KNOWLEDGE, ATTITUDE AND PRACTICE SURVEY TO DETERMINE CONTEMPORARY USE OF ARTIFICIAL INTELLIGENCE AMONG DENTISTS : A QUESTIONNAIRE BASED STUDY
Type of manuscript: Survey
Running title: Determine contemporary use of Artificial intelligence among dentists.

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ABSTRACT :

OBJECTIVE: Artificial Intelligence may replace cognitive human qualities such as rational thinking, learning and problem cracking. It is trying to bring about many revolutionary changes in the modern world. Artificial Intelligence is highly paving its space in the field of pathology and radiology for diagnostic purposes. It helps in data collection and also can be used to compare and come to a relative and rapid diagnosis. Hence, the aim of this cross-sectional

survey was to understand the knowledge and understanding of contemporary use of Artificial intelligence among dental practitioners and students among South India.

METHODOLOGY : The survey is conducted using a standardised questionnaire. Data was collected and tabulated. The data collection software used is SPSS software version 23.The results of this study in terms of individual behavior and awareness of dental students towards use of magnification in dentistry are comparable with similar studies conducted in other countries.

RESULTS : In the current study the questionnaire was circulated on the basis of knowledge, attitude and practice. The data was collected and statistically analysed. 52% of the participants were female and 48% of the participants were male. 60% of participants were aware that virtual dental assistants which are based on AI can perform various functions and tasks with greater accuracy in the dental clinic, minimal errors, and less workforce compared to humans. Chi square value= 2.456; P value= 0.098 (p>0.05, hence statistically significant).

CONCLUSION : The main concept and belief of Artificial Intelligence is by no means futuristic now. It's all in the present situation. The research in the field of Artificial Intelligence is by a quantum leap. It's almost dramatic with the invention of robots for major surgeries, tools for cancer detection and voice control for dental chairs.

KEYWORDS : Artificial intelligence; Contemporary uses; Dental practitioners; Dental students.

INTRODUCTION:

Artificial Intelligence may replace cognitive human qualities such as rational thinking, learning and problem cracking[1]. It is trying to change many revolutionary changes in the modern world[2]. Artificial Intelligence has made its way into a wide variety of markets such as prosthodontics dentistry , orthodontics , education, endodontic dentistry and so on and has the potential to transform the current working scenario which is provided if we keep ourselves flexible enough to incorporate it in day to day system[3]. It can also dramatically improve the efficiencies of dental workplaces and can augment the work humans can do[4]. When artificial intelligence takes over repetitive or dangerous tasks, it can free up the human workforce to do work that is better equipped for tasks that involve both creativity and also empathy among others[5].

While the advances in Artificial Intelligence like neural networking, natural language processing, image recognition, and speech recognition in dentistry have transformed the field of medicine and dentistry in many ways, they have a number of drawbacks and challenges that are yet to be overcome[5,6]. Use of Artificial Intelligence will [6]not just decrease the workload but can also increase the work efficiency in dentistry [6,7]. It can have both pros and cons[8]. Artificial Intelligence has Machine learning, representation learning and deep learning[6].Artificial Intelligence in dentistry once considered a turning into a reality. In the

field of dentistry, Artificial Intelligence is highly paving its space in the field of pathology and radiology for diagnostic purposes[9], [10]. It helps in data collection and also can be used to compare and come to a relative and rapid diagnosis[11]. Artificial intelligence in Dentistry started by procuring its role with emergence of various data computation and seeing availability of large amounts of each and every single patient data [12]. For example, in radiology a definite kind of algorithm can be generated which can help in both diagnosis and treatment of oral disease.

The research in the field of application of Artificial intelligence in dentistry and medicine has been extravagant. Implementation and adoption of the technology is the need of the hour for an efficient healthcare facility in our country[13]. No published information exists on the consideration of Artificial intelligence being incorporated in the daily practice of the dental practitioners[14], [15]. Artificial Intelligence can be used in various other areas like research in the medical field and also involves creating innovative technology[16]. It can be mainly used in the medical field to improve the accuracy of different programs used for detecting health conditions[17]. Our research and knowledge have resulted in high-quality publications from our team [18–31]

The aim of this cross-sectional survey was to understand the knowledge and understanding of contemporary use of Artificial intelligence among undergraduate and postgraduate dental practitioners in India.

MATERIALS AND METHOD:

The Study setting used here was an online setting. The population taken for this study is 100 dental doctors from south Indian .The survey was conducted using a standardized questionnaire. Data was collected and tabulated. The data collection software used is SPSS software. The results of this study in terms of individual behavior and awareness of dental students towards use of magnification in dentistry are comparable with similar studies conducted in other countries. The MCQ type questions are prepared with choices with the help of google forms,and all the questions were shared.

For this research 10 self structured questionnaires were created. Output variables can be risk factors, food habits, aged people. The sampling method used here is a convenient sampling method. Method of representation of data is Pie chart, Bar Diagram. Statistical tests used are Descriptive statistics. Independent variables can be Age, Weight, Gender, Risk factors, crown margins and post placement, Neuronal Network and Deep Learning. dependent variables can be awareness, interaction, knowledge, attitude, practice.

A set of 10 close ended questions was composed in a web-based questionnaire (Google forms) and distributed to south Indian dentists. Answers to all questions were given and grouped such that general information was gathered initially, followed by dividing the survey into two

sections depending on the qualification of the dentist (UG,PG). The results were compiled, and statistical analysis is performed in order to explore any correlation between different demographic variables and the answers given .

RESULTS:

In the current study the questionnaire was circulated on the basis of knowledge, attitude and practice. The data is collected and statistically analysed. 52% of the participants were female and 48% of the participants were male.

45% believed the basic objective of AI is to enable computers to perform such intellectual tasks as decision making, problem solving, perception, and understanding human communication (Figure 1). 60% of participants were aware that virtual dental assistants which are based on AI can perform various functions and tasks with greater accuracy in the dental clinic, minimal errors, and less workforce compared to humans(Figure 2). 60% of participants were aware that artificial intelligence (AI) improves health research productivity (Figure 3). 18% of participants felt that artificial intelligence (AI) can reduce malpractice in healthcare practice (Figure 4). 45% of participants agreed that Artificial intelligence (AI) reduces the chances of error (Figure 5). 34% of participants experienced that artificial intelligence can be used in preclinical conservative dentistry for example virtual simulators for practice for 1st and 2nd year students (Figure 6). About 38% of males reported that artificial intelligence (AI) can reduce malpractice in healthcare practice whereas only 22% of females reported that artificial intelligence (AI) can reduce malpractice in healthcare practice. Majority of females (21%) and males (18%) disagreed with the statement artificial intelligence (AI) can reduce malpractice in healthcare practice. The analysis showed that the level of awareness among males and females was similar. Chi square value= 2.839; P value= 0.092 (Figure 7). About 37% of males reported that artificial intelligence (AI) can reduce malpractice in healthcare practice (blue) whereas only 29% of females reported that artificial intelligence (AI) can reduce malpractice in healthcare practice (blue). The analysis showed that the level of awareness among males and females was similar. Chi square value= 2.456; P value= 0.085 (Figure 8).

DISCUSSION:

Nowadays many advancements in the field of technology during the last few years have added these technological advancements in day to day life. Many studies have been done to check the original efficacy of inculcation of Artificial intelligence in both normal dental diagnosis and treatment. It can also detect the different methods of artificial intelligence that are used frequently together to solve the special problems of medicine[32]. The general approach for artificial intelligence is to find the location of a lesion and also to determine an estimate of the probability of a disease[33]. Also, 56% of the study population believed the complex diagnostic tools cannot be categorized in binary variables. 43% thought that artificial intelligence could not be that effective in India due to lack of recorded data.

Research in modern Computer Aided Diagnosis is a fastly growing dynamic field with new computer techniques, modern imaging modalities, and also latest interpretation tasks. Both model-based intelligent analysis and also decision-support tools are important in medical imaging for computer-assisted diagnosis and for evaluation[34]. Computer Aided Diagnosis helps in radiologists who use the output from a computerized analysis of medical images as their second option in finding the lesions, and assessing extent of disease, and then improving the accuracy and consistency of radiological diagnosis to reduce the rate of false negative cases[35][36].

The cross-sectional study conducted amongst 100 participants showed a mean age of 28 years. There were no statistically significant differences seen in age and gender wise. Majority of the study participants (70 %) were aware of Artificial Intelligence and its contemporary uses. Previous study showed that among those who were aware of contemporary uses of Artificial intelligence, 57% were MDS and 43% were BDS and this difference was statistically significant. When asked the question on Artificial Neuronal Network and Deep Learning, the majority of the BDS study participants answered "No ", however almost equal positive response was seen among MDS study participants.

A similar predominance of artificial intelligence involves Neuronal Network and Deep Learning was seen in a study conducted previously by Vats Y, Dhall JK, Kapoor AK et al(2019), which showed that simulation of human intelligence in machines that are programmed to think like humans and mimic their actions were the predominant, and most of the participants agreed that dental practitioners are among the least likely to be replaced by robots were predominant. And also another study conducted by Sandhu et al (2020) which showed that artificial intelligence can be used in preclinical conservative dentistry for example virtual simulators.

CONCLUSION:

The main concept and belief of Artificial Intelligence is by no means futuristic now. It's all in the present situation. The concept and belief of Artificial Intelligence is by no means futuristic now. The research in the field of Artificial Intelligence is on a quantum leap. Even with the job scarcity for dentists in the present time, not many participants showed concerns on job displacement and replacement. Artificial Intelligence can only assist the doctor in executing the tasks efficiently, but in no way replace the human brain's ability for a successful diagnosis, treatment planning or even the treatment per say.

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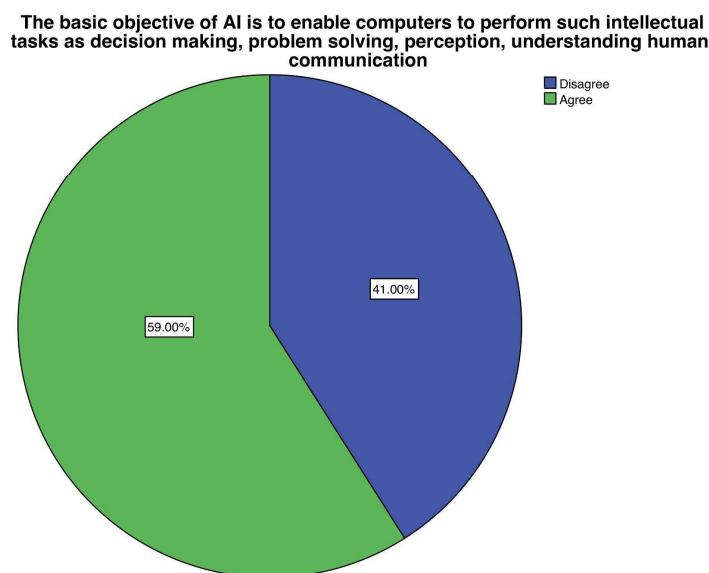
Figure 1: Pie chart showing percentage distribution of responses for involvement of Neuronal Network and Deep Learning in Artificial intelligence. 41%- Disagree (blue); 59% - Agree (green). Majority of participants (60%) agreed with the statement that artificial intelligence involves computers to perform intellectual tasks.
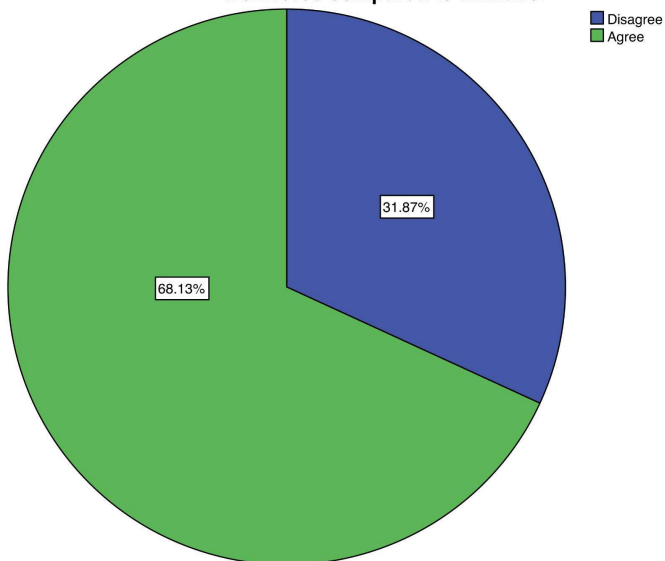
Figure 2: Pie chart showing percentage distribution of responses for the statement that virtual dental assistants which are based on AI can perform various functions. 32%- Disagree (blue); 68% - Agree (green). Majority of participants (68%) agreed with the statement that virtual dental assistants which are based on AI can perform various functions and tasks with greater accuracy in the dental clinic, minimal errors, and less workforce compared to humans.

Artificial intelligence (AI) improve health research productivity.
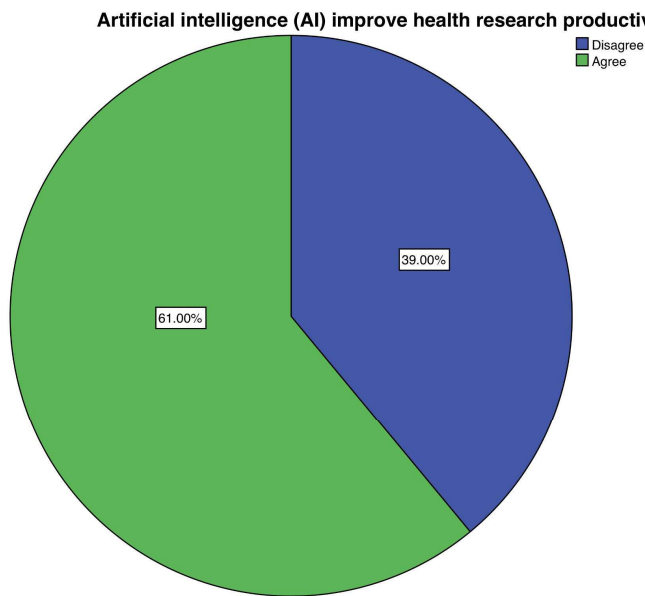
Disagree
Agree

39.00%

61.00%

Figure 3: Pie chart showing percentage distribution of responses for improved health research productivity. 39%- Disagree (blue); 61% - Agree (green). Majority of participants (61%) agreed the statement that artificial intelligence (AI) improves health research productivity.

Artificial intelligence (AI) can reduce malpractice in healthcare practice
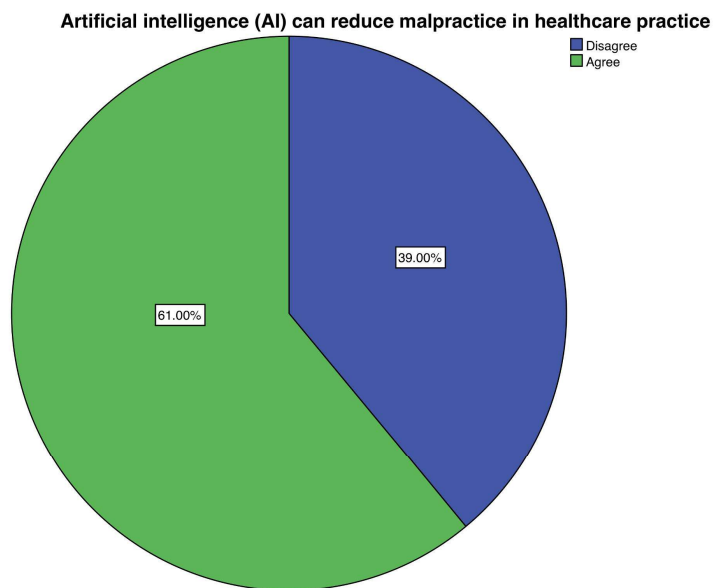
Disagree
Agree

39.00%

61.00%

Figure 4: Pie chart showing percentage distribution of responses for reducing malpractice in healthcare practice. 39%- Disagree (blue); 61% - Agree (green). Majority of participants (61%) agreed that artificial intelligence (AI) can reduce malpractice in healthcare practice.

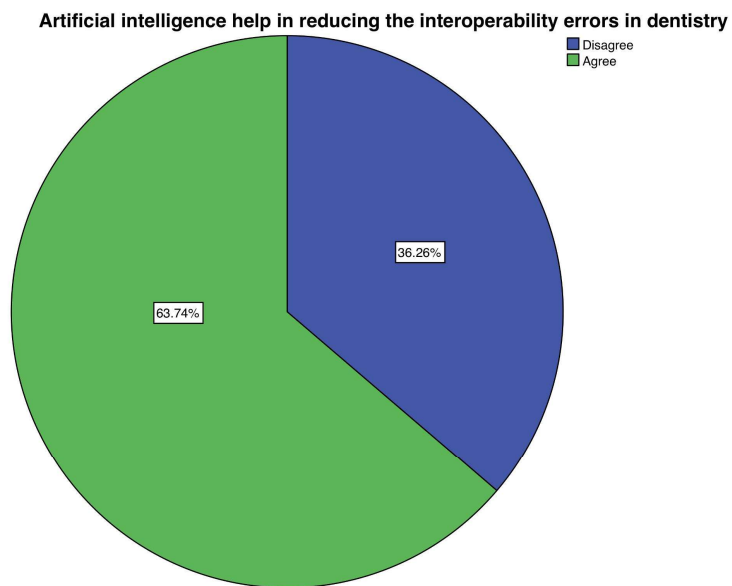**Artificial intelligence help in reducing the interoperability errors in dentistry**

Figure 5: Pie chart showing percentage distribution of responses for reducing the interoperability errors in dentistry. 36%- Disagree (blue); 63% - Agree (green). Majority of participants (63%) agreed the statement artificial intelligence helps in reducing the interoperability errors in dentistry.

Artificial intelligence can be used in preclinical conservative dentistry for example virtual stimulator for practice for 1st and 2nd year students.
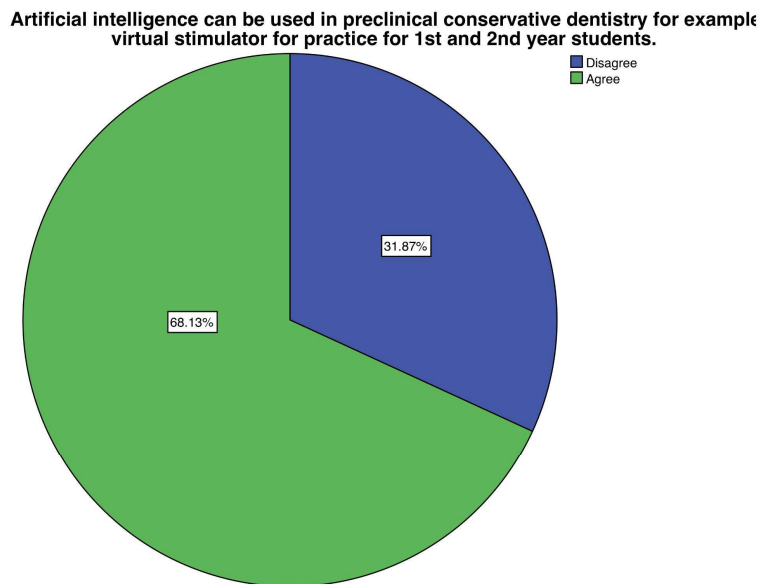
Figure 6: Pie chart showing percentage distribution of responses for statement artificial intelligence can be used in preclinical conservative dentistry. 32%- Disagree (blue); 68% - Agree (green). Majority of participants (68%) agreed with the statement that artificial intelligence can be used in preclinical conservative dentistry for example virtual simulators for practice for 1st and 2nd year students.
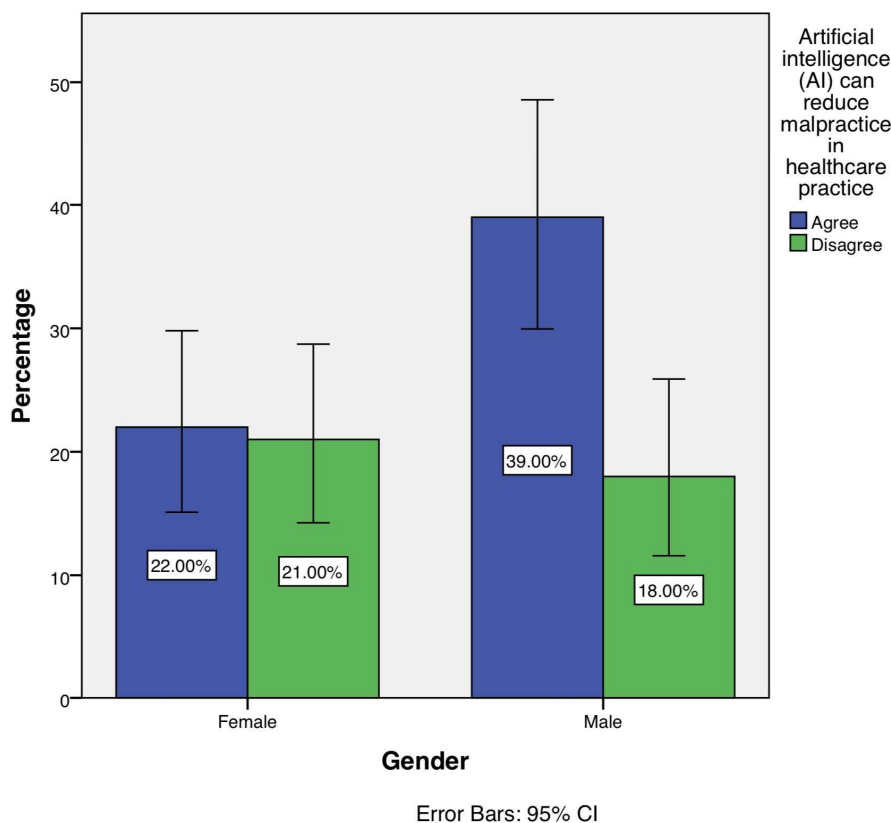

Figure 7: Bar graph showing the association of responses based on different gender to the awareness on reducing malpractice by using artificial intelligence, where blue denotes agree and green denotes disagree. X axis represents gender and Y axis represents percentage. This shows the percentage distribution of responses for reducing malpractice in healthcare practice. 39%- Disagree (blue); 61% - Agree (green). Majority of participants (61%) agreed that artificial intelligence (AI) can reduce malpractice in healthcare practice. About 38% of males reported that artificial intelligence (AI) can reduce malpractice in healthcare practice (blue) whereas only 22% of females reported that artificial intelligence (AI) can reduce malpractice in healthcare practice (blue). Majority of females (21%) and males (18%) disagreed with the statement artificial intelligence (AI) can reduce malpractice in healthcare practice. The analysis showed that the level of awareness among males and females was similar. Chi square value=

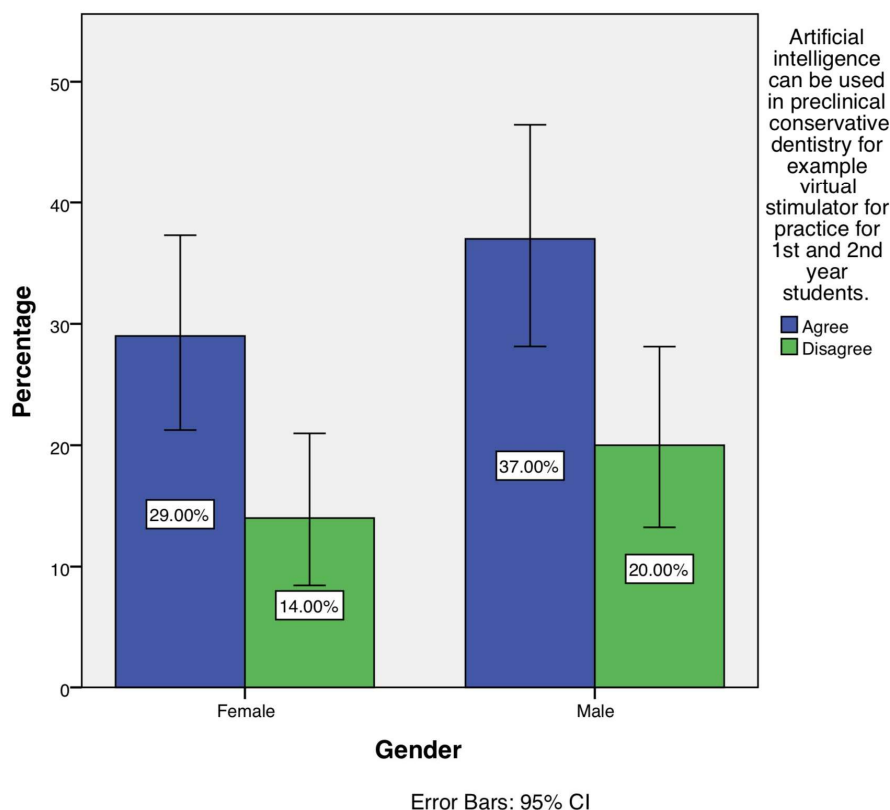2.839; P value= 0.092 (p>0.05, hence statistically significant).

Figure 8: Bar graph showing the association of responses based on different gender to the awareness on uses of artificial intelligence in preclinical works, where blue denotes agree and green denotes disagree. X axis represents gender and Y axis represents percentage. This shows the percentage distribution of responses for statement artificial intelligence can be used in preclinical conservative dentistry. 32%- Disagree (blue); 68% - Agree (green). Majority of participants (68%) agreed with the statement that artificial intelligence can be used in preclinical conservative dentistry, for example virtual simulators for practice for 1st and 2nd year students. About 37% of males reported that artificial intelligence (AI) can reduce malpractice in healthcare practice (blue) whereas only 29% of females reported that artificial intelligence (AI) can reduce malpractice in healthcare practice (blue). Majority of males (19%) and females (14%) disagreed with the statement that artificial intelligence can be used in preclinical conservative dentistry. The analysis showed that the level of awareness among males and females was similar. Chi square value= 2.456; P value= 0.085 (p>0.05, hence statistically significant).