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KNOWLEDGE AND ATTITUDE OF ORTHODONTIC PATIENTS TOWARDS ORTHODONTIC RELAPSE IN SAUDI ARABIA: A CROSS-SECTIONAL STUDY

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Abstract:
Background: The most difficult aspect of an orthodontic treatment plan is often keeping teeth in their proper placements following treatment. Relapse after orthodontic treatment is typically seen as a return to the initial malocclusion. Relapse, on the other hand, might be defined as any unfavorable shift in tooth position after orthodontic treatment away from a corrected malocclusion. However, a return to the previous malocclusion does not always occur. These modifications might potentially be the outcome of typical aging-related effects. Patients undergoing orthodontic treatment must have a good grasp of the causes of relapse and be knowledgeable about various strategies for preventing it. The aim of this study was to determine the Knowledge and attitude of orthodontic patients towards orthodontic relapse in Saudi Arabia.
Methods: This study created use of a structured questionnaire that the authors created for an across-successional study questionnaire survey that would be carried out in Saudi Arabia (SA). The study's population consisted of Saudi patients who had undergone orthodontic intervention. The study's population comprised Saudi patients classified as adults who aged 19 years or older. The recruitment of participants took place during the months of September 2023 to September 2024, drawing from patients seeking orthodontic treatment across multiple orthodontic clinics situated in various locations within Saudi Arabia.
Results: The study involved 304 individuals, a significant 93.8% were aware of the necessity for retention appliances post-treatment, with 45.7% believing they should be used universally. Awareness of potential relapse was reflected in 60.5% acknowledging that perfect treatment outcomes do not ensure stability. Preferences for retention duration varied, with 36.2% suggesting one to three years and 30.3% advocating for lifelong retention. Notably, 64.5% favored bonded retention devices, while 79.3% considered stable results extremely important, and 77.6% opposed charges for recall visits. Satisfaction with teeth alignment was high at 83.2% upon treatment completion but dropped to 60.9% over time. Nearly half reported no significant changes in crowding or bite, yet 42.8% desired further treatment,

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indicating concerns about retainer adherence. Compliance issues were evident as over half used removable retainers, but a similar percentage had ceased wearing them. Among current retainer users, 37.9% wore them for over 21 hours daily, indicating variable adherence. Overall, 42.8% of participants had a moderate level of knowledge about orthodontic relapse, while 22.0% exhibited a high level and 35.2% were classified as having low knowledge.
Conclusion: a significant majority of the study participants 93.8% were aware of the necessity of retention appliances post-treatment, the findings indicate relatively high knowledge levels; however, a concerning number of participants exhibited compliance issues, with nearly half discontinuing the use of retainers. This highlights the need for enhanced patient education and ongoing engagement throughout the retention period to sustain treatment outcomes. Given that satisfaction with teeth alignment declined over time, there is a clear pathway for orthodontists to improve follow-up practices and ensure that patients understand the long-term significance of their retention protocols.

Keywords: Relapse, Orthodontic, Retention, Knowledge and attitude.

Introduction:
Relapse process has been a concern of orthodontists for decades (Moyers,RE, 1988 as cited in Srivastava,R, 2018) defines relapse as "loss of any correction achieved by orthodontic treatment." [2]. Modern orthodontists aim to achieve the ideal balance between occlusal relationships, dental and facial esthetics, stability and long-term maintenance of the results [3]. Hence, dental and skeletal retention is required to prevent return of malocclusion [4]. There are various etiological factors (skeletal, dental, systemic disease, or surgical factors) for the teeth's tendency to shift positions as soon as the orthodontic appliances are removed [5]. Successful post-retention cases are greatly influenced by the type and duration of retention chosen [6]. Any violation of the biological limit will result in miserable failure and relapse [7].
According to Little et al., 40% - 90% of the patients have dental irregularities 10 to 20 years post-treatment but with large individual and unpredictable variations [8].
Another earlier study published in the scientific literature, only 30% to 50% of orthodontic patients successfully retain the initially achieved good alignment after 10 years, and this percentage reduces to 10% after 20 years [9]. In order to develop ways to successfully manage the problem when orthodontic recurrence occurs, it is necessary to review the patient's periodontal, physiological, and psychological situation [8]. According to a 2022 study, direct cause of the relapse after orthodontic treatment is the irregularity in wearing the orthodontic retainer [5]. Another study was done in 2022 proves that after receiving orthodontic treatment, 36.7 percent of patients in an average medical student’s orthodontic population are having got orthodontic relapse [10]. Due to the small amount of people involved in our topic, particularly in Saudi Arabia. Previous studies have used a variety of sample sizes and produced a wide range of findings.
To the best of our knowledge, the studies that have been published and the data that is readily available rarely offer a sufficient response to the question of whether patients were aware of relapse following orthodontic treatment [11]. Also, Recent research in Saudi Arabia suggested that more than 37.7% of individuals Males not interested in our topic [12]. Our study was designed to assess Knowledge and attitude of orthodontic patients towards orthodontic relapse in Saudi Arabia.

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Material and methods:

This is an observational descriptive cross-sectional study conducted in Saudi Arabia from August 2023 until September 2024. The study's population consisted of Saudi patients who had undergone orthodontic intervention. The study's population comprised Saudi patients were classified as adults who aged 19 years or older.

Sample size:
The minimum number of individuals was estimated by using the (Raosoft, Inc., Seattle, WA, USA) (22); means and standard deviation was applied; and the following formula was used: n= (Z^2 P (1-P)/d^2 with standard deviation (=1.96) for 95% confidence interval and the maximum acceptable marginal error (=0.05).
n: Estimated sample size
Z: The z-value (1-a) = 1.96 for the chosen level of confidence.
P: Expected prevalence
Q: (1-0.50) = 50%, i.e., (0.50)
D: The 0.05 maximum allowable margin of error.
Therefore, the determined minimum individuals was: n=((1.96)^2*0.50*0.50)/(0.05)^2 =384 participants.

Inclusion criteria:
Post-treatment patients were selected based on the following criteria: they were at least 19 years old and consent to participate in our study, and they have completed fixed orthodontic treatment.

Exclusion criteria:
Uncooperative patients, patients who did not finish fixed orthodontic treatment.

Method for data collection and instrument:
A structured questionnaire was employed as a measurement tool to assess the Knowledge and attitude of orthodontic patients towards orthodontic relapse Following Orthodontic Appliance Treatment Among Patients in Saudi Arabia. Google Forms were utilized to create the questionnaire and collect data. To assess the appropriateness, relevance, clarity, and adequacy of the questions, the questionnaire was reviewed by orthodontists. The questionnaire was initially designed in English and subsequently translated into Arabic, the native language of the participants. To gauge the appropriateness, relevance, clarity, and adequacy of the Arabic version, it was evaluated by experts who were native Arabic speakers and volunteers from the general population. Necessary modifications to the Arabic questionnaire were implemented based on the feedback provided by the experts and volunteers. The final version of the questionnaire comprised 20 questions categorized into five main sections.
The first section included Ensure that the case matches the research objective.
The second section personal information. The demographic portion of the survey provided valuable insights into the characteristics of the respondents, encompassing gender, age, nationality, and the presence of any health issues. This information contributed to a comprehensive understanding of the study's sample population. The third section encompassed Participants' level of knowledge about appliances were used for retention after orthodontic treatment and the awareness if the appliances were necessary.
The fourth section contained Participants' expectations in orthodontic retention, how long they think

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should the retention phase be and the type of retention device would you favor.
The fifth section focused details of the Treatment and the Treatment Experience. This section investigated the duration of orthodontic treatment and asked if crowding occurs or their bite has changed after they orthodontic treatment over if these changes bother them and lead them to seek orthodontic treatment again. We aimed to gain an understanding the reasons of relapse among orthodontics' patients after treatment The level of awareness of these reasons.

Scoring System of knowledge and awareness level:
There were 19 questions in our survey except for demographic questions.
All correct answers received score of 1 and all (incorrect or I don't know) answers received score of 0.
The participants were divided into three groups based on their scores:
High level (= 80% or more): 18 points or more.
Moderate level (= 60% to 80%): 14-17 points.
Low level (= 59% or less): 13 points or less.

Data analysis:
Data was entered on the computer using the "Microsoft Office Excel Software" program
(2013) for windows. Data was then transferred to the Statistical Package of Social Science Software (SPSS) program, version 20 version 20 (IBM SPSS Statistics for Windows, Version 20.0; Armonk, NY: IBM Corp.), to be statistically analyzed.

Results:

Table (1) displays various demographic parameters of the participants with a total number of (433). A striking 70.2% of respondents indicated that they have finished their orthodontic treatment, a reflection of the increasing accessibility and public interest in orthodontic care. Gender representation in the sample appears to be significantly skewed towards females, who account for 80.3%, suggesting a potential gender disparity in seeking orthodontic services. The overwhelming majority of participants, at 94.7%, are of Saudi nationality, reflecting a demographic that is primarily localized, and possibly emphasizing the need for culturally tailored orthodontic practices in the region. Age analysis reveals that over 32.9% of participants are in the 24 to 26 ages, highlighting this cohort as a critical demographic for orthodontic intervention, while those over 32 represent a minority, indicating a trend towards younger individuals seeking treatment. The social status data indicates a majority of the participants are unmarried (61.8%), which might correlate with factors related to lifestyle and healthcare decisions among younger adults. Educational attainment is notably high, with 69.4% of participants holding a Bachelor's degree or higher, which could translate into greater health literacy and proactive engagement with orthodontic care. Regionally, the data reveals a concentration of participants from the Asir Region (43.1%), providing insight into geographic trends in orthodontic treatment availability or preferences.

Table (1): Sociodemographic characteristics of participants (n=304)

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Parameter		**No.**	**Percent (%)**
Have you finished orthodontic treatment? (n=433)	No	129	29.8
	Yes	304	70.2
Gender	Female	244	80.3
	Male	60	19.7
Nationality	Saudi	288	94.7
	Non-Saudi	16	5.3
Age	23 or less	79	26.0
	24 to 26	100	32.9
	27 to 32	78	25.6
	more than 32	47	15.5
Social status	Unmarried	188	61.8
	Married	116	38.2
Education level	Primary school	2	.7
	Middle school	2	.7
	High school	45	14.8
	Diploma	32	10.5
	Bachelor's degree	211	69.4
	Post-graduate degree	12	3.9
Region	Eastern Region	64	21.1
	Al Bahah Region	4	1.3
	Al Jouf Region	5	1.6
	Riyadh Region	26	8.6
	Qassim Region	6	2.0
	Madinah Region	11	3.6
	Tabuk Region	3	1.0
	Jazan Region	10	3.3
	Ha'il Region	7	2.3
	Asir Region	131	43.1
	Makkah Region	33	10.9
	Najran Region	4	1.3

As shown in figure 1, The figure presented provides critical insights into patient knowledge and attitudes toward orthodontic relapse. Notably, the data indicates a significant awareness discrepancy, with 285 respondents affirmatively recognizing the importance of retention appliances as opposed to just 19 who were unaware. This substantial majority underscores the effective educational outreach efforts that may have been implemented within the orthodontic community, highlighting the necessity for continued patient education regarding relapse prevention strategies post-treatment. The stark contrast in responses suggests potential gaps in understanding that could influence patient compliance and ultimately, treatment outcomes. In exploring this data, it becomes essential to ascertain the sources of information that informed these patients and to identify the implications for orthodontic practice, particularly in relation to enhancing patient engagement and adherence to retention protocols.

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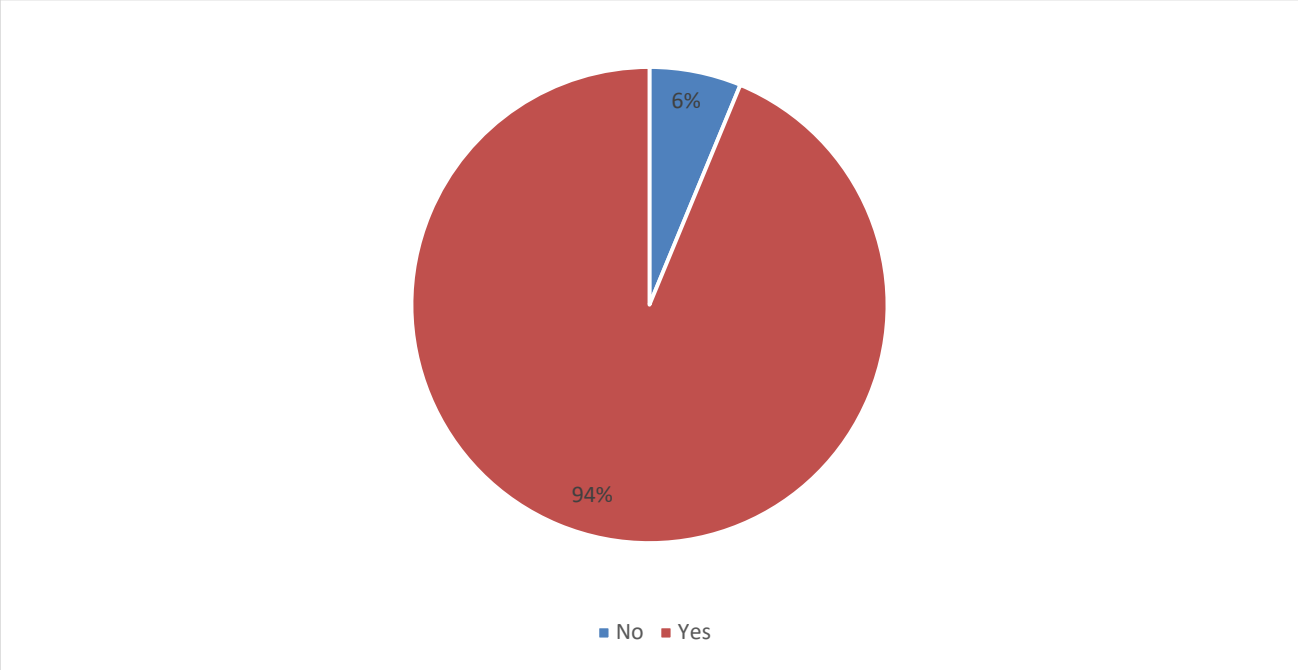
Figure (1): Illustrates whether appliances are used for retention after orthodontic treatment among participants.



As illustrated in table (2), The data presented offers insightful parameters concerning the knowledge of 304 participants regarding orthodontic relapse and retention strategies post-treatment. A significant majority, 93.8%, affirm their awareness of the necessity for retention appliances after orthodontic treatment, suggesting a strong foundational understanding of retention principles among this population. Notably, when questioned about the frequency with which such appliances are deemed necessary, 45.7% advocate that retention should be applied in all cases, highlighting a prevailing consensus on the critical role these devices play in maintaining orthodontic results. This viewpoint correlates with the belief held by 60.5% of respondents that a perfect treatment outcome cannot guarantee stability, underscoring the risk of relapse and the importance of post-treatment protocols. A substantial 74.7% of participants also recognize that teeth can shift without orthodontic appliances, indicating an awareness of inherent dental movements regardless of intervention. Regarding the duration of the retention phase, responses indicate a diverse range of beliefs, with 36.2% suggesting a retention period of one to three years and 30.3% advocating for lifelong retention, reflecting differing opinions on the optimal timeframe required to ensure stability. The overwhelming emphasis on the importance of achieving stable treatment results is further validated by the 79.3% who rate it as extremely important. As preferences for retention devices are revealed, a notable majority (64.5%) favor bonded devices over removable options, signalling a trend towards more fixed solutions. Additionally, the data reflects a greater inclination towards structured recall schedules, with 40.5% proposing six-month intervals as ideal. Responsibility for post-treatment stability is seen as shared primarily between patients, parents, and orthodontists, with respective acknowledgments from 47.0% and 41.4%. In a noteworthy financial consideration, a substantial 77.6% of participants express opposition to charging for recall visits, raising questions about the economic dynamics of orthodontic care.

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Table (2): Parameters related to participants' level of knowledge of orthodontic relapse (n=304).

Parameter		***No.***	***Percent (%)***
Are you aware that appliances are used for retention after orthodontic treatment?	No	19	6.3
	Yes	285	93.8
How often do you think such appliances are necessary?	In rare cases	27	8.9
	In half the cases	42	13.8
	In most cases	96	31.6
	In all cases	139	45.7
In which cases do you consider retention necessary?	After comprehensive tooth movement	50	16.4
	After treatment with extractions	31	10.2
	After treatment during growth	27	8.9
	After treatment in adults	19	6.3
	In all cases	177	58.2
Do you believe a perfect treatment result can guarantee stability?	No	120	39.5
	Yes	184	60.5
Do you think that teeth can also move without orthodontic appliances?	No	77	25.3
	Yes	227	74.7
How long do you think should the retention phase be?	<1 year	64	21.1
	1-3 years	110	36.2
	3-10 years	38	12.5
	Lifelong	92	30.3
How important is a stable result for you?	Not important	13	4.3
	Ambivalent	5	1.6
	Rather important	45	14.8
	Extremely important	241	79.3
Which type of retention device would you favor?	Removable device	108	35.5
	Bonded device	196	64.5
At which interval do you believe is a recall necessary?	Every 3 month	65	21.4
	Every 6 month	123	40.5
	Yearly	93	30.6
	Every 2nd year	19	6.3
	Every 5th year	4	1.3
Who do you consider responsible for the stability after treatment?	Patient and/or parent	143	47.0
	General dentist	35	11.5
	Orthodontist	126	41.4
Do you think it is appropriate to charge for recall visit?	No	236	77.6
	Yes	68	22.4

As shown in figure (2), The data presented in the figure regarding the knowledge and attitudes of orthodontic patients towards orthodontic relapse in Saudi Arabia offers intriguing insights into the

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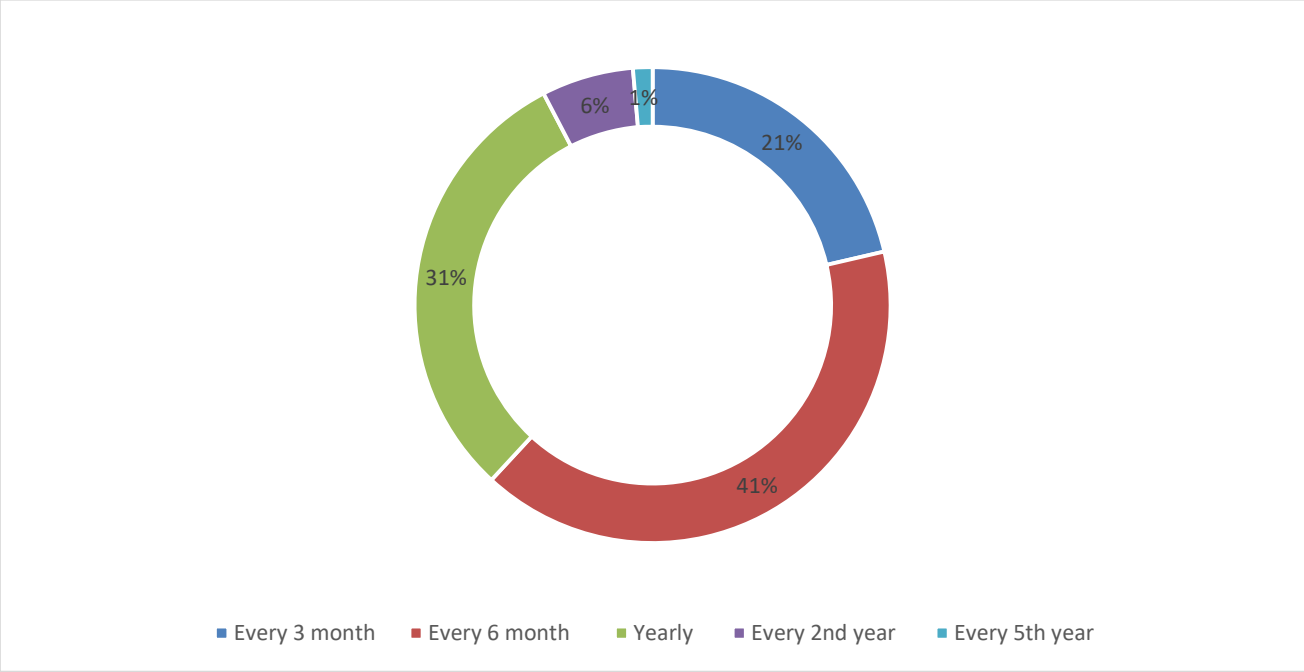
perceptions surrounding recall intervals for orthodontic follow-ups. Notably, a significant proportion of respondents, specifically 123 individuals or 43.1%, indicated a preference for recall every six months, suggesting a consensus on the necessity of biannual assessments in managing orthodontic treatment and monitoring potential relapse. In contrast, only a minority, represented by four respondents, recommended a recall every five years, indicating a possible underestimation of the importance of regular follow-up appointments. The inclination towards more frequent check-ups may reflect an understanding of the dynamic nature of orthodontic treatment outcomes and the need for ongoing support in maintaining achieved results, particularly in preventing relapse. Additionally, the notable percentage of patients advocating for quarterly (65 responses) and yearly (93 responses) check-ups further underscore the importance of establishing a structured recall system that balances patient needs with clinical practicality. Given these findings, it would be beneficial for orthodontic practitioners to consider incorporating educational initiatives that highlight the rationale behind recommended recall intervals, thereby enhancing patient compliance and potentially improving long-term treatment outcomes.

Figure (2): Illustrates the interval necessary for a recall among participants.



The data presented in Table 3 provides a comprehensive overview of participants' understanding and experiences related to orthodontic retention following their treatment. With a sample size of 304 respondents, the findings reveal significant trends in satisfaction and post-treatment behavior. Notably, a substantial majority of participants (65.8%) completed their orthodontic treatment over one year ago, suggesting a preference for longitudinal follow-up in orthodontic care. Despite this elapsed time, an overwhelming 83.2% reported satisfaction with their final tooth positioning upon treatment completion; however, this satisfaction diminished over time, as only 60.9% expressed continued contentment with their teeth's position currently. The prevalence of perceived changes post-treatment is noteworthy, with nearly half (48.0%) of respondents indicating no perception of crowding or bite changes, yet a significant minority acknowledged alterations, particularly in both arches (18.4%). These concerns

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correlate with the responses to whether such changes resulted in discomfort, where 47.4% reported no disturbance. Nevertheless, a considerable proportion (42.8%) expressed a desire to seek further orthodontic treatment, reflecting the critical role of retainer compliance in maintaining treatment outcomes. Over half of participants (52.3%) utilize removable retainers, with a similar percentage no longer wearing their retainers, which underscores the challenges of adherence to post-treatment retention protocols. Among those who continue to use their retainers, a substantial portion (37.9%) wears them for over 21 hours daily, indicating variability in compliance that necessitates further investigation.

Table (3): participants understanding of orthodontic Retention after treatment (n=304).

Parameter		***No.***	***Percent (%)***
When did your orthodontic treatment end?	≤ 6 months	39	12.8
	7 months - 1 year	65	21.4
	≥ 1 year	200	65.8
Were you happy with the position of your teeth when your orthodontic treatment finished?	No	51	16.8
	Yes	253	83.2
Are you currently satisfied with the position of your teeth?	No	119	39.1
	Yes	185	60.9
Do you think that crowding occurs or your bite has changed after your orthodontic treatment over?	upper arch Yes,	62	20.4
	lower arch Yes,	40	13.2
	both arch	56	18.4
	No	146	48.0
Do any of these changes bother you and if so, which arch?	upper arch Yes,	67	22.0
	lower arch Yes,	44	14.5
	both arch	49	16.1
	No	144	47.4
Are you so disturbed by the changes that you want to seek orthodontic treatment again?	No	174	57.2
	Yes	130	42.8
What type of retainer do you wear?	Removable	159	52.3
	Lingual Fixed retainer	145	47.7
Are you still wearing your retainers?	No	159	52.3
	Yes	145	47.7
If the answer to the previous question is yes, how long have you been wearing these retainers?	10 hours or less	50	45.0
	11 hours to 20	19	17.1
	more than 21	42	37.9

The data presented in Table 4 illustrates the knowledge and awareness of orthodontic patients regarding the potential for orthodontic relapse, as evidenced by the distribution of knowledge levels across the sampled population. With a total of 304 respondents, the findings indicate that a significant proportion, 42.8%, possess a moderate level of knowledge, suggesting that while they have some understanding of the implications surrounding orthodontic treatment and the risk of relapse, there remains ample room for enhancement in their awareness. Conversely, a lower percentage of patients, specifically 22.0%,

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exhibit a high level of knowledge, which underscores a potential gap in education and communication from orthodontic professionals. Furthermore, a notable 35.2% of patients were categorized as having a low level of knowledge, raising concerns about their preparedness and ability to adhere to recommended post-treatment protocols, which are essential for minimizing the likelihood of relapse. Collectively, these statistics reflect a critical opportunity for orthodontic practitioners to develop and implement more effective educational strategies aimed at improving patient understanding, thereby potentially reducing the incidence of relapse and promoting better long-term treatment outcomes. Enhanced educational initiatives could include patient seminars, informative literature, and follow-up consultations to reinforce the importance of retention measures and address any misconceptions regarding orthodontic care.

Table (4): Shows knowledge and awareness about knowledge and attitude of orthodontic patients towards orthodontic relapse score results.

	Frequency	**Percent**
High level of knowledge	67	22.0
Moderate level	130	42.8
Low level	107	35.2
Total	304	100.0

Table (5) shows that knowledge level of orthodontic relapse has statistically significant relation to gender (p value=0.007). It also shows statistically insignificant relation to age, nationality, marital status and education level.

Table (5): Relation between knowledge level of orthodontic relapse and sociodemographic characteristics.

Parameters		***Knowledge level of orthodontic relapse***		***Total (N=304)***	***P value****
		High or moderate level	**Low level**		
Gender	Female	167	77	244	0.007
		84.8%	72.0%	80.3%	
	Male	30	30	60	
		15.2%	28.0%	19.7%	
Age	23 or less	50	29	79	0.928
		25.4%	27.1%	26.0%	
	24 to 26	66	34	100	
		33.5%	31.8%	32.9%	
	27 to 32	52	26	78	
		26.4%	24.3%	25.7%	
	more than 32	29	18	47	
		14.7%	16.8%	15.5%	
Nationality	Saudi	187	101	288	0.843

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		94.9%	94.4%	94.7%	
	Non-Saudi	10	6	16	
		5.1%	5.6%	5.3%	
Marital status	Unmarried	127	61	188	0.201
		64.5%	57.0%	61.8%	
	Married	70	46	116	
		35.5%	43.0%	38.2%	
Education level	Primary school	2	0	2	0.298
		1.0%	0.0%	0.7%	
	Middle school	2	0	2	
		1.0%	0.0%	0.7%	
	High school	26	19	45	
		13.2%	17.8%	14.8%	
	Diploma	18	14	32	
		9.1%	13.1%	10.5%	
	Bachelor's degree	139	72	211	
		70.6%	67.3%	69.4%	
	Post-graduate degree	10	2	12	
		5.1%	1.9%	3.9%	
Region	Eastern Region	50	14	64	N/A
		25.4%	13.1%	21.1%	
	Al Bahah Region	4	0	4	
		2.0%	0.0%	1.3%	
	Al Jouf Region	0	5	5	
		0.0%	4.7%	1.6%	
	Riyadh Region	22	4	26	
		11.2%	3.7%	8.6%	
	Qassim Region	4	2	6	
		2.0%	1.9%	2.0%	
	Madinah Region	9	2	11	
		4.6%	1.9%	3.6%	
	Tabuk Region	3	0	3	
		1.5%	0.0%	1.0%	
	Jazan Region	4	6	10	
		2.0%	5.6%	3.3%	
	Ha'il Region	5	2	7	
		2.5%	1.9%	2.3%	
	Asir Region	65	66	131	
		33.0%	61.7%	43.1%	
	Makkah Region	29	4	33	
		14.7%	3.7%	10.9%	
	Najran Region	2	2	4	
		1.0%	1.9%	1.3%	

P value was considered significant if ≤ 0.05.

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Discussion:

Malocclusion is a fairly common dental issue that can negatively impact a person's quality of life by affecting oral functions like chewing, speaking, and swallowing, as well as having psychological and social effects due to its influence on appearance [13]. The effectiveness of orthodontic treatment relies on various factors related to patient cooperation, including attending appointments, practicing good oral hygiene, and avoiding damage to appliances [14]. Without some form of retention, undesirable shifts in tooth alignment often occur after orthodontic treatment. Kaplan [15], suggested that patients should be made aware of the likelihood of some relapse after the removal of appliances and the natural changes that can occur over time. This approach allows patients to participate actively in the decision-making process, alongside the orthodontist, regarding the suitable length of retention treatment. Ultimately, the most effective way to maintain orthodontic results is when patients take responsibility for wearing and caring for their retention appliances. Thus, we aimed in this study to determine the Knowledge and attitude of orthodontic patients towards orthodontic relapse in Saudi Arabia.

As regard the participants' level of knowledge and awareness of orthodontic relapse, we have found that 93.8% out of 304 were aware of the need for retention appliances post-orthodontic treatment, with 45.7% believing they should be used in all cases. A significant 60.5% acknowledge that perfect treatment outcomes do not guarantee stability, reflecting awareness of potential relapse. The preferred retention duration varies, with 36.2% suggesting one to three years and 30.3% advocating for lifelong retention. Additionally, 64.5% favor bonded retention devices, and 79.3% deem stable results as extremely important, while 77.6% oppose charges for recall visits. While 83.2% were satisfied with their teeth alignment at completion, satisfaction declined to 60.9% over time. Nearly half reported no significant changes in crowding or bite, yet 42.8% desired further treatment, highlighting concerns about retainer adherence. Over half used removable retainers, but a similar percentage had stopped wearing them, indicating compliance issues. Among those still using retainers, 37.9% wore them for over 21 hours daily, suggesting variable adherence levels that warrant further research. Collectively, knowledge and awareness score about orthodontic relapse revealed that 42.8%, possess a moderate level of knowledge. Conversely, a lower percentage of patients, specifically 22.0%, exhibit a high level of knowledge. Furthermore, a notable 35.2% of patients were categorized as having a low level of knowledge. Another study conducted by Nikolay D. Mollov et al. (2010) [16] demonstrated high treatment satisfaction initially (96%) that declined to 84% over time, mirroring our decrease from 83.2% to 60.9%. While 88% of participants in the abstract felt personally responsible for retention, this reflects a broader theme of compliance issues seen in our study, where nearly half of participants reported discontinued use of retainers. Thus, both studies underscore the importance of patient education and engagement in orthodontic retention plans. In contrast to our results, a study conducted by T. Sarva Sri et al. (2022) [17] reported that 79.6% of the patients acknowledged orthodontic efficacy in aligning teeth. While 60.5% of our respondents understood that optimal treatment outcomes do not ensure stability, the existing literature indicates similar awareness regarding proper teeth positioning for aesthetic enhancement, noted in 73.5% of participants. Despite the high satisfaction rates at treatment completion (83.2%), long-term contentment wanes to 60.9%, suggesting aligned concerns across studies about knowledge retention and compliance with orthodontic protocols. In a comparative analysis of patient awareness regarding orthodontic relapse, our findings highlighted a striking contrast with previous studies [18]. In our sample 93.8% recognized the importance of retention appliances post-treatment, with 60.5% acknowledging that optimal outcomes do not guarantee stability, indicating a higher overall awareness compared to only 74% of vacuum-formed retainer users and 47.1% of bonded

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retainer users in the prior study. While both studies observed satisfaction with treatment results—83.2% in our cohort versus 69.4% for vacuum-formed and 76.5% for bonded retainers—our findings revealed a concerning compliance issue: nearly half of our participants ceased retainer use, echoing the need for improved education on the importance of retention to prevent relapse. In a comparative analysis of knowledge and awareness regarding orthodontic relapse, our findings reveal that 93.8% of participants understood the necessity for retention appliances, with 80.9% recognizing the need for retainers' post-treatment, aligning with the results from Kuala Lumpur and Putrajaya [19]. Notably, while 45.7% believed retainers were essential in all cases, 69.4% acknowledged that incomplete treatment could worsen malocclusion. Both studies indicate compliance challenges, as reflected in our finding of high satisfaction rates at treatment completion (83.2%) contrasted with a satisfaction decrease over time (60.9%). Our data emphasize the necessity for continued education, particularly concerning adherence to retainer usage.

Conclusion:

In conclusion, this study highlighted the critical role of patient knowledge and attitude towards orthodontic relapse, revealing a significant awareness of the necessity for retention appliances post-treatment among participants. While a high percentage (93.8%) recognized the importance of retainers, compliance issues persist, with nearly half of the respondents ceasing use over time, leading to a decline in long-term satisfaction with treatment results. The findings underscore the necessity for enhanced patient education and engagement strategies to reinforce the importance of retention in maintaining orthodontic outcomes. Future efforts should focus on developing tailored educational programs that address compliance challenges, ensuring that patients remain informed and motivated to adhere to retention protocols for sustained oral health and satisfaction.

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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 that there are no conflicts of interest.

Informed consent:

Written informed consent was obtained from all individual participants included in the study.

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Data and materials availability

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

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