding patients diagnosed using sequencing techniques in precision medicine
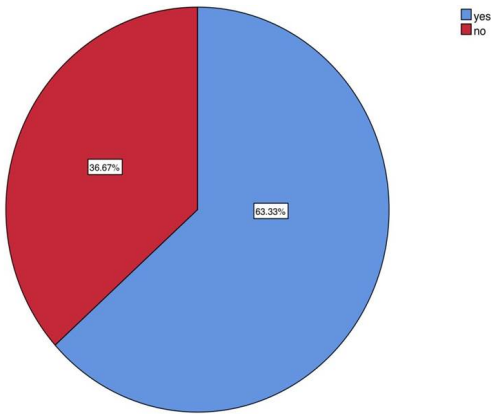

Figure 7: Piechart representing the percentage distribution of responses regarding whether teaching precision medicine to medical students enhances their practice in the future
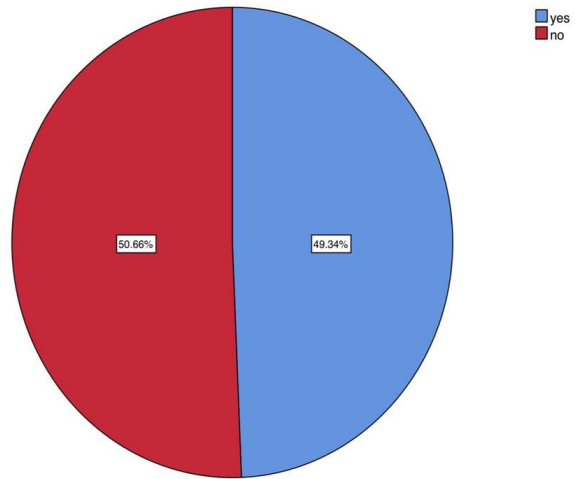
Figure 10: Piechart representing the percentage distribution of awareness about precision medicineis cost-effective compared to other modalities in medicine
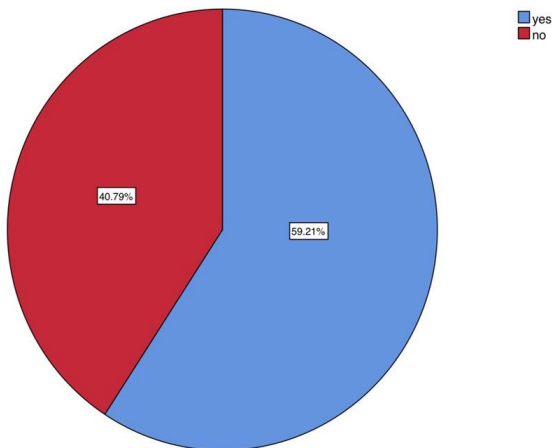

Figure 8: Piechart representing the percentage distribution of awareness on precision medicine has a role to play with genetic, clinical and environmental conditions
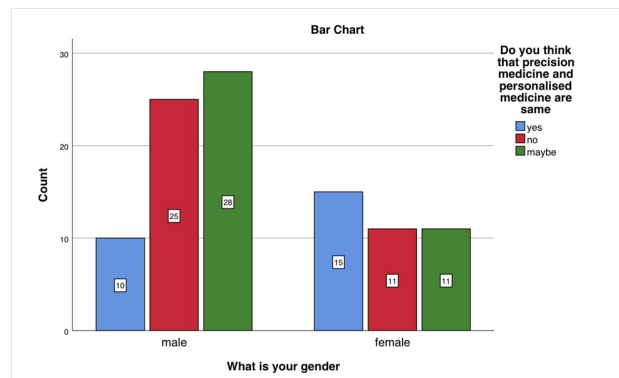

Figure 11: Bargraph showing the association of gender with the awareness on whether precisionmedicine and personalised medicine are the same
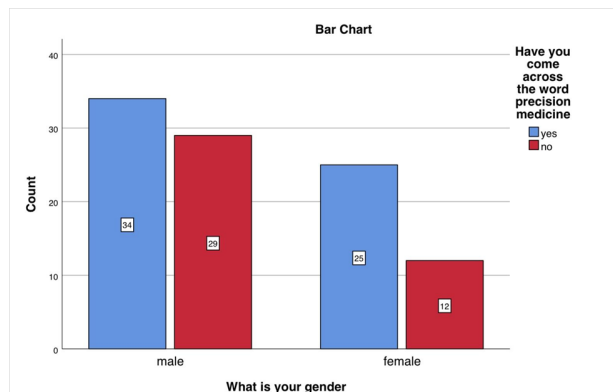
Figure 12: Bar graph showing the association gender with the awareness of the word precision medicine
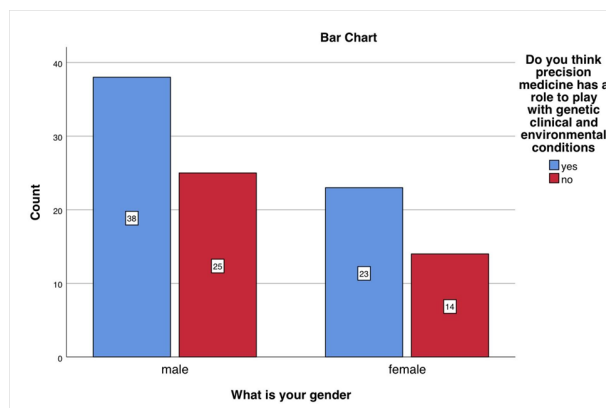

Figure 15: Bargraph showing the association gender with the awareness that precision medicine has a role to play with genetic, clinical and environmental conditions
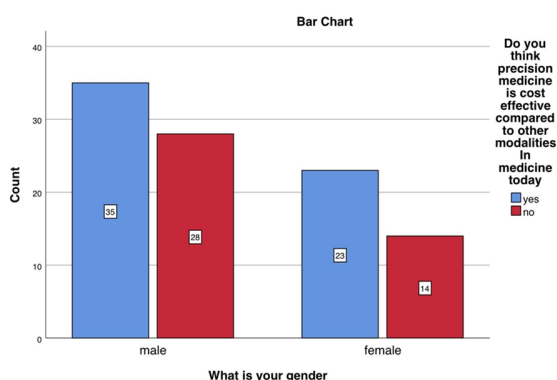

Figure 13: Bargraph showing the association of gender with the response regarding whether precision medicine is cost-effective compared to other modalities in medicine today
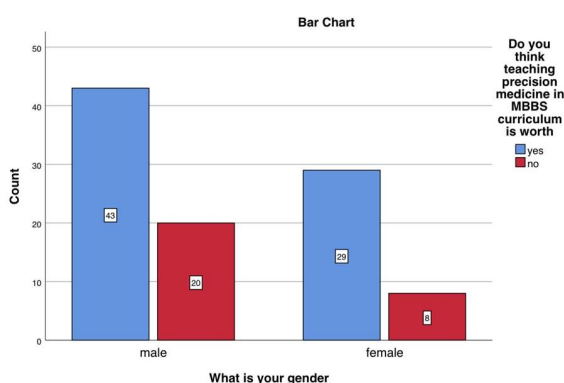

Figure 14: Bargraph showing the association gender to the responses regarding whether teaching precision medicine in the MBBS curriculum is worth

Our physicians and scientists sequence and analyses the DNA of individual tumours and evaluate which specific mutations might be making cancer grow (Cao and Zhou, 2018). Precision medicine could have a major impact on outcomes and costs. The precision medicine initiative is widely viewed as a way to improve healthcare (Mousa *et al.*, 2020) because it focuses on diagnosing and treating each patient based on his or her Genetic characteristics (Lemieux, 2018).

Most of the previous research in our department was focused on cancer biology, nanotechnology, phytomedicine, endocrinology, etc. Our team conducted numerous research on various fields like cancer biology (Gan *et al.*, 2019; Jainu *et al.*, 2018; Rengasamy *et al.*, 2018; Ma *et al.*, 2019), nanotechnology (Wu *et al.*, 2019; Ke *et al.*, 2019; Li *et al.*, 2020; Wang, 2019), studies were also done in plant extracts and natural products (Chen, 2019; krishna mohan *et al.*, 2015; Ramya *et al.*, 2018; Rengasamy *et al.*, 2016; Menon *et al.*, 2016), and studies regarding childhood obesity and diabetes (Shukri *et al.*, 2016; Ponnulakshmi *et al.*, 2019). This study is aimed to assess the awareness of precision medicine among medical students.

MATERIALS AND METHODS

A survey was conducted with a self-administered questionnaire and circulated among 100 medical students. The questionnaire was prepared with ten questions comprising regarding the awareness of precision medicine among medical students and circulated through an online platform google forms. The responses were recorded and analysed using the statistical software, SPSS version 20. The Pearson Chi-square analysis was done in comparison

with the gender of the responses. All the results were represented as pie charts and bar diagram.

RESULTS AND DISCUSSION

A total of 100 participants in the study, and the responses for each question is as follows:67.78% of the respondents were male, and 32.24% were females (Figure 1). Majority of the respondents were (67.78%) male (Blue) and 32.24% of the respondents were female (red).

When the respondents were asked whether Precision medicine and Personalised medicine are the same, 40.13% answered yes, 42.11% answered no, and 17.76% answered maybe (Figure 2). Majority of participants (42.11%) answered no (red),40.13% answered yes (blue), and 17.76% answered maybe (green).

Figure 3 shows that 59.21% were aware of the word Precision Medicine, and 40.79% were not aware of 61.59% of the students responded as precision medicine develops chronic diseases, while 38.41% answered no. Majority of participants (59.21%) were aware (blue), and 40.79% were not aware (red)

(Figure 4) Majority of participants (61.59%) answered yes (blue), and 38.41% answered no (red).

Figure 5 shows that 65.31% of the students felt that precision medicine in the MBBS curriculum is worth, while 34.67% answered no. Majority of participants (65.33%) answered yes (blue), and 34.67% answered no (red)

From Figure 6 it was clear that 61.81% of the students responded that precision medicine varies according to age or gender, and 38.82% responded as it will not vary. Majority of participants (61.81%) answered yes (blue), and 38.82% answered no (red).

For the question regarding whether teaching Precision medicine to medical students enhances their practice in the future, 63.33% answered yes, and 36.67% answered no (Figure 7). Majority of participants 63.33% answered yes (blue), and 36.67% answered no (red).

59.29% of the participants answered that precision medicine has a role to play with genetic Clinical and environmental conditions, while 40.79% answered no (Figure 8). Majority of participants 59.29% answered yes (blue), and 40.79% answered no (red)

57.24% of the students were aware that patients are diagnosed by using sequencing techniques in preci-

sion medicine, while 42.76% were not aware (Figure 9). Majority of participants (57.24%) answered yes (blue), and 42.76% answered no(red).

Figure 10, 50.66% ofparticipants answered no (red), and 49.34% answered yes (blue).

When the students were asked whether precision medicine is cost-effective compared to other modalities in medicine, 49.34% answered yes, and 50.66% answered no. The Pearson chi-square analysis was done to find out the association between the gender of the students and responses regarding the awareness of precision medicine (Figures 10, 11, 12, 13, 14 and 15). There is no association between the awareness and gender of the responses, except for the awareness on whether precision medicine and personalised medicine are same, in which males are more aware than the females (p = 0.022 < 0.05, statistically significant)

In a previous study, about 76% of the respondents were aware of precision medicine (Hellings, 2019) ('Circulation: Genomic and Precision Medicine Editors and Editorial Board', 2020). Our results showed that about 61% of the students were aware that precision medicine develops chronic diseases, which is comparable to the previous studies (Hellings, 2019; Cao and Zhou, 2018; Vilgis and Designer, 2018). Patients are diagnosed using gene sequencing In Precision Medicine for patients with immunotherapy and radiotherapy (Horinouchi, 2018). In our study, about 59% of the students were aware that precision medicine has a role to play with genetic Clinical and environmental conditions which can be compared to a previous study, where 50% were aware (Vilgis and Designer, 2018; Buchman, 2016).

Personalised medicine is using data on multiple scales, and having the ability to create a digital human mapping, with superimposed layers which include, among other things, social graphs, biosensors, imaging for anatomy description, the characteristics of various "omics" such as genomics, DNA sequencing, transcriptomics, proteomics, metabolomics, and epigenomics (Morash, 2018). All these layers are wrapped in the non-genetic totality of human environment, the exposome (Araujo et al., 2016). The difference here is that precision medicine seeks to create treatments that apply to groups of individuals who meet certain characteristics (Board, 2019). This is different from personalised medicine which implies individualised treatments available for every unique patient. However, precision medicine and personalised medicine are the same (Kaul, 2019).

Precision medicine often involves the application of analysing the cause of an individual patient's dis-

ease at the molecular level and then to possibly in combination to address that individual patient's disease process (Mccullough, 2019). The patient's response is then tracked as closely as possible, often using surrogate measures such as tumour outcomes, such as five-year survival rate and the treatment finely adapted to the patient's response (Masood and Malik, 2020). The branch of precision medicine that addresses cancer is referred to as "precision oncology". The field of precision medicine that is related to psychiatric disorders and mental health is called "precision psychiatry." (Ciardiello, 2016). The limitation in this current study in that survey was carried through online means, and diagnostic modalities were not included. The sample size is also less (100 participants). In future, the population could be increased to create more awareness and knowledge among medical students, and the limitations should be explored and sorted out.

Figure 11 shows, The X-axis represents gender, and Y-axis represents the number of responses, in which blue denotes yes, and red denotes no and green denotes may be. Males gave maximum awareness responses (25%). Pearson Chi-square test showed that males are more aware than females (Chi-square test = 7.609, p-value = 0.022, which is <0.05, hence statistically significant).

Figure 12 shows, The X-axis represents gender, and Y-axis represents the number of responses, in which blue denotes yes and red denotes no. Males gave maximum awareness responses (34%). However, the difference is not statistically significant. (Chi-square test = 1.782, p-value = 0.182, which is > 0.05, hence statistically not significant). There is no association between the awareness and gender of the respondents.

Figure 13 shows, The X-axis represents gender, and Y-axis represents the number of responses, where blue denotes yes and red denotes no. Majority of the males (35%) responded as precision medicine is cost-effective. However, the difference is not statistically significant (Chi-square test = 0.418, p-value = 0.518, which is >0.05, hence statistically not significant).

Figure 14 shows, the X-axis represents gender, and Y-axis represents the number of responses, in which blue denotes yes and red denotes no. Maximum of the males (43%) responded as teaching precision medicine is worth. However, the difference is not statistically significant. (Chi-square test = 1.185, p-value = 0.276, which is > 0.05, hence statistically not significant).

Figure 15 shows, the X-axis represents gender, and Y-axis represents the number of responses, where

blue denotes yes and red denotes no. Majority of the males (38%) were aware that precision medicine has a role to play with genetic, clinical and environmental conditions. However, the difference is not statistically significant(Chi-square test = 0.033, p-value = 0.855, which is >0.05, hence statistically not significant).

CONCLUSION

The present study was done to assess and create awareness of precision medicine among medical students. The study showed that the awareness of precision medicine among the medical students included in the survey is moderate. However, the Majority of the participants felt that including precision medicine in their curriculum is essential, and it will help in their future practice. The present study concludes that precision medicine is worth adding in the MBBS curriculum to create awareness of precision medicine among medical students.

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