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KNOWLEDGE AND ATTITUDE REGARDING DENTIN-DISINFECTION CHEMICALS AMONG DENTAL STUDENTS, INTERNS, AND DENTISTS IN SAUDI ARABIA

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Abstract:

Background: Bacteria in restorations can lead to secondary caries and pulpal pathology, prompting chemical antibacterial agents to disinfect the tooth structure before restorative procedures. Long-term success is significantly influenced by bacterial remnants in cavity walls. Microleakage causes dormant bacteria to multiply nutrients, leading to postoperative sensitivity, recurrent cavities, and pulpal irritation, ultimately causing restoration failure. The study aimed to assess Knowledge and attitude regarding Dentin-disinfection chemicals among Dental students, interns, and dentists in Saudi Arabia.
Methods: This cross-sectional study was conducted using an online questionnaire among dental students, interns, and dentists in the KSA population. A structured questionnaire was employed as a study tool. This tool was developed after consulting relevant studies conducted in Saudi Arabia, the questionnaire consisted of 19 questions.

Results: Regarding the knowledge and attitudes about dentin-disinfection chemicals among 1,012 dental students, interns, and dentists, we have found significant gaps in understanding. While a notable awareness of chlorhexidine (CHX) and sodium hypochlorite (NaOCl) was present, with 38.1% and 53.0% recognizing their specific concentrations, respectively, only 36.8% demonstrated a high overall awareness of these chemicals. Concerns were raised about NaOCl's adverse effects, and while 69% used these chemicals in practice, more than 49% showed little interest in attending related educational lectures. Despite some respondents recognizing a need for improved education, 73.7% exhibited low knowledge levels, which correlates with a significant proportion (37.9%) showing a low attitude towards the efficacy and safety of these agents.
Conclusion: In conclusion, this study reveals considerable gaps in knowledge and attitudes concerning dentin-disinfection chemicals among Saudi dental students, interns, and practitioners. With a significant proportion demonstrating low knowledge and attitude. Focused educational interventions are critical to optimizing clinical practices and improving long-term patient results in restorative dentistry.

Keywords: Dentin-disinfection, Antibacterial, Cavity-disinfection.

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Introduction:
Restorative treatment aims to restore the cavity after caries are removed and regain mastication function. Traditional cavity preparation principles have been replaced by conservative approaches that focus on soft and denatured dentine. Visual caries detection, based on dentine color and hardness, is insufficient for objective evaluation as it doesn't provide information about the cavity's bacterial status [1]. Long-term success is significantly influenced by bacterial remnants in cavity walls. Microleakage causes dormant bacteria to multiply nutrients, leading to postoperative sensitivity, recurrent cavities, and pulpal irritation, ultimately causing restoration failure [2]. Modern adhesive dentistry focuses on enhancing restoration durability and marginal adaptation, using resin composite filling techniques to establish a durable bond between tooth structure and filling material [3]. The self-etch adhesive protocol requires disinfection of the prepared dentin surface, as incomplete removal of the bacteria-embedded smear layer can occur without proper irrigation. Various antimicrobial agents, such as CHX, sodium hypochlorite, iodine, and EDTA, are used for this purpose [4].
In the 1970s, Brännström and Nyborg highlighted the importance of using antimicrobial agents to eliminate bacteria on cavity walls, including dentin and enamel, after caries excavation [5]. Effective removal of infected dentin is crucial for successful restoration, as failure can lead to issues like microleakage, postoperative sensitivity, secondary caries, and restoration failure. Disinfection of the cavity is vital after preparation [6]. The gap in human dentin allows for the degradation of host-derived matrix metalloproteinases (MMPs) enzymes, which slow caries progression and compromise the quality of bonded restorations [7]. Iodine, a bactericidal biocide, exhibits rapid antimicrobial activity against bacteria, fungi, and viruses, including S. mutans, L. acidophilus, and S. aureus. Its unstable aqueous solutions require iodine carriers or releasing agents, such as povidone-iodine and poloxamer iodine [8]. The smear layer removal was challenging with low-concentration EDTA solution due to its self-limiting effect, so an alkaline solution was prepared and tested for its ability to chelate calcium acetate [9].

Objective: To assess knowledge and attitude regarding Dentin-disinfection chemicals among dental students, interns, and dentists in Saudi Arabia.

Methodology:

Study design and Setting:

This is an observational study conducted in Saudi Arabia, from July and November 2024. The study's population consisted of dental students, interns, and Saudi dentists.

Sample size:
The sample size was calculated using the Raosoft sample size calculator, ensuring a representative sample of 384 respondents with an indicator percentage of 0.50 and a margin of error of 5%.

Inclusion and Exclusion criteria:

The inclusion criteria for this study were as follows: Dental students, interns, and Saudi dentists living in KSA.

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Method for data collection, instrument, and score system:

A structured questionnaire was employed as a study tool. This tool was developed after consulting relevant studies conducted in Saudi Arabia, the questionnaire consisted of 19 questions organized into three sections: the first section included five demographic questions regarding gender, nationality, level of education, place of work and place of residence. The second section asked general knowledge questions regarding Dentin-disinfection, such as types of Dentin-disinfection, with multiple choice answers. Correct answers were added to the total score regarding general Dentin-disinfection knowledge and were derived from previous literature [2].
The third section asked for the Attitudes regarding Dentin-disinfection.

Scoring system:
In all, 19 statements served to assess the participants' attitudes and degree of knowledge. 5 statements for demographics, 7 for knowledge, and 7 for attitudes. One point is given for correct answers, and zero points given for incorrect answers. For scoring, utilized Likert scales (Dichotomous, Three Point, and Quality Scales) The maximum score was 14 and divided as follows: The original Bloom's cut-of points, 80.0%-100.0% 60.0%-79%, and 59.0% or less, the participants divided into three groups based on their scores. knowledge score varied from 0 to 7 points and was classified into three levels as follows: those with a score of 4 or below were classified as having a low level of knowledge, those with scores between 5 as having a moderate level of knowledge, and those with scores 6 or above as a high level of knowledge.
Attitudes scores varied from 0 to 7 points and were classified into three levels as follows: those with a score of 4 or below were classified as having a low level of attitude, those with scores 5 as having a moderate level of attitude, and those with scores 6 or above as having a high level of awareness.

:Pilot test

Twenty people were given the questionnaire and asked to complete it. This was done to assess the study's viability and the ease of use of the questionnaire. The pilot study's results were not included in the study's final analysis.

Analyzes and entry method:

The PC was used to enter data using the "Microsoft Office Excel Software" (2016) Windows software. Then, the data was loaded into the IBM SPSS Statistics for Windows, Version 15.0 (Armonk, NY: IBM Corp.), Statistical Package of Social Science Software (SPSS) program, version 20, for statistical analysis. Gathered On a computer, data was input using the Windows version of Microsoft Excel (2016). After that, the data was moved to version 15 of the Statistical Package for Social Science Software (SPSS). to be examined statistically.

Results:

Table (1) displays various demographic parameters of the participants with a total number of (1012). The sociodemographic characteristics of the study participants, totaling 1,012 individuals, reveal a

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diverse yet distinctly youthful sample, with a mean age of 28.6 years and a standard deviation of 7.5 years. Notably, the largest age cohort falls between 23 and 25 years (28.0%), suggesting a significant presence of young adults, which is crucial for understanding the dynamics within dental education and practice. Gender distribution indicates a male predominance, with 62.3% identifying as male compared to 37.7% female participants, which may reflect broader trends in the dental profession within the region. Most participants (90.5%) are of Saudi nationality, highlighting the local context of the findings. Regarding educational background, dental students constitute one-third (33.6%) of the sample, indicating a strong representation of early career individuals. The geographical distribution of participants reflects a higher concentration in the southern region of Saudi Arabia, further emphasizing the need for region-specific strategies in dental training and healthcare provision.

Table (1): Sociodemographic characteristics of participants (n=1012)

Parameter		**No.**	**Percent (%)**
Age (Mean: 28.6, STD: 7.5)	less than 23	146	14.4
	23 to 25	283	28.0
	26 to 27	127	12.5
	28 to 33	243	24.0
	34 to 40	152	15.0
	more than 40	61	6.0
Gender	Female	382	37.7
	Male	630	62.3
Educational level	Dental student	340	33.6
	Dental intern	142	14.0
	General dentist	308	30.4
	Specialist	128	12.6
	Other	94	9.3
Nationality	Saudi	916	90.5
	Non-Saudi	96	9.5
Place of residence	The North of Saudi Arabia	106	10.5
	The south of Saudi Arabia	454	44.9
	The Centre of Saudi Arabia	150	14.8
	The East of Saudi Arabia	106	10.5
	The West of Saudi Arabia	196	19.4
Place of work (Dentist)?	Dental schools	284	28.1
	Government clinic	228	22.5
	Private clinic	168	16.6
	Other	142	14.0
	I do not work	190	18.8

As shown in figure 1, The data presented indicates the utilization of chlorhexidine (CHX) in dentin-disinfection chemicals, revealing notable insights into its varying concentrations among respondents. A striking 94 participants, accounting for approximately 9.7%, reported using a 0.01% concentration of CHX, whereas the 0.02% concentration was utilized by 270 individuals, constituting about 27.8%. The

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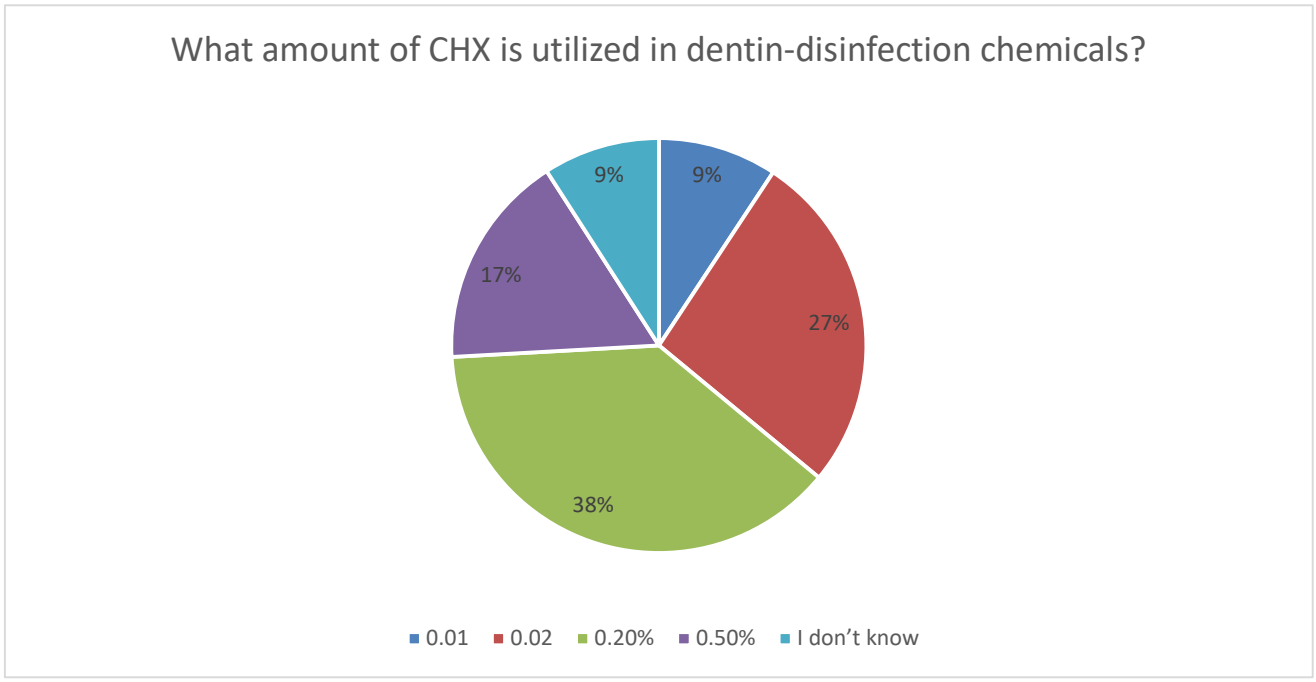
highest engagement is noted with the 0.20% concentration, as 386 respondents, approximating 39.6%, indicated usage, showcasing its popularity in practice. Conversely, the 0.50% concentration had the least representation, with only 170 participants, or roughly 17.6%, indicating its application. Additionally, a notable segment, 92 individuals (about 9.5%), remained uncertain about their CHX utilization.

Figure (1): Illustrates the amount of CHX utilized in dentin-disinfection chemicals among participants.



As illustrated in table (2), The data presented provides a comprehensive overview of the knowledge level concerning dentin-disinfection chemicals among a sample of 1,012 participants. Notably, there is a significant understanding of chlorhexidine (CHX) concentrations, with the majority (38.1%) recognizing the 0.2% solution, while 9.1% remain uncertain. This indicates a well-formed baseline knowledge among practitioners regarding CHX's application in dental procedures. In terms of antimicrobial efficacy, a robust 41.9% of respondents acknowledge that CHX acts against both Gram-negative and Gram-positive bacteria, though a concerning 19.2% remain uninformed. Regarding sodium hypochlorite (NaOCl), the data reveals that over half (53.0%) of the participants are aware of the 5.25% concentration used. However, responses about the unfavorable consequences of NaOCl usage highlight significant concerns, particularly with pulpal inflammation (26.1%) and tissue irritation (24.3%). Furthermore, the perception that NaOCl diminishes bond strength is agreed upon by 56.5%.

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Table (2): Parameters related to assessment of knowledge level regarding Dentin-disinfection chemicals (n=1012).

Parameter		***No.***	***Percent (%)***
What amount of CHX is utilized in dentin-disinfection chemicals?	0.01	94	9.3
	0.02	270	26.7
	0.2%	386	38.1
	0.5%	170	16.8
	I don't know	92	9.1
CHX acts against	Gram –	166	16.4
	Gram +	228	22.5
	Both	424	41.9
	I don't know	194	19.2
NaOCl has a superior to	Bonding action	184	18.2
	Cleansing action	238	23.5
	Reducing action	126	12.5
	Tissue-solving action	304	30.0
	I don't know	160	15.8
What amount of NaOCl is utilized for dentin-disinfection chemicals?	0.01	104	10.3
	2.35%	192	19.0
	5.25%	536	53.0
	6.3%	64	6.3
	I don't know	116	11.5
Unfavorably consequences of using NaoCl as dentin-disinfection chemicals	Failure to restore	198	19.6
	Pulpal inflammation	264	26.1
	Staining of teeth	176	17.4
	Tissue irritation	246	24.3
	I don't know	128	12.6
The bond strength diminishes as a result of NaOCl	Agree	572	56.5
	Disagree	242	23.9
	I don't know	198	19.6
Iodine can indeed destroy bacterial cells	Agree	620	61.3
	Disagree	194	19.2
	I don't know	198	19.6

The data presented in figure (2) reveals significant concerns associated with the use of NaOCl (sodium hypochlorite) as a dentin-disinfection agent. A total of 198 incidents, representing approximately 22.8%, were recorded as failures to restore, indicating a notable risk in achieving successful dental outcomes. Furthermore, pulpal inflammation was reported in 264 cases, accounting for 30.6% of the responses, highlighting the potential inflammatory effects on dental pulp. Additionally, tissue irritation was noted in 246 instances, which constitutes around 28.7%, raising alarms regarding the

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biocompatibility of NaOCl. Staining of teeth was recorded in 176 cases, corresponding to 20.4%, indicating a concern over aesthetic outcomes. Lastly, 128 respondents, representing 15.0%, were uncertain about the consequences.

Figure (2): Illustrates the consequences of using NaoCl among participants.

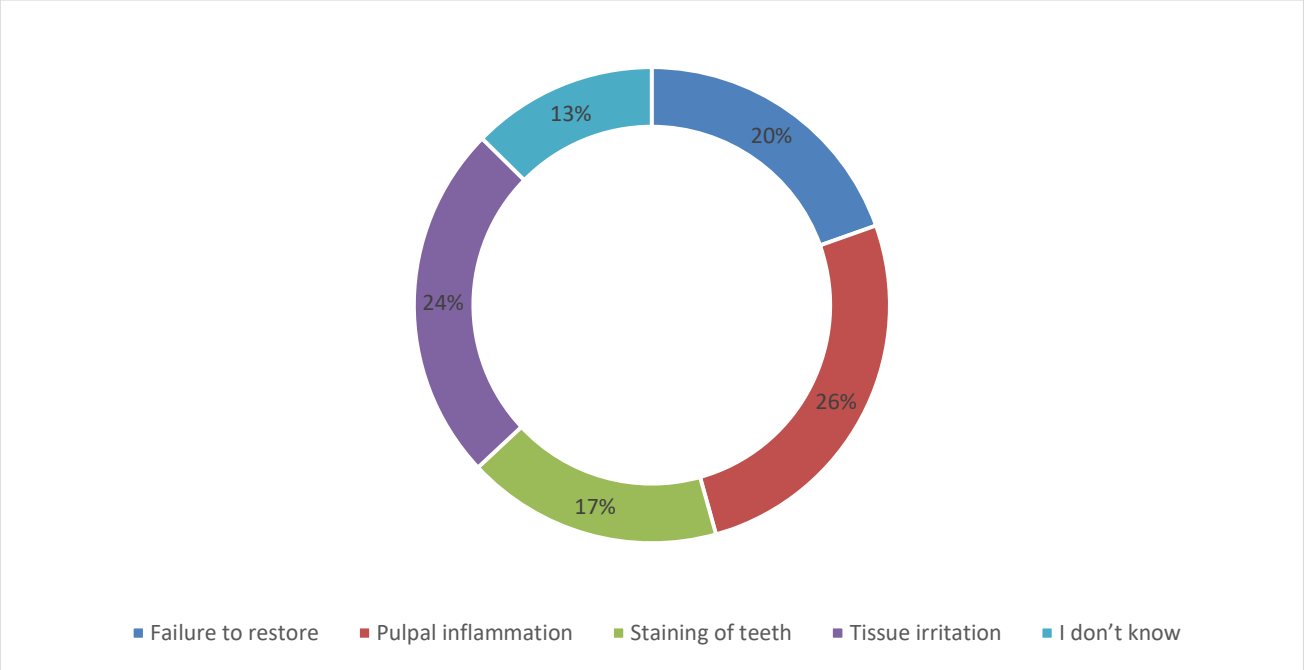

Table (3) reveals insights into the awareness and attitudes of participants regarding dentin-disinfection chemicals among a sample size of 1012 individuals. Notably, only 36.8% reported a high level of awareness about these chemicals, indicating a considerable knowledge gap, as 27.7% were either unknown or only moderately aware. Among the chemicals recognized, ethylenediaminetetraacetic acid (EDTA) and sodium hypochlorite (NaOCl) emerged as the most acknowledged, reflecting the familiarity practitioners have with these commonly used agents. Interestingly, while a majority (58.3%) agree that all disinfection chemicals share similar objectives, a significant portion (41.7%) remains skeptical, suggesting room for educational efforts. Furthermore, despite 69% of participants utilizing these chemicals in their clinical practices at least occasionally, over 49% expressed a lack of interest in attending lectures on the subject. This points to a crucial need for enhanced public awareness campaigns in Saudi Arabia, where over 86% believe in the necessity of increasing knowledge around these vital chemical agents for effective dental care.

Table (3): participants' assessment of attitudes level regarding Dentin-disinfection chemicals (n=1012).

Parameter		***No.***	***Percent (%)***
How would you rate your awareness about the dentin-disinfection chemicals that are available?	Known	372	36.8
	Probably known	360	35.6
	Probably unknown	182	18.0

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	Unknown	98	9.7
What dentin-disinfection chemicals options that you are aware of are available? including the following	CHX	176	17.4
	EDTA	330	32.6
	Ionine	180	17.8
	NaOCI	326	32.2
Why do we use the disinfection chemicals?	Clean surface	192	19.0
	destroying bacteria and other organic component	392	38.7
	Remove the smear layer and other organic component ….	114	11.3
	Strength of the surface of teeth	66	6.5
	Stronger the bonding between the components and the tooth	248	24.5
All the dental disinfection chemicals have the same goals	Agree	590	58.3
	Disagree	422	41.7
In your routine clinical procedures, do you utilize dentin-disinfection chemicals?	Never	138	13.6
	Seldom	178	17.6
	Some of the time	356	35.2
	Most of the time	340	33.6
Would you be interested in going to lectures about dentin-disinfection chemicals?	Definitely will	172	17.0
	Probably will	340	33.6
	Probably won't	242	23.9
	Definitely won't	258	25.5
Do you believe there is a need for more public awareness campaigns regarding dentin-disinfection chemicals in Saudi Arabia?	Strongly Agree	536	53.0
	Agree	334	33.0
	Disagree	100	9.9
	Strongly Disagree	42	4.2

The data presented in Table 4 provides a comprehensive overview of knowledge levels regarding dentin-disinfection chemicals among the surveyed population. Notably, a striking 73.7% of respondents fall within the low knowledge category, suggesting a significant gap in understanding essential disinfection practices that could impact dental health outcomes. In contrast, only 7.1% of participants demonstrated a high level of knowledge, pointing to a concerning deficiency in education and awareness surrounding this critical aspect of dental care. The moderate knowledge level, capturing 19.2% of the respondents, reflects an intermediary understanding that may warrant further investigation and targeted educational interventions.

Table (4): Shows knowledge about dentin-disinfection chemicals score results.

	Frequency	**Percent**
High knowledge level	72	7.1

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Moderate knowledge	194	19.2
Low knowledge level	746	73.7
Total	1012	100.0

The data presented in Table 5 provides insightful observations regarding attitudes toward dentin-disinfection chemicals among the surveyed population. Notably, a significant proportion of respondents—approximately 37.9%—exhibited a low attitude level towards these chemicals, which could indicate skepticism or a lack of confidence in their efficacy or safety. In contrast, those with a high attitude level account for 29.6%, suggesting that a smaller segment of the population strongly embraces these products. Meanwhile, the moderate attitude level, representing 32.4%, reflects a substantial amount of respondents maintaining a balanced perspective.

Table (5): Shows attitude about dentin-disinfection chemicals score results.

	Frequency	**Percent**
High attitude level	300	29.6
Moderate attitude	328	32.4
Low attitude level	384	37.9
Total	1012	100.0

Table (6) shows that knowledge level about dentin-disinfection chemicals has statistically significant relation to educational level (P value=0.0001), place of residence (P value=0.0001), and place of work (P value=0.022). It also shows statistically insignificant relation to gender, age, and nationality.

Table (6): Relation between knowledge level about dentin-disinfection chemicals and sociodemographic characteristics.

Parameters		***Knowledge level***		***Total (N=1012)***	***P value****
		High or moderate knowledge	**Low knowledge level**		
Gender	Female	90	292	382	0.125
		33.8%	39.1%	37.7%	
	Male	176	454	630	
		66.2%	60.9%	62.3%	
Age	less than 23	32	114	146	0.198
		12.0%	15.3%	14.4%	
	23 to 25	86	197	283	
		32.3%	26.4%	28.0%	
	26 to 27	26	101	127	
		9.8%	13.5%	12.5%	

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	28 to 33	60	183	243	
		22.6%	24.5%	24.0%	
	34 to 40	44	108	152	
		16.5%	14.5%	15.0%	
	more than 40	18	43	61	
		6.8%	5.8%	6.0%	
Educational level	Dental student	86	254	340	0.0001
		32.3%	34.0%	33.6%	
	Dental intern	46	96	142	
		17.3%	12.9%	14.0%	
	General dentist	80	228	308	
		30.1%	30.6%	30.4%	
	Specialist	48	80	128	
		18.0%	10.7%	12.6%	
	Other	6	88	94	
		2.3%	11.8%	9.3%	
Nationality	Non-Saudi	32	64	96	0.099
		12.0%	8.6%	9.5%	
	Saudi	234	682	916	
		88.0%	91.4%	90.5%	
The place of residence	The North of Saudi Arabia	10	96	106	0.0001
		3.8%	12.9%	10.5%	
	The south of Saudi Arabia	158	296	454	
		59.4%	39.7%	44.9%	
	The Centre of Saudi Arabia	28	122	150	
		10.5%	16.4%	14.8%	
	The East of Saudi Arabia	18	88	106	
		6.8%	11.8%	10.5%	
	The West of Saudi Arabia	52	144	196	
		19.5%	19.3%	19.4%	
Place of work (Dentist)?	Dental schools	86	198	284	0.022
		32.3%	26.5%	28.1%	
	Government clinic	46	182	228	
		17.3%	24.4%	22.5%	
	Private clinic	44	124	168	
		16.5%	16.6%	16.6%	
	I do not work	60	130	190	
		22.6%	17.4%	18.8%	
	Other	30	112	142	
		11.3%	15.0%	14.0%	

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P value was considered significant if ≤ 0.05.

Table (7) shows attitude level about dentin-disinfection chemicals has statistically significant relation to age (P value=0.0001), educational level (P value=0.0001), nationality (P value=0.034), place of residence (P value=0.0001), and place of work (P value=0.0001). It also shows statistically insignificant relation to gender.

Table (7): Relation between attitude level about dentin-disinfection chemicals and sociodemographic characteristics.

Parameters		***Attitude level***		***Total (N=1012)***	***P value****
		High or moderate attitude	**Low attitude level**		
Gender	Female	226	156	382	0.140
		36.0%	40.6%	37.7%	
	Male	402	228	630	
		64.0%	59.4%	62.3%	
Age	less than 23	96	50	146	0.0001
		15.3%	13.0%	14.4%	
	23 to 25	211	72	283	
		33.6%	18.8%	28.0%	
	26 to 27	74	53	127	
		11.8%	13.8%	12.5%	
	28 to 33	128	115	243	
		20.4%	29.9%	24.0%	
	34 to 40	78	74	152	
		12.4%	19.3%	15.0%	
	more than 40	41	20	61	
		6.5%	5.2%	6.0%	
Educational level	Dental student	222	118	340	0.0001
		35.4%	30.7%	33.6%	
	Dental intern	104	38	142	
		16.6%	9.9%	14.0%	
	General dentist	180	128	308	
		28.7%	33.3%	30.4%	
	Specialist	78	50	128	
		12.4%	13.0%	12.6%	
	Other	44	50	94	
		7.0%	13.0%	9.3%	
Nationality	Non-Saudi	50	46	96	0.034
		8.0%	12.0%	9.5%	
	Saudi	578	338	916	

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		92.0%	88.0%	90.5%	
The place of residence	The North of Saudi Arabia	52	54	106	0.0001
		8.3%	14.1%	10.5%	
	The south of Saudi Arabia	292	162	454	
		46.5%	42.2%	44.9%	
	The Centre of Saudi Arabia	86	64	150	
		13.7%	16.7%	14.8%	
	The East of Saudi Arabia	52	54	106	
		8.3%	14.1%	10.5%	
	The West of Saudi Arabia	146	50	196	
		23.2%	13.0%	19.4%	
Place of work (Dentist)?	Dental schools	202	82	284	0.0001
		32.2%	21.4%	28.1%	
	Government clinic	146	82	228	
		23.2%	21.4%	22.5%	
	Private clinic	92	76	168	
		14.6%	19.8%	16.6%	
	I do not work	120	70	190	
		19.1%	18.2%	18.8%	
	Other	68	74	142	
		10.8%	19.3%	14.0%	

****P value was considered significant if ≤ 0.05.***

Discussion:

The remnants of bacteria following tooth preparation can persist and reproduce, potentially resulting in recurrent caries, damage to the pulp, and failure of the restoration [10]. Studies have shown that bacteria can survive beneath restorations for over a year [11]. The complete mechanical removal of carious dentin may jeopardize both pulp health and the structural integrity of the tooth. Although disclosing agents are used, it is not possible to completely eliminate bacteria from the prepared tooth surface. Therefore, in modern dentistry, the chemical disinfection of prepared teeth has become a crucial step prior to the application of restorative materials. This process not only eliminates viable bacteria and their toxins from the restorative interface but also helps prevent long-term degradation of bond strength by inhibiting the activity of matrix metalloproteinases (MMPs) [12]. Disinfecting the prepared dentin surface is particularly critical in self-etch adhesive protocols, as the absence of an irrigation step after etching can lead to inadequate removal of the bacteria-laden smear layer. Presently, several antimicrobial agents are employed for disinfecting prepared teeth, which include chlorhexidine (CHX), sodium hypochlorite, iodine, EDTA, fluoride-based solutions, and benzalkonium chloride. Thus, we aimed in this study to assess Knowledge and attitude regarding Dentin-disinfection chemicals among Dental students, interns, and dentists in Saudi Arabia.

Our study findings highlight significant gaps in knowledge and attitudes regarding dentin-disinfection chemicals among dental students, interns, and dentists, with only 36.8% demonstrating high overall awareness despite a reasonable recognition of chlorhexidine (CHX) and sodium hypochlorite (NaOCl). In comparison, the study conducted by Kumar et al. found that 87.5% of students were mandated to sterilize teeth before working on them [13], indicating a more structured educational approach towards

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disinfection protocols in their curriculum. However, despite this apparent emphasis on sterilization, similar knowledge gaps persist in understanding the specifics of disinfecting agents, as illustrated in Adou-Assoumou et al. (2016), where 76% of practitioners were unaware of the recommended concentrations of sodium hypochlorite [14]. This suggests that while sterilization practices may be recognized, the details concerning the safety and efficacy of the chemicals used remain inadequately addressed in education.

Furthermore, our study indicated a concerning level of disengagement from further educational opportunities, with over 49% expressing little interest in attending related lectures, even though 73.7% had low knowledge levels about these chemicals. This lack of motivation to deepen their understanding correlates with findings from Maysoon Haji Albahiti et al., where 43% of practitioners were also uninformed about the effective concentrations of sodium hypochlorite utilized in practice [15]; such an unawareness can have direct implications on clinical outcomes. Additionally, only 12.7% of participants in our study reported using chelating agents, which aligns with the findings of Unal et al. (2012), who reported a usage rate of 32.4% for chelating agents [16]. Both studies highlight how low engagement with important disinfection agents and techniques can lead to suboptimal treatment outcomes. While our cohort exhibited some familiarity with chlorhexidine (CHX) and sodium hypochlorite (NaOCl), with knowledge levels low (36.8% demonstrating overall awareness), the Bhopal study [17] reported mean knowledge and practice scores of 1.25 ± 1.12 and 4.89 ± 0.96, respectively, signifying inadequate comprehension across both contexts. Furthermore, similar to our findings, a significant proportion of participants expressed a lack of interest in further education, underscoring the urgent need for enhanced instructional interventions in dental curricula. Moreover, A study conducted by Bogari et.al, [18] revealed that about half of the general dental practitioners GDPs use NaOCl either in full or diluted concentration. In addition, high percentage of GDPs mentioned using saline as an irrigant in endodontics.

Conclusion:

The study illustrates a significant deficit in the knowledge and attitudes regarding dentin-disinfection chemicals among dental students, interns, and practicing dentists in Saudi Arabia. Despite a general awareness of common agents such as chlorhexidine and sodium hypochlorite, only 36.8% of participants demonstrated a high level of knowledge, with a concerning 73.7% categorizing within the low knowledge range. This gap in understanding could predispose patients to adverse outcomes, including recurrent caries and compromised restoration longevity. Furthermore, the expressed disinterest in attending educational sessions about dentin-disinfection chemicals underscores a critical need for enhanced educational strategies within dental training programs. The data also suggests a correlation between knowledge levels and demographic variables, emphasizing the necessity to tailor educational efforts based on educational background and workplace contexts. Therefore, targeted interventions, such as workshops, seminars, and improved curricula focusing on dentin-disinfection practices, are essential to elevate practitioners' competency in utilizing these chemicals effectively. Addressing these knowledge gaps will not only improve clinical outcomes but also align dental practice in Saudi Arabia with modern standards of patient care and safety. Thus, we advocate for a proactive approach that prioritizes ongoing education and training in dentin-disinfection methodologies to optimize dental health outcomes.

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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.

References:

1. BEKTAŞ Ö. Cavity Disinfection in Operative Dentistry – Review. J Int Dent Sci. 2023;
2. Naveen T. KAP Survey on Knowledge, Attitude And Practice of Cavity Disinfectants Among Dental Practitioners. 2022;1–7.
3. Pradhan PK, Sahoo KC, Ghosh K, Lata S, Patri G, Bhol S. Does Cavity Disinfectant Affect Sealing Ability of Universal Self-etch Adhesive? J Contemp Dent Pract. 2021;22(3):273–7.
4. Haralur SB, Alqahtani MM, Alqahtani RA, Shabab RM, Hummadi KA. Effect of Dentin-Disinfection Chemicals on Shear Bond Strength and Microhardness of Resin-Infiltrated Human Dentin in Different Adhesive Protocols. Med. 2022;58(9).
5. Bin-Shuwaish MS. Effects and effectiveness of cavity disinfectants in operative dentistry: A literature review. J Contemp Dent Pract. 2016;17(10):867–79.
6. Singh T, Sattiraju P, Kamishetty S, Reddy S, Bhattacharjee P, Habeeb A. Effect of a novel quaternary ammonium silane based cavity cleanser FiteBac 2% K21 QAS in comparison with other cavity disinfectants on the bond strength of resin-modified glass ionomer cement. J Conserv Dent Endod. 2023;26(6):688.
7. Erhardt MCG, Osorio R, Toledano M. Dentin treatment with MMPs inhibitors does not alter bond strengths to caries-affected dentin. J Dent. 2008;36(12):1068–73.

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

8. Alp Ş. Novel Cavity Disinfectants and Their Effects : A Review Novel Cavity Disinfectants and Their Effects : A Review. 2024;(July).
9. Nakashima K, Terata R. Effect of pH modified EDTA solution to the properties of dentin. J Endod. 2005;31(1):47–9.
10. Imazato S., Torii Y., Takatsuka T., Inoue K., Ebi N., Ebisu S. Bactericidal effect of dentin primer containing antibacterial monomer methacryloyloxydodecylpyridinium bromide (MDPB) against bacteria in human carious dentin. J. Oral Rehabil. 2001;28:314–319. doi: 10.1046/j.1365-2842.2001.00659.x. [PubMed] [CrossRef] [Google Scholar]
11. Sharma V., Rampal P., Kumar S. Shear bond strength of composite resin to dentin after application of cavity disinfectants—SEM study. Contemp. Clin. Dent. 2011;2:155. doi: 10.4103/0976-237X.86438. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
12. Varoni E., Tarce M., Lodi G., Carrassi A. Chlorhexidine (CHX) in dentistry: State of the art. Minerva Stomatol. 2012;61:399–419. [PubMed] [Google Scholar]
13. Kumar M, Sequeira PS, Peter S, Bhat GK. Sterilisation of extracted human teeth for educational use. *Indian J Med Microbiol.* 2005;23:256–8. [PubMed] [Google Scholar]
14. Adou-Assoumou M., Krah-Sinan A., Koffi-Gnagne Y. Protocol for root canals' irrigation in endodontic practice in ivory coast: a survey of 100 dentists. J. Dent. Oral Care Med. 2016;3:303. [Google Scholar]
15. Albahiti, Maysoon Haji. "Knowledge and practices of decontamination during root canal treatment by dentists in Jeddah." *The Saudi dental journal* vol. 32,4 (2020): 213-218. doi:10.1016/j.sdentj.2019.08.010
16. Unal G.C., Kaya B.U., Tac A.G. Survey of attitudes, materials and methods preferred in root canal therapy by general dental practice in Turkey: part 1. Eur. J. Dent. 2012;6:376. [PMC free article] [PubMed] [Google Scholar]
17. Smitha D, Tijare MS, Amith HV, Gujjar KR, Sharma R. Knowledge, attitude and practice regarding handling of extracted human teeth among students of a dental college in Bhopal. J Indian Assoc Public Health Dent. 2014;12:276–82. [Google Scholar]
18. Bogari DF, Alzebiani NA, Mansouri RM, Aljiaid FG, Alghamdi MA, Almalki M, Merdad K, Alhazzazi TY. The knowledge and attitude of general dental practitioners toward the proper standards of care while managing endodontic patients in Saudi Arabia. Saudi Endodontic Journal. 2019 Jan 1;9(1):40-50.