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ARTIFICIAL INTELLIGENCE PERCEPTION AND UTILIZATION IN PROSTHODONTICS

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Abstract:
Background: The incorporation of Artificial Intelligence (AI) in dentistry has emerged as a significant advancement, particularly in prosthodontics, enhancing both efficiency and accuracy in clinical work. Existing studies highlight a growing body of evidence regarding AI's positive impact on dental workflows, yet a comprehensive understanding of its perception and utilization among dental professionals remains underexplored. This study aimed to assess the perception and practical application of AI among dental practitioners, students, and technicians in prosthodontics.
Methods: A cross-sectional online questionnaire survey was conducted from July to November 2024, involving a structured questionnaire distributed via social media platforms. A convenience sampling method was used to recruit participants, including dental interns, students, specialists, and lab technicians.
Results: A total of 1,006 participants completed the survey. The demographic analysis indicated a predominantly young group, with 31.9% aged 23 or younger and 49.3% between 24 and 26 years old. Although 40.4% reported previous AI usage in dental practice, a majority (59.6%) had not, suggesting a gap in experience. Notably, 85.6% expressed a desire to integrate AI into their work. Awareness of AI applications was high, with 65.6% knowledgeable about its role in dentistry, yet 59.0% had not engaged in AI-related professional training. Statistical analysis revealed significant correlations between AI usage and factors such as gender, education level, years of practice, and geographical region.
Conclusion: The findings indicate a positive perception and interest in AI within prosthodontics, juxtaposed with limited practical application and training. There exists a critical opportunity for dental education institutions to enhance AI integration into curricula, addressing knowledge gaps and fostering competency in emerging technologies. Emphasizing AI's benefits in prosthodontics can significantly elevate the quality of care and professional development among dental practitioners.

Keywords: Artificial intelligence (AI), Prosthodontics, Dentistry, Technologies.

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Introduction:

Artificial intelligence (AI) is a technology that utilizes machines to mimic human behavior, its assistive role in dental professionals. [1]. Artificial Intelligence (AI) is a significant advancement in science and technology, learning and adapting to external data to achieve specific goals and tasks [2]. This approach eliminates the time-consuming procedure of traditional casting, as well as the risk of human inadvertent in the finished prosthesis [3]. AI and design technologies can help dentists create aesthetically pleasing prostheses based on patient preferences and facial measurements [4]. McCarthy, an arithmetic teacher, coined the word "AI" in 1955 [5].Modern artificial intelligence (AI) had its start in 1956, but it wasn't made available until the 21st century [6]. Machine learning, a subfield of artificial intelligence, was first presented by Arthur Samuel in 1959 [7].

Several studies internationally revealed that Al has a positive impact on their profession or their workflow in dentistry and there is increasing of applications in prosthodontics. A cross-sectional exploratory study of dentists, professors, and dental students who practice and study dentistry was carried out in the United Arab Emirates in 2023. One hundred thirty-four people, about 78% of the invited group, completed the poll, according to the results. It demonstrates the enthusiasm for putting artificial intelligence to use in the real world mixed with intermediate to advanced expertise and a dearth of educational and training opportunities. Because of this, organizations needed to make sure they were ready to incorporate AI [8]. On the other hand, 200 dental students who satisfied the inclusion requirements were polled online in the Lima, Peru Metropolitan area in 2023. Descriptive statistical metrics, such as absolute and relative frequencies, were produced for the qualitative variables.86% of the students polled agreed, according to the data, that artificial intelligence will significantly enhance dentistry. Forty-five percent of interviewees disagreed that dentists will eventually be replaced by artificial intelligence. Furthermore, 67% and 72% of respondents were in favor, respectively, that the application of artificial intelligence should be included in undergraduate and graduate programs. 86% of the students, based on their attitudes and beliefs, thought that artificial intelligence would greatly benefit the field of dentistry. This indicates that the interaction between dentists and artificial intelligence has a promising future [9]. However, methodological research that used the most recent scientific results in 2023 investigated the application of AI in prosthodontics. ANOVA was used to statistically assess the results. 172 studies on AI and dentistry were found through titles and abstracts; these were examined in this study. There were thirty-eight papers removed. The assessment states that the application of AI in prosthodontics is growing and improving patient rehabilitation led by prosthodontics. AI is useful in prosthodontics—removable, fixed, maxillofacial, and implant. The application of AI improves prosthodontic treatment acceptability and functionality while lowering the possibility of human mistakes. It was also discovered that artificial intelligence helps prosthodontic implants the most [10]. In 2023, another systematic review investigation was carried out. Thirty-six publications were examined and categorized into six groups according to how the artificial intelligence model was used. One AI model for tooth shade selection produced better shade matching than traditional visual selection techniques, according to the analyzed research; 14 research examined the viability of employing various AI models to automatically design dental restorations; One AI model that was evaluated had an accuracy of 90.6% to 97.4% on average when it came to finding the margin line without the need for human intervention; Four research produced artificial intelligence (AI) algorithms that enhanced the casting production process; one AI model predicted changes in patients' faces who wore detachable prosthesis; and seventeen studies showed that AI applications might be used to design RPDs [11]. Eventually, AI integration will be improved in practice by making an effort to guarantee professional and student readiness. Furthermore, to bridge the knowledge gap, dental professional

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groups and academic institutions need to work together to create appropriate dental education programs. This article is distinctive as it is highly focused on the topic of prosthetic dentistry within the field of dentistry. It closes a gap in the literature by providing an outline of prosthetic dentistry, which is currently lacking in a lot of literature. Reviews on the application of AI in dentistry, oral medicine, and endodontics are already abundant. This article closes this gap by outlining the application of AI in dentistry, particularly in prosthetic dentistry, and enhancing its value. The study aimed to determine the perception of artificial intelligence and its utilization in prosthodontics.

Methodology

Study design and Setting

The online cross-sectional questionnaire survey was conducted from July to November 2024, based on a structured questionnaire that was developed by the authors.

Study setting: participants, recruitment, and sampling procedure:

A convenience sample approach was used to find study participants. The invitations were sent out via a Google Form survey that was posted on a variety of social media sites, such as Facebook, Instagram, WhatsApp, Telegram, and X. They were sent to student organizations and a dental intern and a dentist at various dental clinics, hospitals, and universities, dental lab technicians.

Sample size

To determine the bare minimum of responders required to constitute a representative sample for the entire population, sample size calculations were made. The Raosoft sample size calculator was used to calculate the sample size. Data collection started in July 2024. A target sample of 384 patients was used for data collection (confidence level: 95%; margin of error: 5%). With a 95% confidence level, the sample size was calculated using the formula: n = P(1-P) * Zα 2 / d 2.
n: Sample size calculation.
n = P(1-P) * Zα 2 / d 2 with a 95% confidence level.
n: Calculated sample size.
Z: The z-value for the selected level of confidence (1- a) = 1.96.
P: An estimated prevalence of knowledge.
Q: (1 – 0.50) = 50%, i.e., 0.50.
D: The maximum acceptable error = 0.05.
Therefore, the calculated minimum sample size was: n = (1.96)2 X 0.50 X 0.50/ (0.05) 2 = 384.

Inclusion and Exclusion Criteria

The inclusion criteria were dental interns, dental students, dental specialists, dental lab technicians, or dentists who work or study at the moment. The study excluded all patients and respondents who failed to sign the informed consent form. Before any questions could be answered, informed consent, which contained information about every aspect of the study, had to be accepted.

Method for data collection and instrument (Data collection Technique and Tools)

A structured survey was employed as a research tool. This instrument was developed after analyzing pertinent research from Saudi Arabia and other countries. The final version of the questionnaire comprised 34 questions, which were classified into three sections. Section one gathered socio-demographic data. The second section contained questions related to the utilization of AI among dental

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practitioners. [12–14]. The third section focused on questions regarding the Perception and practice of using AI in prosthodontics. [13–15]. The data was collected from participants' responses to an online survey.

Pilot test

Twenty respondents were provided with the questionnaire and asked to answer all of it. This was done to evaluate the study's profitability and the ease of use of the questionnaire. The pilot study's results were not included in the study's final analysis Analyses and entry method.

Analyzes and entry method

Data was entered on a computer using the "Microsoft Office Excel Software" (2016 for Windows). Data was analyzed using IBM SPSS Statistics for Windows, Version 25 (Armonk, NY: IBM Corp.).

Results:

Table (1) displays various demographic parameters of the participants with a total number of (1006). Notably, the age distribution indicates a predominance of younger individuals, with a substantial 31.9% aged 23 or younger and a significant portion (49.3%) between the ages of 24 and 26. This suggests a relatively youthful demographic within the field, potentially offering insights into the evolving practices and perspectives of emerging dental professionals. Gender representation shows a slight male predominance at 53.1%, which may warrant further investigation into gender dynamics within dental education and practice. The educational background reveals that nearly half of the respondents are dental students, emphasizing the importance of incorporating their perspectives in future studies. Furthermore, the duration of practice indicates that a notable majority, 75.9%, have been practicing for five years or less, highlighting a potential gap in experience that could affect patient care and professional development. The distribution across various residential regions also underscores the regional diversity, particularly the high concentration of participants from the Southern region (49.5%), which could influence regional practices and education.

Table (1): Sociodemographic characteristics of participants (n=1006)

Parameter		***No.***	***Percent (%)***
Age ***(Mean: 25.6, STD: 4.7)***	23 or less	321	31.9
	24 years old	189	18.8
	25 to 26	232	23.1
	27 or more	264	26.2
Gender	Female	472	46.9
	Male	534	53.1
Level of education	Dental students	456	45.3
	Dental intern	184	18.3
	Dentists	266	26.4
	Dental lab technicians	12	1.2
	Dental specialists	88	8.7
Duration of dentistry practice	0-5 years	764	75.9
	6-10 years	160	15.9

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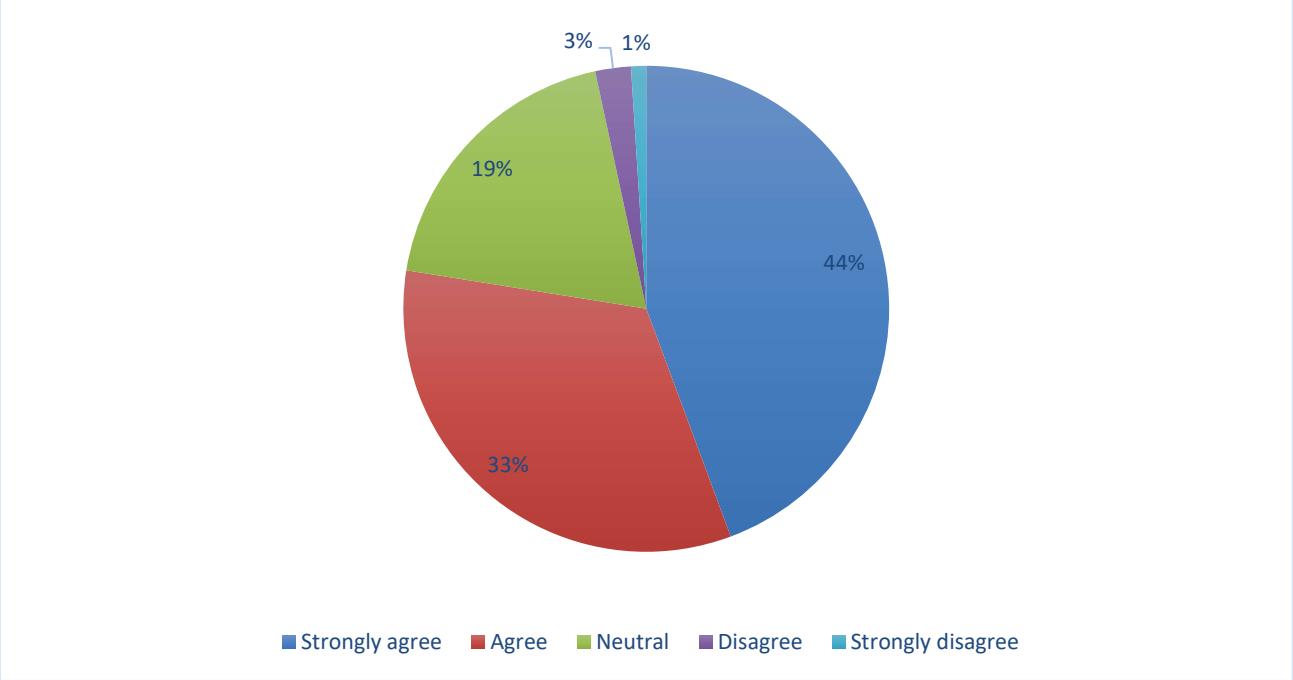
	11-15 years	66	6.6
	More than 16 years	16	1.6
Residential area	Northern region	56	5.6
	Southern region	498	49.5
	Center region	154	15.3
	Eastern region	92	9.1
	Western region	206	20.5

As shown in figure 1, The provided data highlights a significant consensus regarding the enhanced efficiency of patient care through the utilization of artificial intelligence (AI) in prosthodontics. Notably, a substantial 446 respondents, representing approximately 50.7% of the total, strongly agree with this assertion, while an additional 334 individuals, or roughly 38.6%, express their agreement, cumulatively indicating that about 89.3% of participants are in favor of AI's impact on improving patient care in this field. Conversely, the neutral responses encompass 192 individuals, accounting for about 22.2% of the total respondents, suggesting some level of ambivalence or lack of exposure to AI applications in their practice. In contrast, dissenting opinions are minimal, with only 24 individuals (2.8%) disagreeing and a mere 10 (1.2%) strongly disagreeing.

Figure (1): Illustrates the effect of AI in prosthodontics on patient care according to participants.



As illustrated in table (2), The data provides meaningful insights into the utilization of artificial intelligence (AI) in the field of prosthodontics among a sample of 1,006 respondents. Notably, 59.6% of participants reported that they have not previously used AI in dentistry, while a substantial 40.4% acknowledged prior experiences with AI, indicating a growing interest in integrating technology into dental practices. Interestingly, a significant majority (85.6%) expressed a desire to utilize AI in their dental work, emphasizing a positive outlook towards technological advancements. However, when questioned about their understanding of AI principles, the responses were relatively balanced; 55.5%

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confirmed having basic knowledge, whereas 44.5% did not. When examining the practical application of AI, 56.1% of professionals indicated they have not used AI in their prosthodontic clinics. Among those who did, the frequency of use varied, with 13.5% stating they use it always, while 18.5% use it sometimes. A resounding 85.3% of respondents recognized the importance of AI in prosthodontics, and 86.7% believed it could be beneficial in fabricating various prosthodontic solutions, such as dentures and implants. The perception of AI's efficiency in enhancing patient care was high, with 44.3% strongly agreeing with this assertion. Furthermore, 47.1% believe that AI will bring significant advancements to the fields of dentistry and medicine. However, concerns remain regarding its implications for patient privacy, with 19.5% and 19.7% strongly agreeing or agreeing that AI could violate this aspect. The overall enthusiasm for AI in dental training is evident, with 43.3% advocating for its inclusion in undergraduate programs, suggesting a future-oriented approach aimed at fostering familiarity and competence with AI tools among upcoming dental professionals.

Table (2): Parameters related to utilization of AI in prosthodontics (n=1006).

Parameter		***No.***	***Percent (%)***
You used AI in dentistry before.	No	600	59.6
	Yes	406	40.4
You are interested in using AI in dentistry	No	145	14.4
	Yes	861	85.6
You have basic knowledge about the working principles of AI	No	448	44.5
	Yes	558	55.5
You used AI in your prosthodontic clinic	No	564	56.1
	Yes	442	43.9
If yes, how many times did you use it?	Always	136	13.5
	Sometimes	186	18.5
	Rarely	120	11.9
	I didn't use AI	564	56.1
AI is important in prosthodontics	No	148	14.7
	Yes	858	85.3
You think that AI can be used in fabricated prosthodontics in dentistry, such as complete dentures, RPD, crowns, bridges, and implants	No	134	13.3
	Yes	872	86.7
The use of AI in prosthodontics enhances the efficiency of patient care	Strongly agree	446	44.3
	Agree	334	33.2
	Neutral	192	19.1
	Disagree	24	2.4
	Strongly disagree	10	1.0
You perceive the accuracy of AI in prosthodontics about	0.00%	6	.6
	25.00%	36	3.6
	50.00%	164	16.3
	75.00%	428	42.5
	100.00%	372	37.0
You think AI consumes time	No	558	55.5
	Yes	448	44.5

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You heard about the use of AI in prosthodontics in *	A- (social media like (X, Instagram, Snapchat).	676	67.2
	B- (Lecture at university, conference, continuing education.)	520	51.7
	C- (Family, Friends)	222	22.1
	D-(TV)	94	9.3
	E- (Newspaper or magazines)	70	6.9
	F- I have not gotten any information about AI from any sources.	100	9.9
AI influences patients' outcomes	Strongly agree	356	35.4
	Agree	366	36.4
	Neutral	210	20.9
	Disagree	48	4.8
	Strongly disagree	26	2.6
You think AI will lead to major advances in dentistry and medicine	Strongly agree	474	47.1
	Agree	338	33.6
	Neutral	146	14.5
	Disagree	34	3.4
	Strongly disagree	14	1.4
You think that the use of artificial intelligence in dentistry and medicine will lead to bad practices	Strongly agree	215	21.4
	Agree	202	20.1
	Neutral	284	28.2
	Disagree	215	21.4
	Strongly disagree	90	8.9
AI should be a part of undergraduate dental training	Strongly agree	436	43.3
	Agree	312	31.0
	Neutral	210	20.9
	Disagree	24	2.4
	Strongly disagree	24	2.4
You think AI applications should be a part of postgraduate dental training	Strongly agree	446	44.3
	Agree	344	34.2
	Neutral	166	16.5
	Disagree	40	4.0
	Strongly disagree	10	1.0
AI could replace the dentist or physician in the future	Strongly agree	186	18.5
	Agree	170	16.9
	Neutral	230	22.9
	Disagree	184	18.3
	Strongly disagree	236	23.5
You think AI is difficult to learn	Strongly agree	144	14.3
	Agree	180	17.9

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	Neutral	362	36.0
	Disagree	238	23.7
	Strongly disagree	82	8.2
You think AI doesn't have direct relevance to dental work (especially in prosthodontics)	Strongly agree	176	17.5
	Agree	216	21.5
	Neutral	298	29.6
	Disagree	214	21.3
	Strongly disagree	102	10.1
You think AI can violate the patient's privacy	Strongly agree	196	19.5
	Agree	198	19.7
	Neutral	258	25.6
	Disagree	214	21.3
	Strongly disagree	140	13.9

Results may overlap

As shown in figure (2), Based on the provided data regarding the recommendation for treatment with artificial intelligence (AI) in prosthodontics, it is evident that a notable majority of respondents support the integration of AI into this specialized field. Specifically, 670 individuals, representing approximately 62.7% of the total responses, advocated for the use of AI in prosthodontic treatment. In contrast, a smaller group of 84 respondents, equating to around 7.9%, expressed opposition to such technological advancements, suggesting potential concerns or a lack of familiarity with AI applications within this domain. Furthermore, a significant portion of the respondents, numbering 252, or about 23.4%, indicated uncertainty regarding the use of AI.

Figure (2): Illustrates whether participants would recommend treating with the help of AI in prosthodontics.

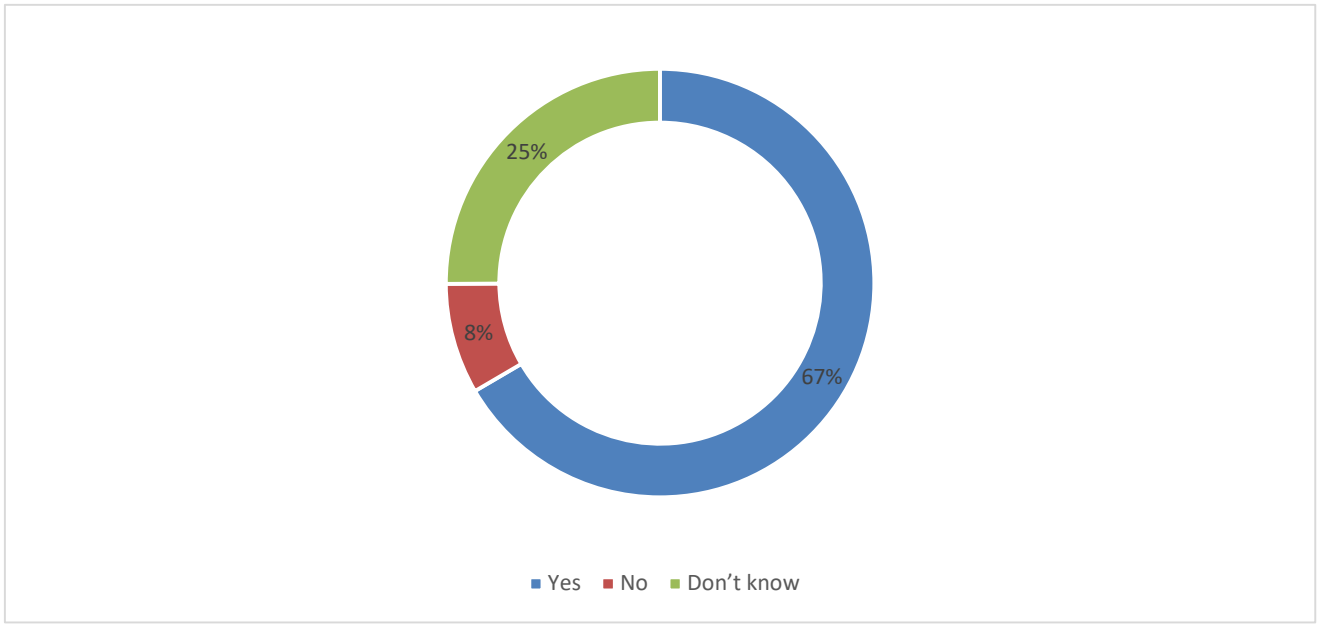

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Table (3) reveals intriguing insights into participants' perceptions of artificial intelligence (AI) in the field of prosthodontics, composed of a substantial sample size of 1,006 individuals. Notably, awareness of AI's applications in dentistry and medicine is markedly high, with 65.6% of respondents affirming their knowledge, while only 34.4% remain unaware. Despite this awareness, a significant portion, specifically 59.0%, have not engaged in professional courses related to AI in dentistry, highlighting a potential gap in training and education on this innovative technology. When it comes to practical utilization, 60.8% of participants have never used AI software or applications in their clinical practice, leaving 39.2% who have utilized such tools. Among those who reported usage, Exocad (25.4%) and 3Shape (18.3%) are the most commonly referenced software. The acceptance of AI in treatment recommendations is robust, with 66.6% expressing willingness to recommend AI-assisted treatment in prosthodontics. Furthermore, 60.8% would prefer AI treatment for themselves, underscoring a strong inclination towards integrating AI into patient care. A commendable 71.8% showed interest in training within AI simulation labs, while an impressive 72.2% believe in AI's role in assisting diagnoses and treatment planning, indicating a positive outlook on the future integration of AI in prosthodontics.

Table (3): participants' perception of AI in prosthodontics (n=1006).

Parameter		***No.***	***Percent (%)***
Are you aware of the using of AI in dentistry and medicine?	No	346	34.4
	Yes	660	65.6
Have you taken any professional courses about AI related to dentistry (especially in prosthodontics)?	No	594	59.0
	Yes	412	41.0
Have you ever used AI software or applications in dentistry?	No	612	60.8
	Yes	394	39.2
If yes, what's the name of the software or the application? *	A-(Exocad)	256	25.4
	B- (3shape)	184	18.3
	C- (blue sky bio)	144	14.3
	D- (dental wings)	80	7.9
	Other	254	25.2
Would you recommend treatment with AI in prosthodontics?	Yes	670	66.6
	No	84	8.3
	Don't know	252	25.0
Would you prefer treatment done with AI in prosthodontics on yourself, if needed?	Yes	612	60.8
	No	142	14.1
	Don't know	252	25.0
Would you prefer to work in an AI simulation lab for training crowns, bridges, etc.?	Yes	722	71.8
	No	90	8.9
	Don't know	194	19.3
Do you think AI is used to assist with patients' diagnosis and the development of an integrated treatment plan in prosthodontics?	Yes	726	72.2
	No	108	10.7
	Don't know	172	17.1

***Results may overlap**

Table (4) shows that participants using AI in their prosthodontics clinic has statistically significant

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relation to gender (P value=0.0001), level of education (P value=0.0001), years of practice (P value=0.0001), and residential region (P value=0.0001). It also shows statistically insignificant relation to age.

Table (4): Relation between participants using AI in their prosthodontics clinic and sociodemographic characteristics.

Parameters		***Have you ever used the AI in your prosthodontics clinic?***		***Total (N=1006)***	***P value****
		No	Yes		
Gender	Female	294	178	472	0.0001
		52.1%	40.3%	46.9%	
	Male	270	264	534	
		47.9%	59.7%	53.1%	
Age	23 or less	174	147	321	0.092
		30.9%	33.3%	31.9%	
	24 years old	106	83	189	
		18.8%	18.8%	18.8%	
	25 to 26	146	86	232	
		25.9%	19.5%	23.1%	
	27 or more	138	126	264	
		24.5%	28.5%	26.2%	
Level of education	Dental students	276	180	456	0.0001
		48.9%	40.7%	45.3%	
	Dental intern	66	118	184	
		11.7%	26.7%	18.3%	
	Dentists	198	68	266	
		35.1%	15.4%	26.4%	
	Dental lab technicians	6	6	12	
		1.1%	1.4%	1.2%	
	Dental specialists	18	70	88	
		3.2%	15.8%	8.7%	
Years of practice	(0-5)	488	276	764	0.0001
		86.5%	62.4%	75.9%	
	(6-10)	64	96	160	
		11.3%	21.7%	15.9%	
	(11-15)	10	56	66	
		1.8%	12.7%	6.6%	
	More than 16	2	14	16	
		0.4%	3.2%	1.6%	
Residential area	Northern region	28	28	56	0.0001
		5.0%	6.3%	5.6%	
	Southern region	280	218	498	
		49.6%	49.3%	49.5%	

ISSN:1624-1940
http://magellanes.com/

	Center region	70	84	154	
		12.4%	19.0%	15.3%	
	Eastern region	38	54	92	
		6.7%	12.2%	9.1%	
	Western region	148	58	206	
		26.2%	13.1%	20.5%	

P value was considered significant if ≤ 0.05.

Table (5) shows that participants' awareness of AI usage in dentistry and medicine has statistically significant relation to age (P value=0.002), level of education (P value=0.001), years of practice (P value=0.035), and residential region (P value=0.003). It also shows statistically insignificant relation to gender.

Table (5): Participants' awareness of AI usage in dentistry and medicine in association with sociodemographic characteristics.

Parameters		***Are you aware of the using of AI in dentistry and medicine?***		***Total (N=1006)***	***P value****
		No	Yes		
Gender	Female	170	302	472	0.308
		49.1%	45.8%	46.9%	
	Male	176	358	534	
		50.9%	54.2%	53.1%	
Age	23 or less	98	223	321	0.002
		28.3%	33.8%	31.9%	
	24 years old	52	137	189	
		15.0%	20.8%	18.8%	
	25 to 26	82	150	232	
		23.7%	22.7%	23.1%	
	27 or more	114	150	264	
		32.9%	22.7%	26.2%	
Level of education	Dental students	146	310	456	0.001
		42.2%	47.0%	45.3%	
	Dental intern	52	132	184	
		15.0%	20.0%	18.3%	
	Dentists	114	152	266	
		32.9%	23.0%	26.4%	
	Dental lab technicians	8	4	12	
		2.3%	0.6%	1.2%	
	Dental specialists	26	62	88	
		7.5%	9.4%	8.7%	
Years of practice	(0-5)	268	496	764	0.035
		77.5%	75.2%	75.9%	
	(6-10)	56	104	160	
		16.2%	15.8%	15.9%	

ISSN:1624-1940
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	(11-15)	22	44	66	
		6.4%	6.7%	6.6%	
	More than 16	0	16	16	
		0.0%	2.4%	1.6%	
Residential area	Northern region	20	36	56	0.003
		5.8%	5.5%	5.6%	
	Southern region	150	348	498	
		43.4%	52.7%	49.5%	
	Center region	54	100	154	
		15.6%	15.2%	15.3%	
	Eastern region	28	64	92	
		8.1%	9.7%	9.1%	
	Western region	94	112	206	
		27.2%	17.0%	20.5%	

P value was considered significant if ≤ 0.05.

Discussion:

Prosthodontics is a specialized area of dentistry that embodies both artistic and scientific principles. It involves the processes of diagnosing, planning, rehabilitating, and maintaining the functionality, comfort, aesthetics, and health of patients' oral structures affected by the absence or inadequacy of teeth and oral and maxillofacial tissues. This field primarily achieves its goals by replacing lost teeth and related structures with artificial alternatives [16]. The scope of prosthodontics encompasses the treatment and creation of both removable and fixed dental prostheses, as well as the preparation of finishing margins on teeth to enhance the fit and extension of crowns, conduct implant surgeries, and produce maxillofacial prostheses. Additionally, it plays a crucial role in establishing and preserving the relationship between the upper and lower jaws to ensure the stability of the prosthesis [17].

Artificial intelligence can significantly assist in various therapeutic approaches. Prosthodontics, the discipline focused on dental prostheses, is a vital area that impacts numerous aspects of a dentist's career [18]. Innovations in digital dentistry have greatly benefited prosthodontics, resulting in remarkable advancements in material science, diagnostic methods, treatment planning, and the fabrication of prostheses. Several elements influence the production of dental prostheses [19].

The rise of AI in prosthodontics mirrors this trend, with a recent and significant increase in literature on AI applications in the field, accounting for 94% of publications over a condensed five-year timeframe. However, despite this recent growth in AI-related prosthodontics literature, there is still a considerable lack of comprehensive understanding regarding the assessment and evaluation of AI applications within the discipline [20]. Therefore, the objective of this study was to explore perceptions of artificial intelligence and its applications in prosthodontics.

Our study provides important insights into the perceptions and utilization of artificial intelligence (AI) within the field of prosthodontics, with focus on both interest levels and gaps in actual experience among dental professionals. A survey of 1,006 respondents revealed that while a significant 40.4% had utilized AI technologies in dentistry, a substantial majority (59.6%) had not engaged with these tools, highlighting an area for potential growth and education. Notably, there exists a pronounced enthusiasm for embracing AI, with 85.6% of respondents expressing an interest in incorporating AI into their clinical practice. This enthusiasm aligns with findings from Hui Jeong et al. [21], which noted that a majority of dental students (60.8%) and practitioners (67.7%) believe that AI can enhance human

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capabilities in dentistry. Furthermore, our study identified that basic knowledge of AI principles was moderately widespread, with 55.5% of participants claiming a fundamental understanding, echoing Nishi Singh et al. [22], where 51.3% of respondents reported having basic knowledge of AI in dentistry. The acknowledgment of AI's potential impact was further underscored in our results, where 85.3% recognized the importance of AI in prosthodontics, drawing parallels to the 71.3% of respondents in Singh's study who viewed AI as a viable "treatment planning tool."

Despite the strong interest in AI, our findings indicated that practical application remains limited, as 56.1% of surveyed respondents had not implemented AI within their clinics, a concern mirrored in Nishi Singh et al.'s results, which highlighted that 59.6% perceived AI as a valuable diagnostic tool but did not necessarily integrate these applications into their practices. Concerns surrounding patient privacy were also apparent, although only a small fraction voiced apprehensions. Our study's observation that 66.6% of participants would recommend AI-assisted treatments parallels findings from Sur J et al. [23] and Hamad Z et al. [24], who reported similar familiarity and awareness levels concerning AI applications among dental practitioners, further reinforcing the notion that while there is awareness, actual usage remains underdeveloped. Moreover, it is noteworthy that 60.8% of respondents in our study would prefer AI-enhanced care for themselves, reflecting a readiness to embrace technology that is consistent with the sentiments expressed by Rohan Sachdev et al. [25], where medical students demonstrated a strong inclination towards integrating AI in medical education. The study also revealed that demographic factors such as gender, educational background, years of practice, and regional differences significantly influenced AI utilization, while age did not exhibit a meaningful association. Such findings emphasize the necessity of targeted educational initiatives to bridge gaps in AI knowledge and use across diverse practitioner demographics. overall, our study illuminates a pivotal opportunity for dental education and practice, highlighting a clear demand for training programs that can effectively integrate AI technologies and address existing knowledge gaps, a sentiment reinforced by the comprehensive overview provided by Patel and Punwani (2019), which illustrates the advancing applications of AI in cosmetic dentistry. The overarching trends and data from our study, in conjunction with existing literature, present a compelling case for the active incorporation of AI in dental education, enhancing the quality and efficiency of care in prosthodontics and beyond.

Conclusion:

In conclusion, this study highlights a significant gap between the enthusiastic perception of artificial intelligence (AI) and its actual utilization in prosthodontics among dental professionals in the United Arab Emirates. Despite a striking 85.6% of participants expressing interest in integrating AI into their practices, only 40.4% reported prior experience with AI technologies, and 56.1% had not utilized any AI applications in their clinics. The findings indicate a moderate understanding of AI principles, reinforcing the need for enhanced educational initiatives tailored to dental practitioners. Notably, demographic factors, such as level of education and years of practice, influenced AI usage, suggesting targeted strategies may be required to foster broader AI adoption across varying professional backgrounds. Importantly, the overwhelming recognition of AI's potential to improve patient care underlines the urgency for dental curricula to adapt and incorporate AI training. These insights call for a concerted effort to bridge the knowledge gap and harness AI's capabilities in prosthodontics effectively.

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Ethical approval

An informed consent was obtained from each participant after explaining the study in full and clarifying that participation is voluntary. Data collected were securely saved and used for research purposes only.

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Conflict of interests

The authors declare no conflict of interest.

Informed consent:

Written informed consent was acquired from each individual study participant.

Data and materials availability

All data associated with this study are present in the paper.

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