*Section: Research Paper*

# Assessment of knowledge & perception of Indian Oral medicine & radiologist regarding the role of artificial intelligence in oral medicine clinical practice-ACross sectional descriptive study

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**ABSTRACT**

**Aims:** The present study was conducted to assess knowledge & perception of Indian Oral medicine & radiologist regarding the role of artificial intelligence in oral medicine clinical practice

**Settings and Design:** The present study included a rapid, short cross-sectional online survey. Itwas conducted using web-based survey platform called Google Forms.

**Methods and Material:** A total of 250 Oral medicine & radiologist -'s were selected by simple random method for participating in the study. A self-administered, 18-point questionnairein the form of online survey was used, to assess the knowledge & perception of Indian Oral medicine & maxillofacial radiologist

**Statistical analysis used:** Results were documented and statistically analysed using chi-squareand Kruskal-Wallis test.

**Results:** Overall knowledge was found to be more in the participants with experience of more than 5years and amongst Academician's. The perception of accepting use of AI in day to day clinical practice was seen more amongst Academician & Clinician's.

**Conclusions:** During the course of the study, high level of knowledge & perception was seen regarding application of Artificial in oral medicine clinical practice .A significant association between years of experience and type of profession could be noted.

**Key-words:** Knowledge, Perception, Artificial Intelligence, Oral medicine & radiologist

**Key Messages:** It is now the time to look for efficiency and growth in OMDR specialty by looking up to widening the scope and ensuring the application of Artificial Intelligence, thus improvising patient's orofacial care.

## INTRODUCTION

As compared to other countries, India has the largest increase in number of specialty, Oral Medicine and Radiology[OMR] services as defined by intensifying numbers of OMR clinical practitioners.[1] This explains that, along with the speedy progress made in dental imaging, OMR expert's opinion is also being understood and supported among medical fraternity and general dental practitioners. We can say that this is the first step up the ladder. But again, we should remember, "Change is the only constant thing in life." As OMR clinical practitioners, we constantly need to assess, review, upgrade and adapt ourselves to the evolving change. The role of Artificial Intelligence (AI), which is defined as the ability of computers to perform tasks that normally require human intelligence is constantly increasing. AI promises to revolutionize dentalpatient care in the coming years. [2] It has a variety of uses in medicine and dentistry, ranging from data analysis, identifying relevant information in using neural networks for diagnosis and use of augmented as well as virtual reality in dental education. Thus, we can say that dentistry is undergoing technological changes. [3] The integration of AI and digitization has ushered a new age of dentistry, with highly promising future prospects. Computer aided diagnosis is gaining impetus due to its ability to detect and diagnose lesions which may go unnoticed to the human eye, thereby facilitating a comprehensible practice. [4] Algorithms basically form the backbone of AI. They analyze structured data, which includes information about genes, biomarkers, and other associated images, and also unstructured data, which includes notes, medical journals or patient's surveys to complement the structured data. [5] The idea of analysis of structured data is fueled by machine learning and deep learning algorithms and that of unstructured data by specialized natural language processing. [5] Machine learning algorithms extract features from data such as patient traits and medical outcomes of interest. The most commonly used are Support Vector Learning [SVM] and Neural Network [NN]. The Support Vector Learning[SVM] algorithm makes the computer to classify and divide the data [6] Whereas neural networks process data via an association of input and output variables through the help of hiddenlayers of pre-specified functions [7,8,9]

Deep learning algorithms is a classical neural networking technique which uses more and extended hidden layers.Therefore, having an increased capacity than the classical machine learning technique. It can navigate through deep and complex nonlinear patterns of data. The most common ones used in medicine are Convolutional Neural Network [CNN], Recurrent Neural Network [RNN], Deep Belief Network [DBN] and Multilayer Perceptron [MLP]. [7-9] Natural language processing is now a piece of huge information having around 80% of the data present in an unstructured form which includes laboratory test reports, narrative texts, operative notes, and discharge summaries. These unstructured data are incomprehensible to the computer and as a result, it increases human workload. This is where, natural data processing comes into the picture.[10] In general, the term cognitive computing is used to refer to any hardware or software that mimics functioning of the human brain and helps to improve human decision- making. [11] It is one of the systems that can interact with us more intelligently and help us understand the data in the form of feedbacks.

The published literature so far states that overall dentists are very well aware of the concept of AI and to some extent they also know that AI software's can be used as an adjunctive tool to increase their diagnostic precision. The survey or studies conducted till date were amongst radiologists, healthcare workers, dental students, dentists, etc. [5] We also know that slowly and gradually oral medicine specialists are erasing the "identity crisis" tag regarding their branch by establishing themselves as private specialty clinical practitioners. But, till now, no one has assessed knowledge and perception of oral medicine specialists regarding

integration of AI in their clinical practice. Role of AI in oral medicine clinical practice could be a possible game changer for the budding OMR specialists, who serve as or are willing to serve as specialty practitioners. Thus, the present study is the first ever study designed to assess the knowledge and perception of oral medicine specialists regarding integration of AI in oral medicine clinical practice. This study was conducted in the form of a cross-sectional online survey.

## MATERIAL AND METHODS

### Study design

This was a cross-sectional study.Study variables:
"Years of Experience" was the independent variable.
"Assessment of knowledge and perception of OMR specialists regarding integration of AI in oralmedicine clinical practice" was the dependent variable.
Following tools were used for data collection:
The tools had three parts.
Part-1: Socio-demographic profile
Part-2: Structured questionnaire to assess knowledge and
Part-3: Structured questionnaire to assess perception of OMR specialists regarding integration ofAI in oral medicine clinical practice.
The survey questionnaire was in accordance with the checklist for Reporting Results of Internet E-Surveys [CHERRIES]. [12] The questionnaire included questions investigating demographic details of each respondent (Q1, 2, 3) and five closed-ended questions aimed at qualitatively assessing the prior knowledge of OMR Specialist on the subject of role of AI in various broad categories of patients being treated under oral medicine clinical practice. Questionnaire (Q 9-12 &15) There was another set of 5 closed-ended questions aimed at assessing the perception of OMR specialists. In all the 10 closed-end questions, we used the word "help in" without giving further clarification for two main reasons: firstly, because we were interested in understanding perceptions of specialists toward not only the current but also future AI applications. Although people with no prior knowledge of AI may have unrealistic views of how this technology can be employed in the oral medicine field. They are likely to still carry positive or negative expectations towards its future use. Secondly, the word "help in" has been used in previous studies in the same context. [13] Also, the survey was validated by distributing it among a small group of participants as a pilot procedure to determine its relevance.

### Study Participants

**Inclusion criteria:** OMR specialists willing to participate. Exclusion criteria: Non-OMR specialists.

### Selection criterion and sample size calculation

A random sampling technique was used for selecting participants of the study. Institutional ethical permission was obtained from the Institutional Ethics Committee, D-104 (via certificate no D-104/IECDYPDS/2022 dated 14/03/2022). Sample size was calculated based on the following formula:

$$S = \frac{[Z^{1-\alpha}/2P\ (1-P)]}{d^2}$$

Where z is a normal deviate, d is the level of precision adjusted at 0.07. Prevalence was considered to be at 70%. The design effect of 2 was taken to compensate the cluster

effect. Thus, he final sample size was calculated to be 250.The entire study participants were divided into three groups, Group 1 (Academician's), Group 2 (Clinician's) & Group 3 (Academician's and Clinician's) After circulating among all the groups, an online form for almost 2 weeks and then eliminating all unfilled as well as partially filled forms, we could receive total 205 responses for this survey. A link to the survey was emailed and/or sent across through social media platforms such as Facebook and What's App group of the Indian Academy of Oral Medicine and Radiology. As the first question of the survey was regarding the consent to participate in the survey, those who filled the forms were considered to have consented to participate in the study. The study was conducted by following all the protocols and principles under the purview of the Helsinki Declaration (1964 and later). The questionnaire was available on Google Forms for 2 weeks. Incomplete forms were scrutinized, and cleaning of the data was carried out by asking respondents to rectify improperly or partially filled forms.

## STATISTICAL ANALYSIS

### Descriptive Statistics

a. Frequency and percentage distribution were used to describe socio-demographic variables,level of knowledge, and perception OMR Specialist.
b. Mean, mean percentage, and standard deviation were used to analyze level of knowledge andperception of OMR specialists

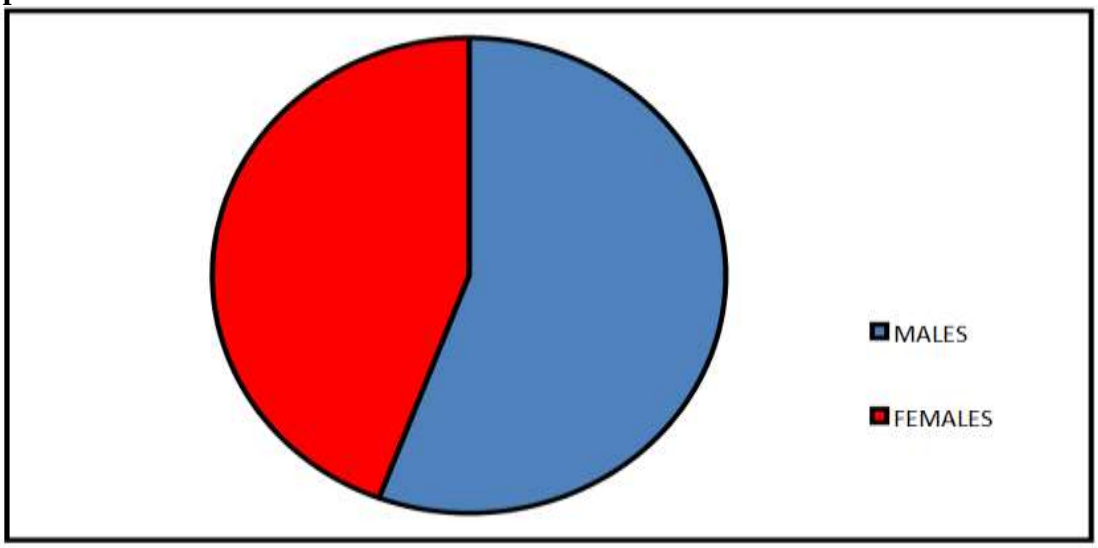
### Inferential Statistics

"Chi-square" test was used to determine association between the level of knowledge and perception with selected socio-demographic variable. Kruskal-Wallis test was used to determine association between the levels of future perception with selected socio-demographic variable.Cronbach's alpha reliability test was conducted with α score of 0.618 indicating acceptable reliability. Significance for all statistical tests was predetermined at a P-value of $\leq 0.05$. The prevalence anticipated rate was calculated up to 20%.

## RESULTS

Among total responses received, i.e., 205, 55.71% were male and 44.28% were female OMR specialists as illustrated in Graph 1.

**Graph1. Gender Distribution**



Overall responses of all the participants as per their professional group vise category into group 1,2 & 3 was evaluated in the form of mean score asillustrated in Table 1.

**Table 1 Responses with respect to knowledge and perception of oral medicine & radiologist's regarding application of Artificial intelligence in clinical practice of oral medicine as per professional profile groupsdivision**

| Question No. | Academician (Group 1) | | | Clinician's (Group 2) | | | Academician and Clinician (Group 3) | | |
|---|---|---|---|---|---|---|---|---|---|
| | RESPONSES | | | | | | | | |
| | YES | NO | NOT SURE | YES | NO | NOT SURE | YES | NO | NOT |
| 4 | 168/93.3% | 10/5.5% | 2/1.1% | 50/45.5% | 20/18.1% | 40/36.36% | 40/66.6% | 2/3.3% | 18/ |
| 5 | 155/86.1% | 5/2.7% | 20/11.1% | 60/54.5% | 20/18.1% | 30/27.27% | 42/70% | 8/13.3% | 10/1 |
| 6 | 170/94.4% | 2/1.1% | 8/4.4% | 40/36.3% | 45/40.9% | 25/22.7% | 38/63.3% | 2/3.3% | 20/3 |
| 7 | 177/98.3% | 1/0.5% | 2/1.1% | 20/18.8% | 20/18.1% | 70/63.6% | 35.58.3% | 5/8.3% | 20/3 |
| 8 | 174/96.6% | 2/1.1% | 4/2.2% | 30/27.2% | 45/40.9% | 35/31.8% | 30/50% | 5/8.3% | 20/3 |
| 9 | 178/98.8% | 1/0.5% | 1/0.5% | 10/9.09% | 60/54.5% | 40/36.3% | 35/58.3% | 5/8.3% | 20/3 |
| 10 | 168/93.3% | 2/1.1% | 10/5.5% | 25/22.7% | 70/63.6% | 15/13.6% | 38/63.3% | 2/3.3% | 20/3 |
| 11 | 170/94.4% | 2/1.1% | 8/4.4% | 20/18.1% | 50/45.4% | 40/36.3% | 32/53.3% | 8/13.3% | 20/3 |
| 12 | 175/97.2% | 1/0.5% | 4/2.2% | 30/27.2% | 50/45.4% | 30/27.2% | 33/55% | 7/11.6% | 20/3 |
| 13 | 171/95% | 3/1.6% | 6/3.3% | 25/22.7% | 70/63.6% | 15/13.6% | 32/53.3% | 8/13.3% | 20/3 |
| 14 | 168/93.3% | 2/1.1% | 10/5.5% | 32/29.0% | 60/54.5% | 18/16.3% | 35/58.3% | 5/8.3% | 20/3 |
| 15 | 170/94.4% | 2/1.1% | 8/4.4% | 20/18.1% | 70/63.6% | 20/18.1% | 38/63.3% | 2/3.3% | 20/3 |
| 16 | 140/77.7% | 2/1.1% | 38/21.1% | 90/81.8% | 2/1.8% | 18/16.3% | 50/83.3% | 2/3.3% | 8/13 |
| 17 | 130/72.2% | 25/13.8% | 25/13.8% | 89/80.9% | 1/0.9% | 20/18.1% | 55/91.6% | 2/3.3% | 3/ |
| 18 | 2/1.11% | 170/94.4% | 8/4.4% | 80/72.7% | 10/9.0% | 20/18.1% | 2/3.3% | 50/83.3% | 8/13 |

Assessment of knowledge and perception score within three groups and mean comparison was carried out using one-way ANOVA test. $P< 0.001$ and hence, the results were significant [Table3].

**Table 3 Assessment of knowledge and perception score between 3 groups and comparison ofMean by One way ANOVA**

| Groups | n | Mean | StandardDeviation | F | P |
|---|---|---|---|---|---|
| 1 [Academician's] | 180 | 15.94 | 3.537 | 23.595 | <0.001 |
| 2 [Clinician's] | 110 | 12.44 | 2.898 | | |
| 3[Academician's& Clinician's] | 60 | 9.55 | 2.475 | | |
| Total | 350 | 116.66 | 3.102 | | |

The mean score was highest in Group 1 followed by Group 2 and Group 3.
Subgroup comparison of knowledge and perception scores was carried out using Benferroni Post Hoc test [Table 4].

**Table 4 Comparison of knowledge and perception scores between groups by Bonferroni post hoctest**

| (I) Group | (J)Group | Mean Difference (I-J) | Std. Error | P |
|---|---|---|---|---|
| 1 | 2 | -2.744 | 0.567 | <0.001 |
| | 3 | -1.241 | 0.473 | <0.056 |
| 2 | 1 | 2.887 | 0.473 | <0.001 |
| | 3 | 1.503 | 0.563 | <0.048 |
| 3 | 1 | 1.241 | 0.473 | <0.056 |
| | 2 | -1.503 | 0.563 | <0.048 |

When Group 1 participants knowledge and perception was compared with other groups, their was significant difference with Group 2. When Group 2 was compared with other groups, the difference was significant with Group 1. The results of Group 3 were non- significant as compared to both the other groups. All questions were also individually assessed totest exact areas for which knowledge and perception is present. Kruskal–Wallis ANOVA test was used for intragroup comparison while Mann–Whitney test was used for intergroup comparison. The association of experience with knowledge and perception of OMR specialists regarding integration of AI in oral medicine clinical practice was evaluated using Chi-square test. The difference between the two groups, that is, OMR specialists with less than 5 years of experience and specialists with more than 5 years of experience, was overall found to be statistically significant with a P-value of < 0.005 [Table 2].

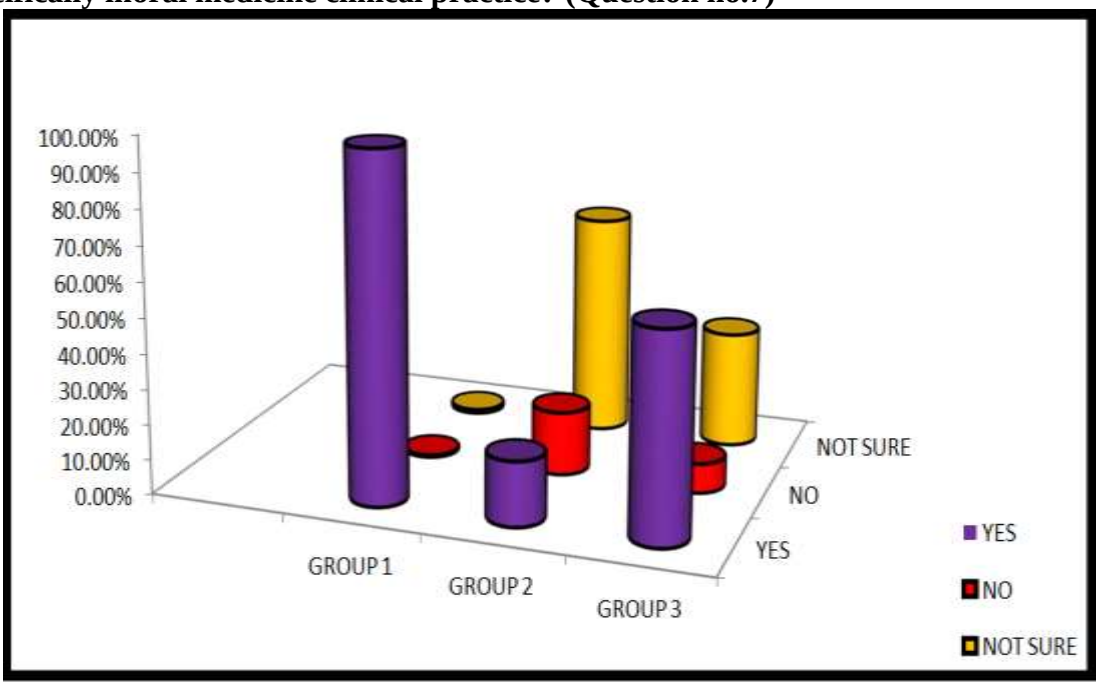
**Table 2 Association of Experience (in years) with knowledge and perception of oral medicine & radiologist's regarding application of Artificial intelligence in clinical practice of oral medicine usingChi-square test.**

| Questionnaire | Experience | | | | | | P-Value |
|---|---|---|---|---|---|---|---|
| | BELOW 5 YEARS | | | ABOVE 5 YEARS | | | |
| | YES | NO | MAYBE | YES | NO | MAYBE | |
| Knowledge | | | | | | | |
| • Term Artificial Intelligence | 135 / 73.51% | 49 / 26.48% | 0/ 0% | 100 / 60.60% | 59 / 35.75% | 6/ 3.63% | 0.37 |
| • Concept Of Ai In Dentistry | 98 / 52.97% | 82 / 44.32% | 5 / 2.7% | 40 / 24.24% | 100 / 60.60% | 25/ 15.15% | 0.04 |
| • Incorporation Of Ai In Daily Dental Practice | 110 / 59.45% | 60 / 32.43% | 15 / 8.10% | 140 / 84.84% | 23 / 13.93% | 2/ 1.12% | 0.67 |
| • Use Of Ai In Oral | 90 / | 45 / | 50 / | 20 / | 85 / | 60/ | 0.005 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Medicine | 48.64% | 24.32% | 27.02% | 12.12% | 51.51% | 36.36% | |
| • Role Of "Florence" In Oral Medicine | 95 / 51.35% | 15 / 8.10% | 75 / 40.54% | 20 / 12.12% | 110 /66.66% | 35 / 21.21% | 0.003 |
| Advanced Intelligence Based Systems & Loc Technique For Early Diagnosis Of Pml | 100 / 54.05% | 60 / 32.43% | 25 / 13.51% | 10 / 6.06% | 120 / 72.72% | 35 / 21.21% | 0.001 |
| • Ai For Predicting Oral Cancer Occurance Rate In Predisposed Individuals | 99 / 53.51% | 36 / 19.45% | 50 / 27.02% | 15 / 9.09% | 108 / 65.45% | 42 /25.45% | 0.001 |
| • Ai For Predicting Survival Rate Of Oral Cancer Patient | 120 / 64.86% | 10 / 5.4% | 55 / 29.72% | 20 / 12.12% | 105 / 63.63% | 40 /24.24% | 0.003 |
| • Contribution Of Ai In Anticancer Drug Development | 85 / 45.94% | 20 / 10.8% | 80 / 43.24% | 50 / 30.30% | 110 /66.66% | 5 /3.03% | 0.005 |
| • Success Of Ai In Diagnosing Orofacial Pain | 90 / 48.64% | 6 / 3.24% | 89 / 48.10% | 06 / 3.63% | 130 /78.78% | 29 / 17.57% | 0.004 |
| Diagnosis/Treatment Of Tmd By Ai | 88 / 47.56% | 07 / 3.78% | 90 / 48.64% | 06 / 3.63% | 132 /80.00% | 27 / 16.36% | 0.001 |
| Diagnosis Of Medically Compromised Patients By AI | 75/ 40.54% | 20 / 10.8% | 90 / 48.64% | 30 / 18.18% | 120 /72.72% | 15 / 9.09% | 0.005 |
| Perspective | | | | | | | |
| Readiness To Learn Technique Sensitive AiFor Clinical Practice | 160 / 86.48% | 20 / 10.8% | 05 / 2.7% | 90 / 54.54% | 08 / 4.84 % | 67 / 40.60% | 0.003 |
| • Adapting Ai In Daily Clinical Practice | 150 / 81.08% | 05 / 2.7% | 30 / 16.21% | 80 / 48.48% | 10 /6.06% | 75 / 45.45% | 0.002 |
| • Will Ai Substitute Oral Medicine Specialists | 10 / 5.40% | 130/70.27 % | 45 / 24.32% | 06 / 3.63% | 140 / 84.84% | 19 /11.51% | 0.03 |

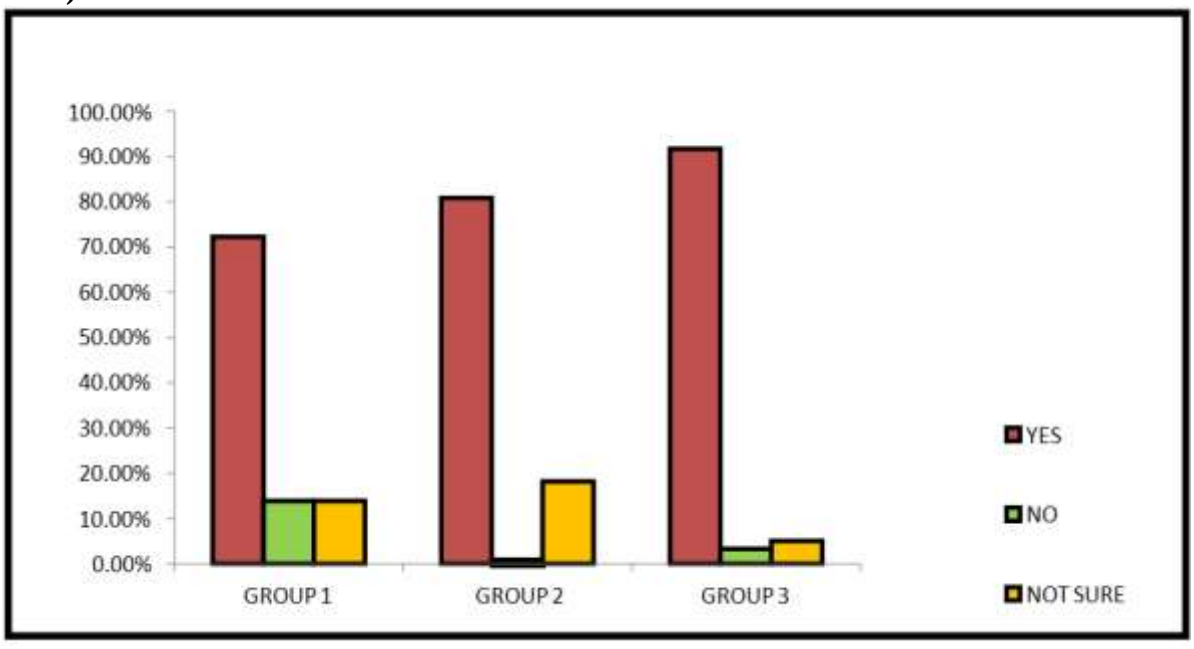
Out of all 18 questions, few most important questions are discussed here. When the question regarding can AI be specifically used in oral medicine clinical practice was asked, 98.33% of academicians (Group 1), 58.33% of academicians and clinical practitioners (Group 3) and only 18.18% of clinical practitioners (Group 2) demonstrated awareness about it. Mean score was calculated [Graph 2 - Question 7].

**Graph 2 Intergroup comparison to know knowledge regarding, can AI be used specifically inoral medicine clinical practice? (Question no.7)**




A question regarding feasibility to adapt AI software in day today clinical practice was asked to all three groups to understand participants perspective, 72.22% of group 1, 80.90% of group 2, and 91.66% of group 3 were ready to adapt this new Technology Mean score was calculated [Graph 3 - Question 17].

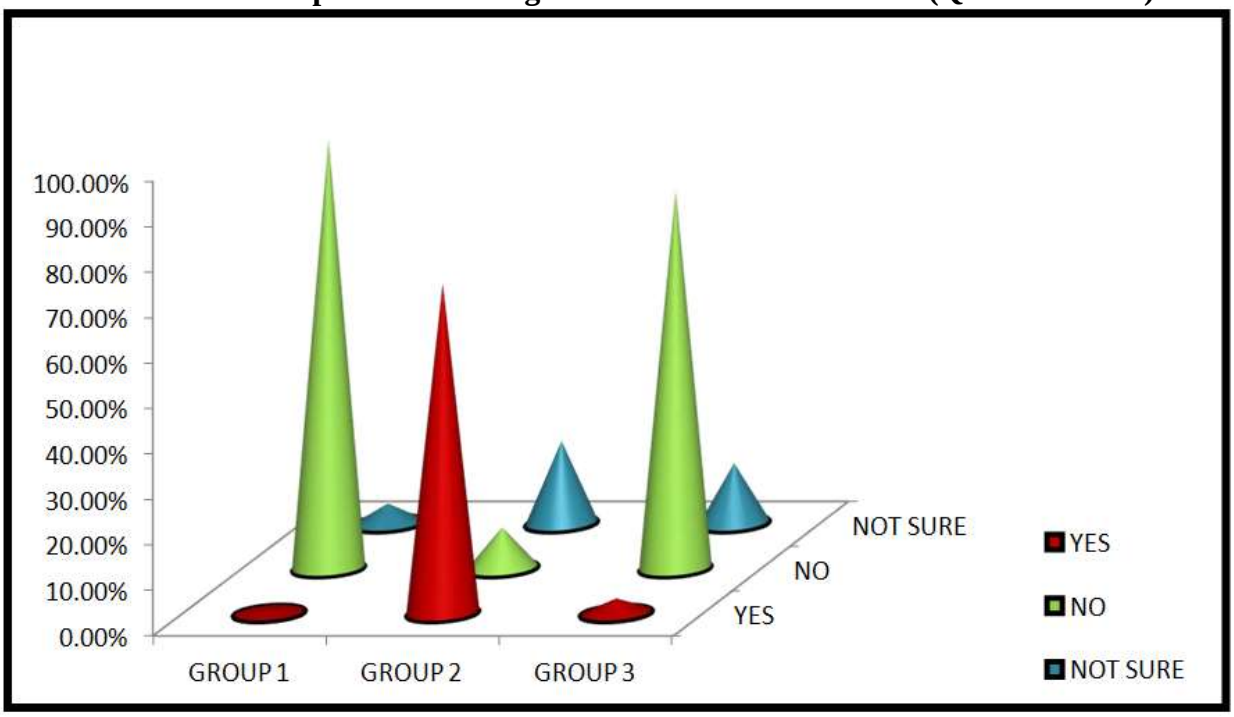
**Graph 3 Intergroup comparison to know perspective regarding, Will you adapt software's of artificial intelligence, in your day to day clinical practice?? (Question no.17)**




Similarly, when the question regarding substituting oral medicine specialists with AI for diagnosis of orofacial diseases was asked only 1.11% of group 1, 3.33% of group 3 &

72.7% of group 3 agreed to it. Mean score was calculated [Graph 4 - Question 18].

**Graph 4 Intergroup comparison to know perspective regarding, Will AI Substitute the need fororal medicine specialist for diagnosis of orofacial diseases?? (Question no.18)**




## DISCUSSION

Till now, survey-based studies regarding knowledge, attitudes, and perceptions of the future of AI among oral radiology professionals, health professionals and in dentistry have been carried out. [12, 13, 14 15]. In the present study, all the participants were divided as per the years of experience i.e. less than 5 and more than 5 [Table 1]. Participants were divided as per experience in order to analyze and compare knowledge and perception of young and experienced specialists.The participants were also divided as per their professional profile i.e. academician, clinician and academician, and clinician [Table 2] in order to analyze which group of specialty practitioners is most willingly ready to integrate AI in OMR clinical practice.

This was the first survey-based study regarding assessment of knowledge and perceptions of oral medicine specialists for integration of AI in oral medicine clinical practice in India. Almost 93.3% of academicians, 66.6% of academicians and clinicians and only 45.5% of clinicians were familiar with the term artificial intelligence i.e. AI. These results suggested that the basicawareness of artificial intelligence was quite high among all the groups of oral medicine specialists. Around 86% of academicians, 70% of academicians and clinicians and 54.5% of clinicians were aware about the concept of AI or its use in dentistry. Similar results were obtained in a study by Neena Gupta et al. [15] where 75.5% (148/196) respondents were aware regarding AI-driven healthcare applications and devices. Contrary to these, a survey-based study by Oh et al. [16] was conducted among Korean medical practitioners where out of 669 participants, only 6% were familiar with the concept of AI and 83.4% agreed that AI could be useful in the medical field. Lack of awareness about AI may be because of lack of sources, but as the availability of sources is increasing, gradual increase in awareness and knowledge about AI and its application could be noticed.

About 98.3% of academicians, 35.58% of academicians and clinicians, and 18.8% of

clinicians knew that AI can be used specifically in OMR clinical practice. The knowledge among academicians seemed to be highest because of exposure to Latest journals, articles and magazines.

In the present study, 96.6% of academicians, 50% of academicians and clinicians, and 27.2% of clinicians knew about Florence, WHO's first virtual health care worker. It uses AI to dispense myths around smoking and help people to develop personalized sequential plan to quit tobacco by setting a quit target date. [17,18] Humanistic approach with Cognitive Behavior Therapy (CBT) along with behavior activation is normally used by an OMR specialist to help such patients. [19] Major drawback of Florence is there are fixed number of questions programmed in it, there is no change in expression as it is the case with the living human beings and also, there isa lack of personalized interaction. [20]

Overall knowledge about use of AI in predicting occurrence rate of oral cancer, advancedtechniques used for early diagnosis of oral cancer, predicting survival rate of oral cancer patients, and anti-cancer drug development as well as treatment was found to be the highest among Group 1 98.8%, 93.3%, 94.4%, and 97.2% respectively compared to other groups. Artificial Intelligence-based systems predict oral cancer by analyzing large amounts of data, including images, clinical, pathological and genetic data [21, 22], whereas, Lab-on-a-chip minimizesdetection of biological molecule at the laboratory-scale down to a small chip. [23, 24] .Artificial Intelligence can accurately predict occurrence of oral cancer by analyzing predisposing factors such as age, gender, tobacco habits, and biomarkers. [25] A tool with the help of AI has been developed, which can be used for oral cancer survival prediction and medical decision-making.

[26] Artificial Intelligence has also made unique contributions in anticancer drug development and treatment. [27-29] This makes us believe that, AI will be a powerful driving force for humancancer research and treatment in nearby future.

Knowledge about successful role of AI in orofacial patients was found to be maximum amongst academicians covering almost 95% of total OMR specialists. A systematic review was conductedto explore outcomes of AI in diagnosing dental diseases, periodontal diseases, trauma and neuralgias, cysts and tumors, glandular disorders, and bone and temporomandibular joints as possible causes of orofacial pain. The study concluded that, knowledge of AI among orofacial healthcare professional has shown respectable results in diagnosing diseases with symptomatic pain. These improved future iterations can be used as a diagnostic aid in the clinics. [30] Role of AI in managing orofacial pain is still emerging and provides modest results in diagnosis.

Knowledge about use of AI in diagnosing TMD patients was found among 93.3%, 58.3% and 29% participants of group 1, 2 and 3 respectively Studies using AI have been conducted to develop a diagnostic tool to automatically detect Temporomandibular Joint Osteoarthritis (TMJOA) using Cone-beam Computed Tomography (CBCT) images [31], to investigate the clinical utility of an AI diagnostic tool developed for TMJOA diagnosis from OPG using deep learning [32], and to develop a deep learning-based algorithm to predict temporomandibular Joint (TMJ) disc perforation based on the findings of Magnetic Resonance Imaging (MRI) and validate its performance. [33] Results stated that, implementation of AI showed superior performance in predicting osteoarthritis using OPG and CBCT images and disc perforation ofTMJ, as compared to conventional methods and hence, can be used to support clinicians in diagnosis and decision-making for the treatment of TMD. In future, a model that incorporates additional data other than images, such as signs, symptoms, demographic data, and medical records of the patient would help in increasing diagnostic accuracy.

Almost 94.4% of total academicians knew that machine learning software of AI/AI software? helps in the diagnosis of medically/systemically compromised patients. There may be alterations in the oral cavity as a result of some of the systemic diseases or due to medication/treatment received for any such diseases. [34] Here comes the role of oral physicians in diagnosing presence of such underlying systemic conditions and providing advice on dental treatment to such patients. Support Vector Machine (SVM), a learning model of machine learning, has become a standard analytical method in medical research where various systemic and medical conditions and their types can be precisely diagnosed with the help of AI. [35, 36, 37& 38] In disease management, AI has been widely used for the analysis of treatment outcomes or to develop precision medicine. [39] Similarly, with the help of AI and its various innovative algorithms and models, a standard protocol can be developed to treat such medically /systemically compromised dental patients.

Urge to learn technique-sensitive software of artificial intelligence and to implement them further in a clinical practice was found to be highest among group 3, and almost 81.8% and 77.7% participants of group 1and 2. Negative Response to the question that will AI Substitutethe need for oral medicine specialists to diagnose of orofacial diseases was received from 94.4% and 83.3% participants of group 1 and 2 respectively. This is because, role of AI in OMR clinicalpractice is still emerging. Such technology is far from replacing clinicians in rendering healthcare and can possibly serve as an adjuvant to the existing diagnostic tools.

## LIMITATIONS

As this was an online survey, there were certain limitations of the study such as poor response rate, difficulty in judging the seriousness of the responses, and absence of potential participants lacking with internet skills. Response bias was also considered to be one of the limiting factors, as the participants respond mandatorily and not voluntarily in such surveys. Also, the sample sizeof the present study was small. A larger sample size could have reduced the effect of confounding factors. Hence, future studies can be conducted using one on one interview method and including additional parameters such as financial implications. Also, a study with a larger sample size including participants from all over the world needs to be carried out. Further studies are required to assess actual and detailed clinical performance of AI techniques in OMR field.

## CONCLUSION

Artificial Intelligence has the potential to revolutionize entire oral healthcare. The progressive development of AI in OMR clinical practice will definitely benefit clinicians and researchers to integrate different fields of knowledge and improve patient's orofacial care. In the upcoming days, learning and understanding ideas and techniques involved in AI will definitely be advantageous. Though AI systems are a great asset in OMR clinical practice, the human biological system is complex and it is to be noted that these technological advancements are still the brain child of innovations and discoveries by mankind. Also, it is essential to be aware about the potential errors in interpretation of data via AI programs. To minimize output errors, currently it seems logical to combine AI technology with the conventional methodologies. Artificial Intelligence technology is far from replacing OMR clinicians in rendering oral healthcare and can possibly serve as an "add-on". It also seems to increase the scope of state-of- the art models in OMR, but is still under development/but is still in a developmental phase.

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**MASTER CHART**

| Questions | Options | N | Mean | Standard Deviation | Standard Error | 95% of confidence Interval formean Lower bound | 95% of confidence Interval for mean Upper bound |
|---|---|---|---|---|---|---|---|
| 4. Are you familiar with the term of artificial intelligence (AI)? | a | 65 | 1.00 | .000 | .000 | 1.00 | 1.00 |
| | b | 68 | 1.00 | .000 | .000 | 1.00 | 1.00 |
| | c | 36 | 1.00 | .000 | .000 | 1.00 | 1.00 |
| | Total | 169 | 1 | 0 | 0 | 1 | 1 |
| 5. Do you have any idea about the concept of AI or its software use in dentistry? | a | 64 | 2.19 | .588 | .073 | 2.04 | 2.33 |
| | b | 67 | 1.99 | .564 | .69 | 1.85 | 2.12 |
| | c | 36 | 2.42 | .692 | .115 | 2.18 | 2.65 |
| | Total | 167 | 2.2 | .614 | .292 | 2.02 | 2.36 |
| 6. Do you have any idea of how AI can be incorporated in daily dental practice? | a | 63 | 2.16 | .827 | .104 | 1.95 | 2.37 |
| | b | 68 | 2.03 | .753 | .091 | 1.85 | 2.21 |
| | c | 36 | 1.94 | 1.013 | .169 | 1.60 | 2.29 |
| | Total | 167 | 2.04 | .864 | .121 | 1.8 | 2.29 |
| 7. What is your view; can AI be used specifically in oral medicine clinical practice? | a | 60 | 2.57 | .698 | .090 | 2.39 | 2.75 |
| | b | 66 | 2.68 | .683 | .084 | 2.51 | 2.85 |
| | c | 35 | 2.69 | .631 | .107 | 2.47 | 2.90 |
| | Total | 161 | 2.64 | .670 | .093 | 2.45 | 2.83 |
| 8. Do you know “Florence”, the first digitalperson launched by WHO, role in oral medicine clinical practice? | a | 62 | 2.05 | 1.093 | .139 | 1.77 | 2.33 |
| | b | 64 | 2.28 | 1.031 | .129 | 2.02 | 2.54 |
| | c | 36 | 1.94 | .924 | .154 | 1.63 | 2.26 |
| | Total | 162 | 2.09 | 1.016 | .140 | 1.80 | 2.37 |
| 9. Do you know, there are some advanced Intelligence-based systems and Lab-on-a-Chip (LOC) techniques available for earlydiagnosis of potentially malignant oral lesions/conditions? | a | 64 | 2.66 | .541 | .068 | 2.52 | 2.79 |
| | b | 68 | 2.65 | .567 | .069 | 2.51 | 2.78 |
| | c | 36 | 2.83 | .378 | .063 | 2.71 | 2.96 |
| | Total | 168 | 2.71 | .495 | .066 | 2.58 | 2.84 |
| 10. Do you know, AI has software which can predict occurrence rate of oral cancer inan | a | 65 | 2.28 | 1.231 | .153 | 1.97 | 2.58 |
| | b | 65 | 1.98 | 1.179 | .146 | 1.69 | 2.28 |
| | c | 36 | 2.36 | 1.334 | .222 | 1.91 | 2.81 |
| | Total | 166 | 1.10 | 1.248 | .173 | 1.85 | 2.55 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| individual by analysis of related predisposing factors? | | | | | | | |
| 11. Do you know, with the help of AI tool, survival rate of an oral cancer patient can bepredicted? | a | 62 | 2.16 | 1.269 | .165 | 1.83 | 2.49 |
| | b | 67 | 2.28 | 1.241 | .152 | 1.83 | 2.49 |
| | c | 36 | 2.56 | 1.297 | .216 | 2.12 | 2.99 |
| | Total | 165 | 2.33 | 1.269 | .177 | 1.92 | 2.65 |
| 12. Do you know, AI has contributed in anti-cancer drug development & treatment? | a | 62 | 1.60 | .819 | .104 | 1.39 | 1.80 |
| | b | 65 | 2.20 | 1.064 | .132 | 1.94 | 2.46 |
| | c | 35 | 1.60 | .914 | .154 | 1.29 | 1.91 |
| | Total | 162 | 1.8 | .932 | .13 | 1.54 | 2.05 |
| 13. Do you know, AI has shown remarkable success in diagnosing orofacial pain patients? | a | 65 | 1.37 | .651 | .081 | 1.21 | 1.53 |
| | b | 66 | 1.64 | .757 | .093 | 1.45 | 1.82 |
| | c | 36 | 1.47 | .845 | .141 | 1.19 | 1.76 |
| | Total | 167 | 1.49 | .751 | .221 | 1.28 | 1.70 |
| 14. Do you know AI software help's in diagnosis/treatment of TMD Patients? | a | 64 | 3.19 | 1.037 | .130 | 2.93 | 3.45 |
| | b | 67 | 2.88 | .993 | .121 | 2.64 | 3.12 |
| | c | 36 | 2.56 | 1.157 | .193 | 2.16 | 2.95 |
| | Total | 167 | 2.87 | 1.062 | .148 | 2.57 | 3.17 |
| 15. Do you know machine learning softwareof AI helps in diagnosis of medically/systemically compromised patients and it is said that it will be holding a promising role in dental management of such patients? | a | 63 | 2.75 | .782 | .099 | 2.55 | 2.94 |
| | b | 66 | 2.65 | .850 | .105 | 2.44 | 2.86 |
| | c | 35 | 2.57 | .917 | .155 | 2.26 | 2.89 |
| | Total | 164 | 2.65 | .849 | .119 | 2.41 | 2.89 |
| 2 | a | 65 | 2.72 | 1.179 | .146 | 2.43 | 3.02 |
| | b | 68 | 2.21 | 1.216 | .147 | 1.91 | 2.50 |
| | c | 36 | 2.03 | 1.253 | .209 | 1.60 | 2.45 |
| | Total | 169 | 2.32 | 1.216 | .167 | 1.98 | 2.65 |
| 17. Will you adapt software's of artificial intelligence, in your day to day clinical practice? | a | 63 | 2.75 | 1.218 | .153 | 2.44 | 3.05 |
| | b | 66 | 2.61 | .909 | .112 | 2.38 | 2.83 |
| | c | 35 | 2.86 | .845 | .143 | 2.57 | 3.15 |
| | Total | 164 | 2.74 | .990 | .136 | 2.46 | 3.01 |
| 18. Will AI Substitute the need for oral medicine specialist for diagnosis of orofacial diseases? | a | 62 | 2.13 | .983 | .125 | 1.88 | 2.38 |
| | b | 63 | 2.24 | 1.174 | .148 | 1.94 | 2.53 |
| | c | 34 | 1.71 | .906 | .155 | 1.39 | 2.02 |
| | Total | 159 | 2.02 | 1.021 | .142 | 1.73 | 2.31 |