
Awareness On Application Of Artificial Intelligence In Medicine Among Dental Students - A Survey

RANJANA V¹, R GAYATHRI^{2*}, V VISHNU PRIYA³, S KAVITHA⁴

¹Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Chennai, India.

²Assistant Professor, Department of Biochemistry, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Chennai, India.

³Professor, Department of Biochemistry, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Chennai, India.

⁴Lecturer, Department of Biochemistry, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS), Saveetha University, Chennai, India.

*Corresponding Author:

Email : 151901051.sdc@saveetha.com¹, gayathri.sdc@saveetha.com², vishnupriya@saveetha.com³
kavithas.sdc@saveetha.com⁴

Abstract: Aim and introduction: Artificial intelligence (AI) is one of the branches of computer science, which is capable of analyzing complex medical data. This technology is helpful in diagnosing disease, treatment, and predicting outcomes in many clinical scenarios. Artificial intelligence is nothing but a natural language processor and does repetitive jobs in a timely manner. Some disadvantages of AI technology are high initial capital requirement, potential for increased unemployment, which shows that this technology has the potential to replace physicians in future. The main aim of this survey is to assess the awareness on application of artificial intelligence in medicine among dental students.

Materials and Method: Self-administrated questionnaire was designed based on awareness. The questionnaire was distributed through an online Google forms link. The study population included dental students belonging to the 18 – 26 age group. Method of representation of each output variable was in pie charts and bar graphs. The statistics done using SPSS software, chi square test was done to check the association and a p value of 0.05 was said to be statistically significant.

This survey has been completed in the month of may 2020.

Result: 56% of the participants were aware that artificial intelligence is the analysis of medical data without direct human input. From the survey it was evident that 57% of the participants feel that with the help of AI clinical decision and diagnosis can be revolutionized and also found that both male and female students were equally aware of the importance of application of artificial intelligence in medicine (p-value > 0.05).

Conclusion: This study concludes that about 59% of the study participants were aware that Artificial Intelligence technology in medicine is beneficial to doctors and also found that both male and female students were equally aware of artificial intelligence. Since AI technology has the potential to develop into an innovative platform which is capable of analyzing more complex medical data, more awareness has to be created for better understanding and analysis of this technology.

Keywords: Artificial intelligence; awareness; dentistry; medicine; technology.

INTRODUCTION

Artificial intelligence (AI) is one of the branches of computer science, which is capable of analyzing complex medical data. This technology is helpful in diagnosing disease, treatment, and predicting outcomes in many clinical scenarios (Ramesh et al., 2004). Artificial intelligence is nothing but a natural language processor and does repetitive jobs in a timely manner (B. Tran et al., 2019). Artificial intelligence is also used for drug discovery (Shortliffe, 2019). Similar to Artificial intelligence, there are other emerging scientific areas such as Bionanotechnology which has a role in development of a novel therapy, applications of gold nanoparticles (AuNPs) in the treatment of cancer (Ke et al., 2019). Numerous scientific studies such as, studies on the disclosure of ultraviolet (UV) radiation from the environment which causes inflammation, photoaging and skin cancer (Chen et al., 2019). Studies related to cancer biology (Ma et al., 2019), and various other treatments related to it are trending in the scientific arena (Gan et al., 2019). Glioma is the prime cause of cancer allied mortality in adolescent people and it is responsible for about 80% of all malignant tumours (Li et al., 2020).

Biosynthesis of Zinc oxide nanoparticles (ZnONPs) from natural plants is a promising nano drug delivery system in cancer therapeutics (Wang et al., 2019). For all these researches, when needed to be applied in the medical field, it needs an improvement in technology as well. One such promising technology which can flourish in medical sciences is artificial intelligence. There are some disadvantages also associated with AI technology. AI technology requires high initial capital requirement, potential for increased unemployment, which shows that this technology has the potential to replace physicians in future (Ahuja, 2019). Also AI has few more drawbacks like lack of privacy and security, lack of interoperability between AI solutions, lack of curated healthcare data and so on (Vellido, 2019).

It is revealed that, Inorder to improve disease management for the benefit of patients and rare disease, AI agents with cloud based platforms for multihospital collaboration are designed (Long et al., 2017). Artificial intelligence has two main branches – virtual and physical. Informatics approach is included in virtual branches like electronic health record and physical branch is best represented by robots, which is used to assist surgeons (Hamet and Tremblay, 2017). AI technology is used in detection of atrial fibrillation, hypoglycemia, disease based on histopathological examination and so on (Briganti and Le Moine, 2020). Childhood obesity, a major problem of current generation affecting the child's health which is commonly due to nutritional disorder and much less because of inborn error can also be detected using AI technology (Shukri et al., 2016). Also natural products, especially plants have been used in the treatment of various diseases for many years (Rengasamy et al., 2018). Siberian ginseng which is a perennial herb belongs to the Araliaceae family, a traditional medicine used to treat hypertension, thrombus, inflammation and cancer (Wu et al., 2019). Garcinia mangostana is also extensively used in most of the Indian herbal pharmaceuticals and nutraceuticals which has chemopreventive property that helps in reducing the tumor promoting growth factor (Priya, Jainu and Mohan, 2018). Berries including strawberry may have beneficial effects against cancer (G et al., 2018). Also pineapple extract is an effective natural way in treating oral cancer instead of harmful treatments (Menon, V and Gayathri, 2016). Consumption of high dietary fat increases stored fat mass which is a main risk factor for metabolic diseases which can also be detected using AI technique (Ponnulakshmi et al., 2019). AI technology also has the ability to give treatment selection with existing therapies and provide bases for domain based therapeutic discovery (Tai et al., 2019). As a whole, artificial technology has the ability to approximate optimal decisions even in complex and uncertain environments (Bennett and Hauser, 2013).

There is no proper research or survey that has been done previously on the awareness of application of artificial intelligence in medicine among medical students. Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Ariga et al., 2018; Basha, Ganapathy and Venugopalan, 2018; Hannah et al., 2018; Hussainy et al., 2018; Jeevanandan and Govindaraju, 2018; Kannan and Venugopalan, 2018; Kumar and Antony, 2018; Manohar and Sharma, 2018; Menon et al., 2018; Nandakumar and Nasim, 2018; Nandhini, Babu and Mohanraj, 2018; Ravinthar and Jayalakshmi, 2018; Seppan et al., 2018; Teja, Ramesh and Priya, 2018; Duraisamy et al., 2019; Gheena and Ezhilarasan, 2019; Hema Shree et al., 2019; Rajakeerthi and Ms, 2019; Rajendran et al., 2019; Sekar et al., 2019; Sharma et al., 2019; Siddique et al., 2019; Janani, Palanivelu and Sandhya, 2020; Johnson et al., 2020; Jose, Ajitha and Subbaiyan, 2020). The main aim of this survey is to create awareness on application of artificial intelligence in medicine among dental students. Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J et al., 2018; Menon et al., 2018; Prabakar et al., 2018; Rajeshkumar et al., 2018, 2019; Vishnu Prasad et al., 2018; Wahab et al., 2018; Dua et al., 2019; Duraisamy et al., 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019; Malli Sureshbabu et al., 2019; Mehta et al., 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran et al., 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma et al., 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi et al., 2020; Samuel, Acharya and Rao, 2020)

MATERIALS AND METHOD

Self-administrated questionnaire was designed based on awareness of artificial intelligence. The questionnaire contained 13 questions which were shared through Google forms link. The study population included 100 dental students belonging to the 18 – 23 age group. The participants were explained about the purpose of study in detail. The questions were carefully studied and the participants marked the corresponding answers. Measures were taken to minimize the sampling bias. Validity was checked both internally and externally. Sample method carried out was simple random sampling. Method of representation of each output variable was in pie charts and bar graphs. The statistics done using SPSS software, chi square test was done to check the association and a p value of 0.05 was said to be statistically significant. The survey has been completed in the month of may 2020.

RESULT

Survey on awareness on artificial intelligence in medicine was done. The study population included dental students. The survey results were collected and statistically analyzed. 100% participants actively responded to

the questions. There were different age groups participating in the survey. 51% of the study population were female and 49% were male. 57% were aware that with artificial intelligence, even a smart phone selfie could become a powerful diagnostic tool [Figure 1]. 48% think definitely AI causes job cuts on a larger scale, 32% thinks so and 20% thinks definitely not [Figure 2]. 51% think definitely AI can take over the medical industry, 23% think maybe, 26% think definitely not [Figure 3]. 57% think AI as a course to be added to our curriculum [Figure 4]. 62% as a whole support artificial intelligence [Figure 5]. When asked about the opinion on artificial intelligence in the medical industry as a beneficial tool to doctors, 34 out of 51 females and 25 out of 49 males strongly believe that artificial intelligence is beneficial. Though statistically not significant, females have a stronger opinion that artificial intelligence in the medical industry is beneficial to doctors than males. [Figure 6]. When asked about the opinion on whether AI be a threat to the medical industry, 30 out of 51 females and 19 out of 49 males strongly believe that artificial intelligence technology is a threat. Results were statistically significant. Hence females have a stronger opinion that artificial intelligence technology is a threat than male [Figure 7]. When analysed the association between gender and their opinion on AI as a tool in revolutionizing the clinical decision and diagnosis, 28 out of 51 females and 29 out of 49 males strongly believe that clinical decision and diagnosis with the help of AI can be revolutionized. Though statistically not significant, males seem to have a better awareness towards diagnosis of a clinical condition [Figure 8]. When analysed the association between gender and their opinion on the role of artificial intelligence as a tool in the analysis of medical data without direct human input, 25 out of 51 females and 31 out of 49 males strongly believe that artificial intelligence is a tool in the analysis of medical data without direct human input. Though statistically not significant, males seem to have a better awareness on the role of artificial intelligence towards diagnosis and analysis of medical data [Figure 9]. The association between gender and their opinion on whether learning AI may become essential in the future, 35 out of 51 females and 27 out of 49 males strongly believe that learning AI may become essential in the future. Though statistically not significant, females seem to have a better awareness towards learning a new technique [Figure 10]. As a whole, the majority of male participants were aware of the technology and majority of the female participants wanted to learn and implement the technology in the medical field.

DISCUSSION

In the research done previously, it was revealed that the potential to create a revolutionary way of practicing evidence based personalized medicine is being offered by the combination of AI, big data and massively parallel computing methods (B. X. Tran et al., 2019). Whereas in this survey, 57% of the participants feel that with the help of AI clinical decision and diagnosis can be revolutionized. AI based systems are unlikely to replace the traditional physician – patient relationship and will augment physicians (Wu et al., 2018). In this survey, 48% think definitely AI causes job cuts on a larger scale. There are specific issues related to artificial techniques such as fairness, explain ability, privacy, ethics and legislation (Vuong et al., 2019)(Rengasamy, G., Jebaraj, D.M., Veeraraghavan, V.P., Mohan, S.K., 2016). In this survey, 49% feels AI technology is a threat. Deep learning algorithms can deal with an increasing amount of data provided by wearable, smartphones and other mobile monitoring sensors in different areas of medicine (Hashimoto et al., 2018). Here, 57% were aware that with artificial intelligence, even a smart phone selfie can become a powerful diagnostic tool. AI technology promises to provide high quality patient care and has the potential to revolutionize the way surgery is taught and practiced (Dilsizian and Siegel, 2014). But, if a disease is not diagnosed and treated properly at an early stage, and if progresses to the end stage it might be difficult to cure the problem completely (Mohan, Veeraraghavan and Jainu, 2015). In this survey, 59% think artificial intelligence in the medical industry is beneficial to doctors. Most of the results from the previous literature are more or less similar to the result of this survey. There is no proper research or survey that has been done previously on the awareness of artificial intelligence in medicine among medical students. Our institution is passionate about high quality evidence based research and has excelled in various fields (Pc, Marimuthu and Devadoss, 2018; Ramesh et al., 2018; Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai et al., 2019; Sridharan et al., 2019; Vijayashree Priyadharsini, 2019; Chandrasekar et al., 2020; Mathew et al., 2020; R et al., 2020; Samuel, 2021)

CONCLUSION

This study concludes that about 59% of the study participants were aware that Artificial Intelligence technology in medicine is beneficial to doctors and also found that both male and female students were equally aware of artificial intelligence. Since AI technology has the potential to develop into an innovative platform which is capable of analyzing more complex medical data, more awareness has to be created for better understanding and analysis of this technology.

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Authors contribution

Ranjana V done literature search, data collection, analysis, manuscript writing. Dr. R Gayathri helped in data verification, manuscript drafting. Dr. V Vishnu Priya and Dr. S kavitha contributed to the title discussion.

Conflict of interest

None declared

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Figure Legends

Figure 1 represents the distribution of participants based on awareness that with AI, even a smart phone selfie could become a powerful diagnostic tool, where 57% (Red) of the participants were aware and 43% (Blue) were not aware of it.

Figure 2 represents the distribution of participants based on opinion that AI may cause job cuts on a larger scale, where 48% (Blue) responded to definitely, 20% (Red) responded to definitely not, 32% (Green) have no opinion on it.

Figure 3 represents the distribution of participants based on opinion that AI can take over the medical industry, where 51% (Blue) responded to definitely, 26% (Red) responded to definitely not and 23% (Green) have no opinion on it.

Figure 4 represents the distribution of participants based on opinion that AI as a course to be added to curriculum, where 57% (Red) think it needs to be added and 43% (Blue) think it's not needed.

Figure 5 represents the distribution of participants based on opinion that supports AI in the medical field, where 62% (Red) support and 38% (Blue) do not support.

Figure 6: Bar chart representing association between gender and opinion on beneficial role of artificial intelligence in the medical industry. X axis represents gender and Y axis represents the number of participants who responded 'yes' (Red) and 'no' (Blue). Females strongly believe that artificial intelligence is beneficial than males, however, it is statistically not significant (Pearson's chi square value = 2.529, df = 1, p value = 0.112(>0.05)).

Figure 7: Bar chart representing association between gender and opinion on whether artificial intelligence technology is a threat in the Medical industry. X axis represents gender and Y axis represents the number of participants who responded 'yes' (Red) and 'no' (Blue). Females strongly believe that artificial intelligence technology is a threat than males and it is statistically significant (Pearson's chi square value = 4.019, df = 1, P value = 0.045(<0.05)).

Figure 8: Bar chart showing the association between gender and their opinion on revolutionizing the clinical decision and diagnosis with the help of AI. X axis represents Gender and Y axis represents number of participants who responded 'yes' (Red) and 'no' (Blue). Males strongly believe that clinical decision and diagnosis with the help of AI can be revolutionized than females, however, it is statistically not significant (Pearson's chi square value = 0.187, df = 1, P value = 0.665(>0.05)).

Figure 9: Bar chart showing the association between Gender and their opinion on the role of artificial intelligence as a tool in the analysis of medical data without direct human input. X axis represents Gender, Y axis represents number of participants who said 'yes' (Red) and 'no' (Blue). Males strongly believe that artificial intelligence is a tool in the analysis of medical data without direct human input than females, however, it is statistically not significant (Pearson's chi square value = 2.058, df = 1, P value = 0.151(>0.05)).

Figure 10: Bar chart showing the association between Gender and their opinion on whether learning AI may become essential in the future. X axis represents Gender, Y axis represents number of participants who responded 'yes' (Red) and 'no' (Blue). Females strongly believe that learning AI may become essential in the future than males, however, it is statistically not significant (Pearson's chi square value = 1.940, df = 1, P value = 0.164(>0.05)).

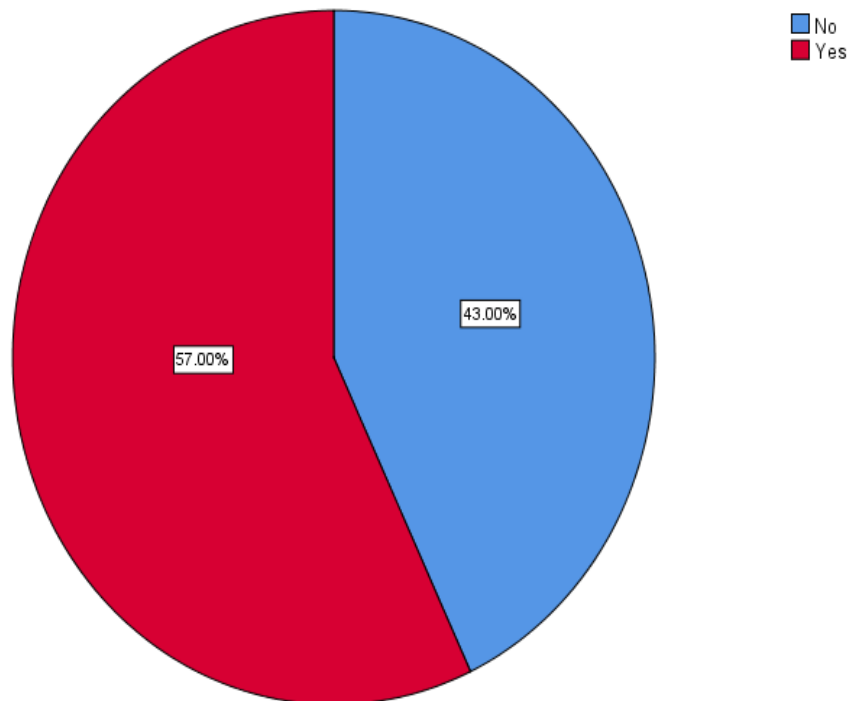


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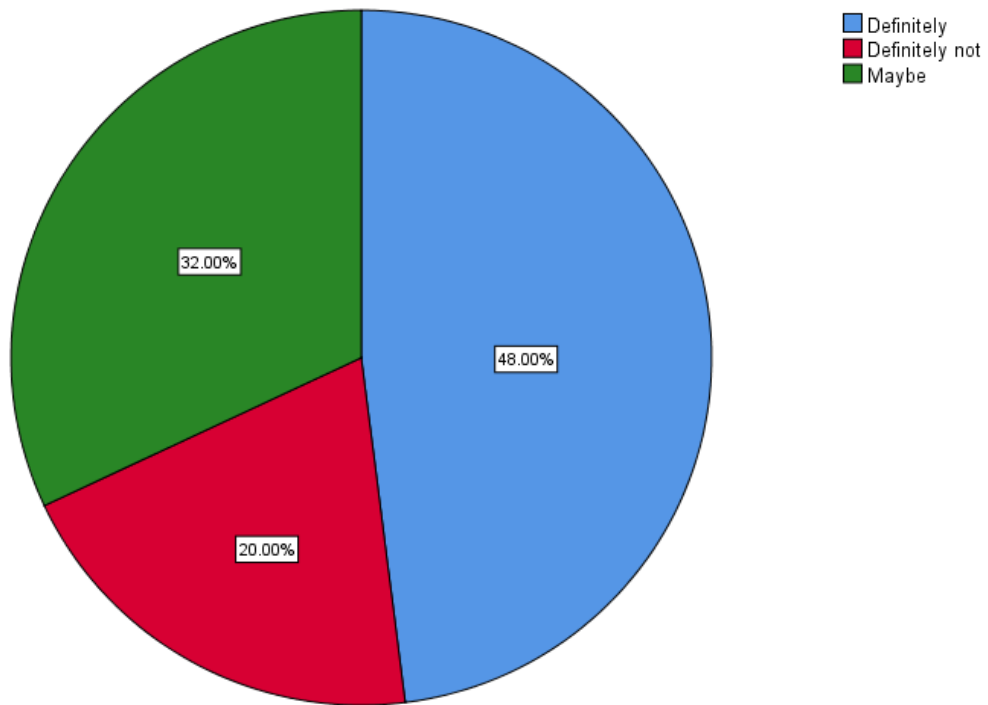


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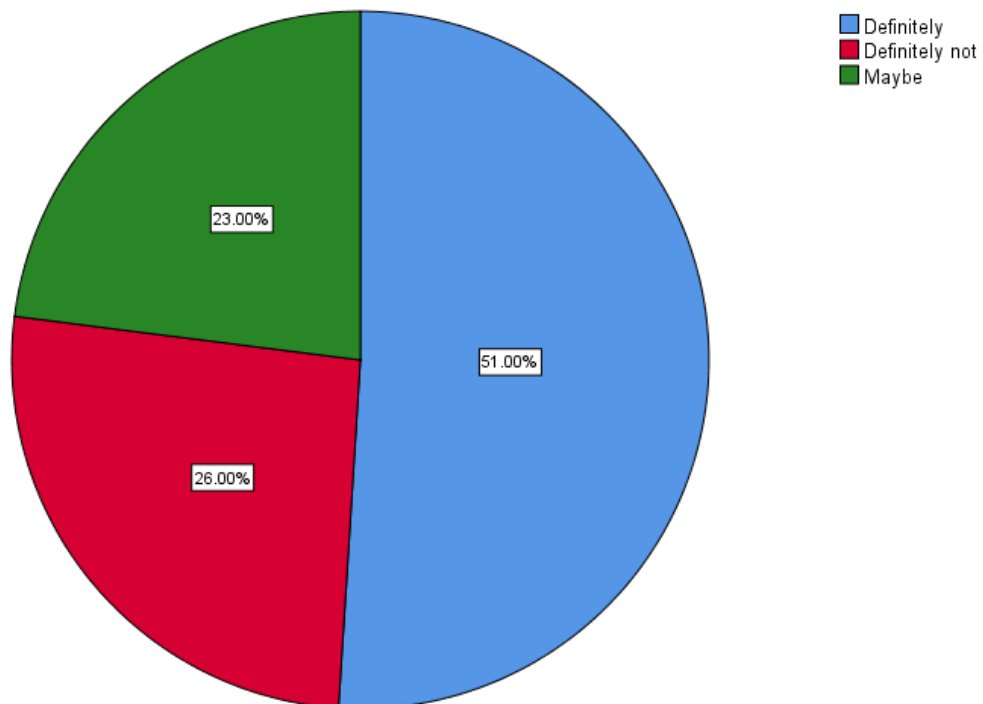


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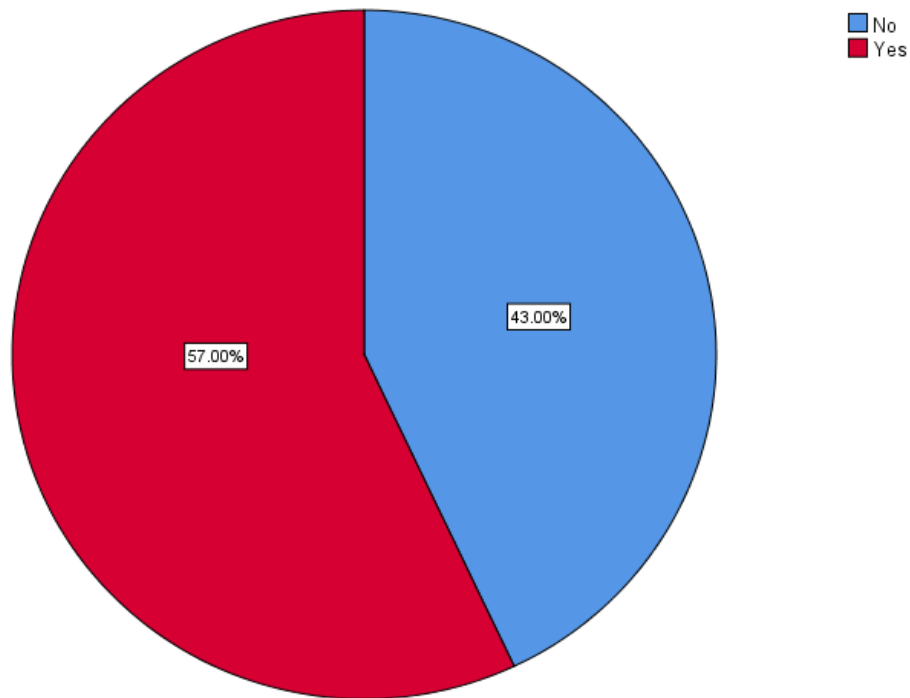


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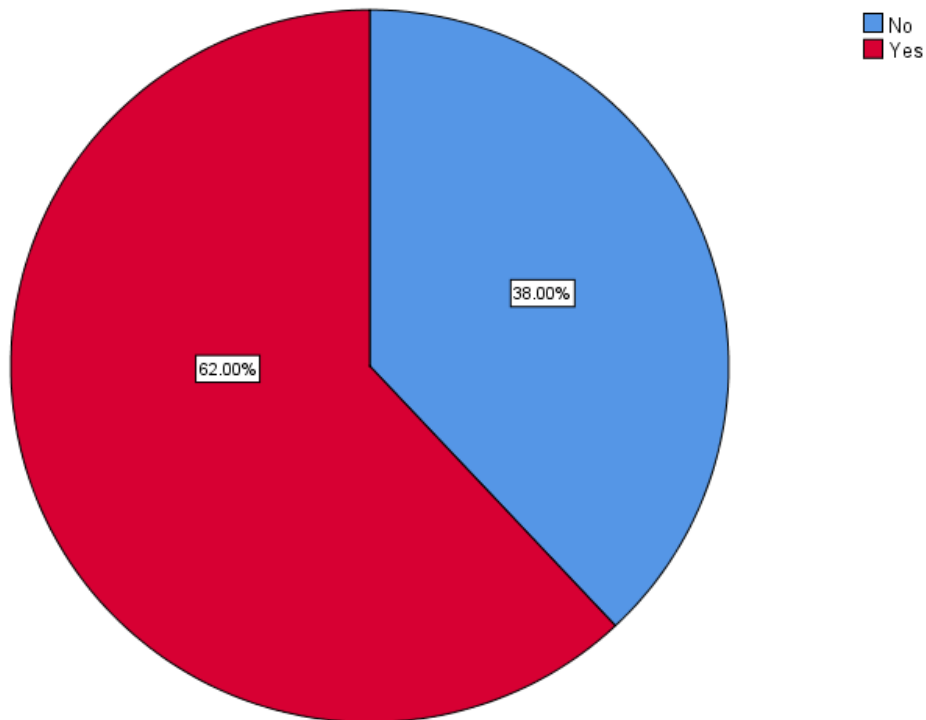


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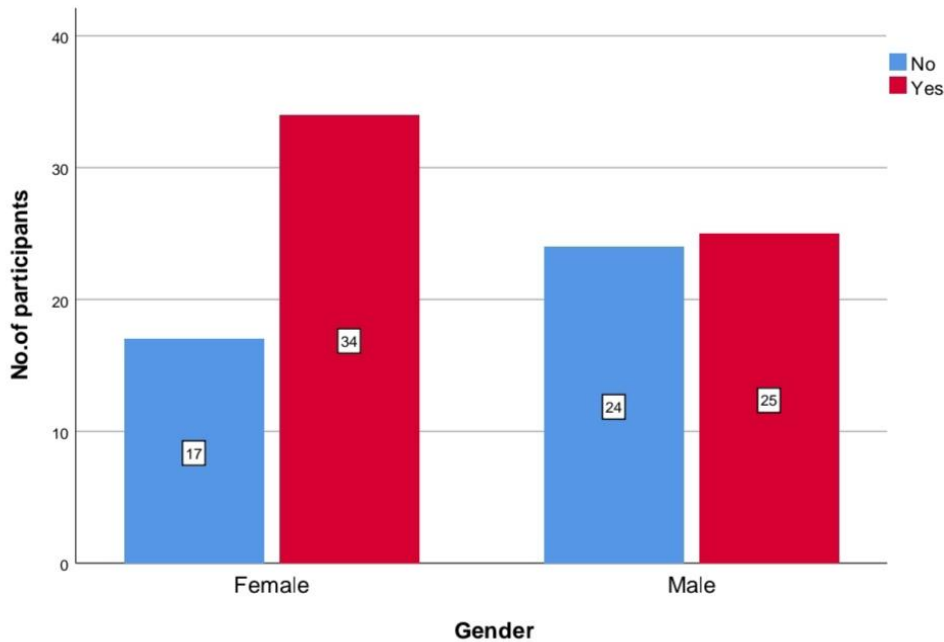


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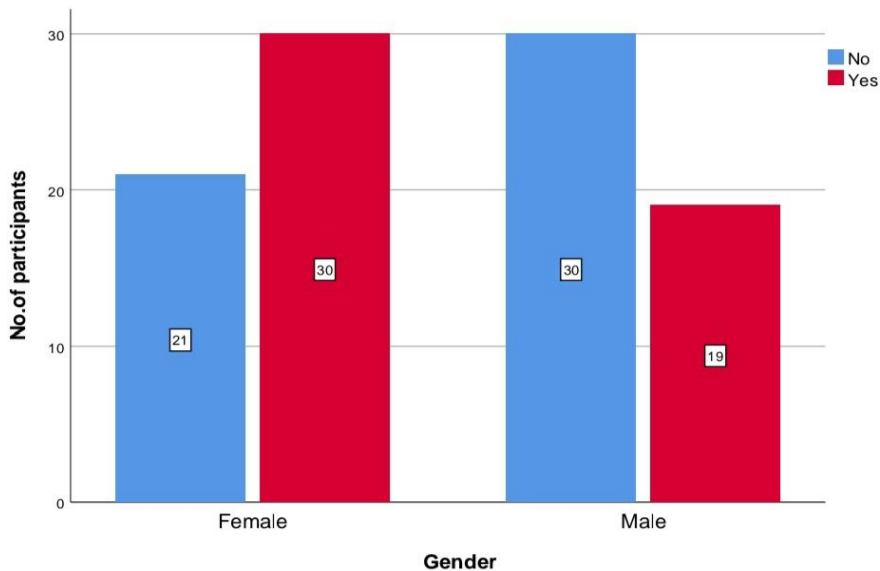


Fig.7: Bar chart representing association between gender and opinion on whether artificial intelligence technology is a threat in the Medical industry. X axis represents gender and Y axis represents the number of participants who responded 'yes' (Red) and 'no' (Blue). Females strongly believe that artificial intelligence technology is a threat than males and it is statistically significant (Pearson's chi square value = 4.019, df = 1, P value = 0.045(<0.05)).

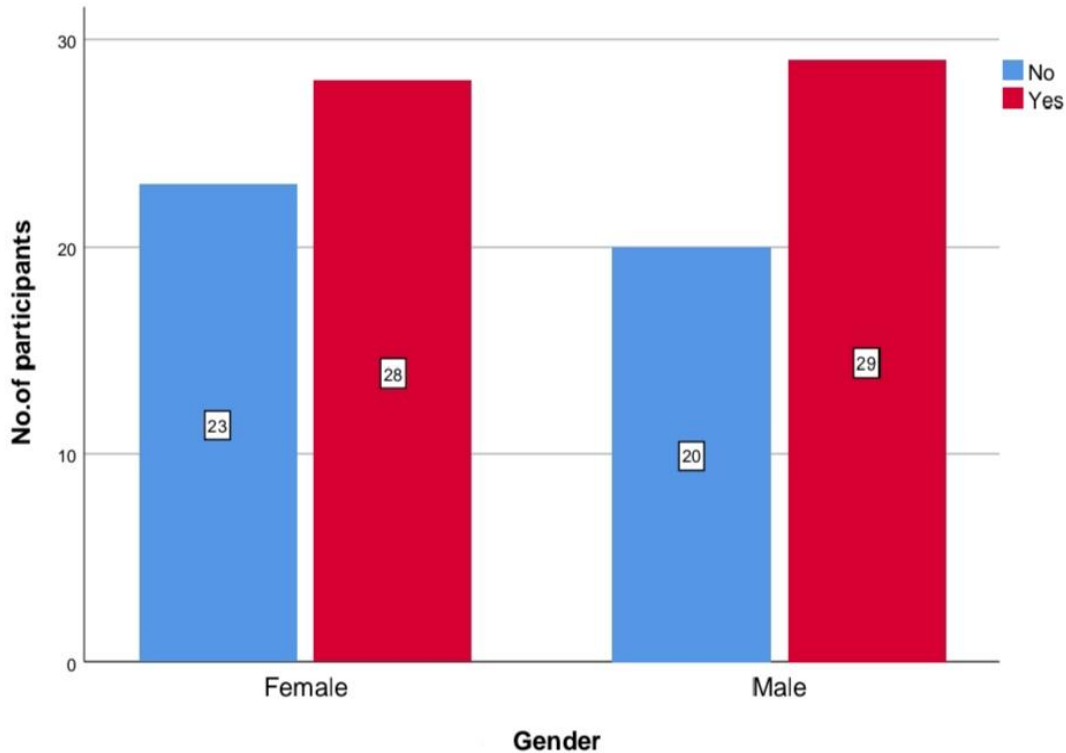


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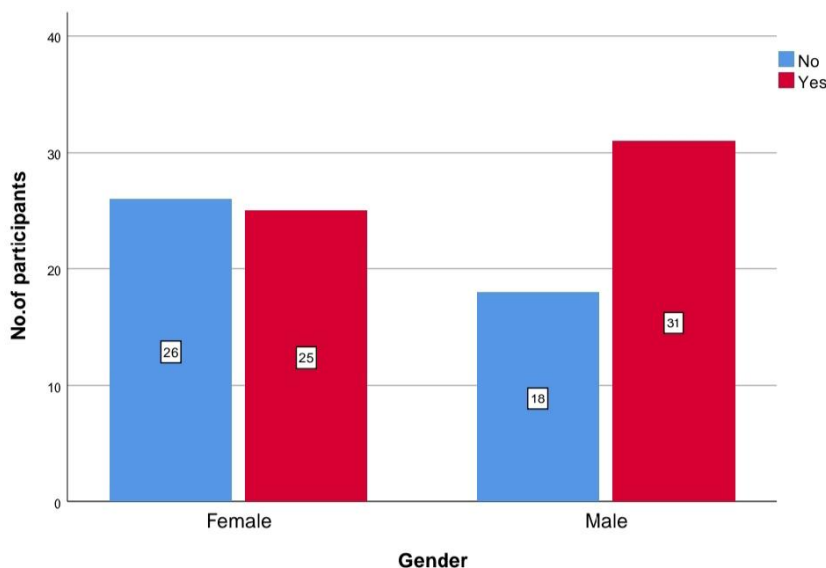


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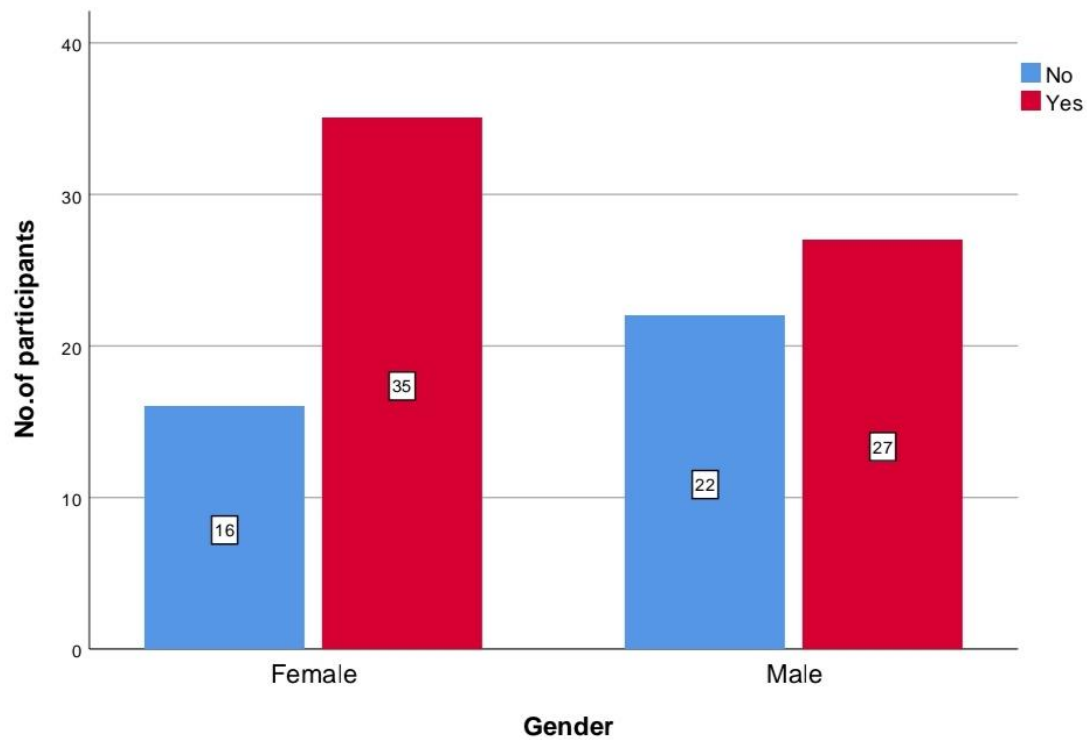


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