

The knowledge and Attitude Toward Orthodontic Treatment and its Perceived Oral-Health Effects among University Students in Derna City, Libya

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المعرفة والسلوكيات تجاه تقويم الأسنان وآثاره المتصورة على صحة الفم بين طلاب الجامعات في مدينة درنة، ليبيا

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Abstract:

This study assesses the knowledge and attitudes of students at the University of Derna in Libya, regarding orthodontic treatment. A cross-sectional survey was conducted among 461 participants (34.3% males and 65.7% females) from both public and private universities. The questionnaire evaluated demographic data, awareness of orthodontic treatment, and attitudes toward orthodontic care. Overall, students demonstrated a high level of awareness, with most recognizing the role of orthodontists in correcting irregular teeth and understanding the aesthetic and functional importance of alignment. However, gaps were noted concerning the hereditary and habitual causes of malocclusion, such as tongue thrusting and mouth breathing. Female and science-major students showed slightly higher knowledge scores, though these differences were not statistically significant. Despite positive attitudes toward treatment, actual treatment uptake and adherence to post-treatment care remained low. The findings highlight the need for enhanced educational programs focusing on preventive and etiological aspects of orthodontic health among university students.

Keywords: Orthodontics, University students, Knowledge, Attitude, Libya.

المخلص:

تهدف هذه الدراسة الى تقييم مدي معرفة ووعي طلاب الجامعات في درنة، ليبيا، وسلوكهم تجاه تقويم الاسنان. طبقت هذه الدراسة منهج المسح المقطعي لجمع البيانات علي 461 مشاركا (34.3% ذكور و 65.7% إناث) من جامعات حكومية وخاصة بالمدينة. قُيم الاستبيان البيانات الديموغرافية، ومدي الوعي بعلاج تقويم الاسنان، والسلوكيات تجاه خدمات تقويم الاسنان. بشكل عام، أظهر الطلاب مستوى عالٍ من الوعي، حيث أدرك معظمهم دور أخصائيي تقويم الأسنان في تصحيح الأسنان غير المنتظمة وفهم الأهمية الجمالية والوظيفية لتقويم الاسنان. ومع ذلك، لوحظت فجوات فيما يتعلق بالأسباب الوراثية والعادات المسببة لسوء الإطباق، مثل دفع اللسان والتنفس من الفم. أظهرت الطالبات وطلاب التخصصات العلمية

درجات معرفة أعلى قليلاً، على الرغم من أن هذه الاختلافات لم تكن ذات دلالة إحصائية. على الرغم من السلوكيات الإيجابية تجاه العلاج، إلا أن الإقبال الفعلي على العلاج والالتزام بالرعاية بعد العلاج ظل منخفضاً. تُسلط النتائج الضوء على الحاجة إلى برامج تعليمية مُحسّنة تُركز على الجوانب الوقائية والسببية لصحة تقويم الأسنان بين طلاب الجامعات.

الكلمات المفتاحية: تقويم الاسنان، طلاب الجامعة، معرفة، السلوك، ليبيا.

Introduction:

Oral health plays a crucial role in overall health. One prevalent dental issue impacting oral health is malocclusion, which ranks just next to other common problems like dental caries and periodontal diseases (1). Malocclusion is defined by an improper relationship between the dental arches in any plane or the misalignment of teeth (2,3).

This condition can disrupt oral functions such as chewing, swallowing, and speaking (4). In addition to physical effects, malocclusion significantly affects patients' psychological and social well-being, particularly concerning dentofacial aesthetics, as well as their quality of life, including self-esteem and self-image (5, 6). Therefore, early identification and intervention are vital for managing both the functional and psychological effects of malocclusion, highlighting the need for timely orthodontic treatment (7). Orthodontics is an effective solution for addressing the health and aesthetic challenges linked to malocclusion (8).

Adolescence is seen as the best time for such interventions, with many teenagers seeking orthodontic care during their middle and high school years (9). The decision to pursue treatment largely depends on individuals' attitudes towards orthodontics, as well as their awareness, beliefs, and behaviours regarding malocclusion, which are essential for effective care (10, 11). Evaluating adolescents' knowledge and attitudes is crucial for identifying barriers and facilitators in accessing orthodontic treatment. Understanding these factors can improve treatment decisions and guide interventions, ultimately enhancing treatment results (3).

Although some studies have explored knowledge, attitudes, and practices related to orthodontic treatment (12, 13), there is a lack of sufficient research on awareness among students. Therefore, this study aims to assess and compare awareness, knowledge and attitudes towards orthodontic treatment among students from public and private universities.

Material and methods:

Study Design and Setting:

A cross-sectional descriptive study was conducted to assess the knowledge and attitudes of university students toward orthodontic treatment. The research was carried out in Derna City, Libya, across multiple universities representing both public and private institutions. Data collection was conducted during the 2024-2025 academic year.

Ethical Considerations:

Ethical approval for the study was obtained from the Ethics Committee of the University of Dentistry. Participation was voluntary, and informed consent was obtained from all respondents. Data confidentiality and anonymity were strictly maintained throughout the study.

Study Population and Sample Size:

The study population comprised undergraduate university students from various academic disciplines, including both science and arts departments. A total of 461 students participated in the study, consisting of 158 males (34.3%) and 303 females (65.7%). Participants were selected using a convenience sampling method to ensure inclusion from different academic years and departments.

Inclusion and Exclusion Criteria:

Students enrolled in undergraduate programs at Derna universities who consented to participate were included. Students with professional dental training or those previously enrolled in orthodontic courses were excluded to avoid bias due to prior specialized knowledge.

Validity and Reliability:

The questionnaire was adapted from previously validated instruments (14-17) and reviewed by two orthodontic specialists for content validity. A pilot study involving 30 students was conducted to assess clarity and internal consistency, yielding a Cronbach's alpha of 0.82 for the knowledge items and 0.79 for the attitude items, indicating acceptable reliability.

Data Collection Instrument:

Data were collected using a structured, self-administered questionnaire designed to evaluate participants' knowledge and attitudes toward orthodontic treatment and its oral health effect.

The questionnaire consisted of three sections:

1. **Demographic information:** age, gender, university type (public or private), academic department (science or arts), and educational level.
2. **Knowledge section:** 16 items assessing participants' awareness of orthodontic treatment, causes of malocclusion, and potential effects of irregular teeth.
3. **Attitude section:** 13 items evaluating perceptions toward orthodontic treatment, willingness to undergo treatment, and treatment compliance behaviours.

Each knowledge item was scored as "1" for a correct response and "0" for an incorrect response. The total knowledge score ranged from 0 to 16, with higher scores indicating better knowledge. Attitude responses were measured on a Likert-type scale, where higher scores reflected more positive attitudes toward orthodontic care.

Data Analysis:

Data were entered and analyzed using IBM SPSS Statistics (Version 25). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize demographic variables and overall scores.

Comparative analyses were performed using:

- **Independent samples t-test** to compare mean knowledge and attitude scores by gender and university type. A p-value < 0.05 was considered statistically significant.

Results:

A total of 461 university students participated in the study, including 158 males (34.3%) and 303 females (65.7%). The mean age was 21.58 ± 4.56 years. The average number of children per family was 4.77 ± 2.08 , and the mean birth order was 2.95 ± 2.20 . Most participants were from science departments (79.8%), and 82.2% were enrolled in public universities (Table 1).

Table (1): Demographic data

Variables	N (%)
Age	Mean SD
Age by years	21.58±4.56
Number of children in the family	4.77±2.08
Your position among your siblings	
Knowledge	2.95±2.20
Attitude	
	11.86±2.04
	6.84±2.39
Sex	
Male	158(34.3%)
Female	303(65.7%)
Educational level	
Premedical	41(8.9%)
First grade	156(33.8%)
Second grade	78(16.9%)
Third grade	78(16.9%)
Fourth grade	47(10.2%)
Fifth grade	12(2.6%)
Internal	49(10.6%)
Department	
Science	368(79.8%)
Art	93(20.2%)
University type	
Public	379(82.2%)
Private	82(17.8%)

Table (2): Knowledge assessment of participants Toward orthodontics treatment

Questions (16 questions related for knowledge assessment)	N (%)
Have you heard of an Orthodontist? Yes No	401(87%) 60(13.1%)
Are you aware that orthodontist arrange irregular teeth? Yes No	422(91.5%) 39(8.5%)
Have you heard about the irregularity of teeth? Yes No	422(91.5%) 39(8.5%)
Have you noticed people having irregular teeth? Yes No	424(92%) 37(8%)
Do you think heredity can influence the arrangement of teeth? Yes No	224(48.6%) 237(51.4%)
Do you think habits like thumb sucking can cause irregularity of teeth? Yes No	338(73.3%) 123(26.7%)
Do you think habits like tongue thrusting can cause irregularity of teeth? Yes No	202(43.8%) 259(56.2%)
Do you think habits like mouth breathing can cause irregularity of teeth? Yes No	326(70.7%) 135(29.3%)
Do you think irregular teeth can affect chewing ability? Yes No	253(54.9%) 208(45.1%)
Do you think irregular teeth can affect speech? Yes No	314(68.1%) 147(31.9%)
Do you think irregular teeth can affect oral hygiene? Yes No	247(53.6%) 214(46.4%)
Do you think dental check-up and treatment of irregularity is essential in early childhood and adolescent? Yes No	447(97%) 14(3%)
Do you know crooked teeth have ill effects? Yes No	408(88.5%) 53(11.5%)
Have you seen people wearing braces? Yes No	436 (94.6%) 25 (5.4%)
Did you know braces at the earlier age would improve facial appearance? Yes No	433(93.9%) 28(6.1%)
Are you aware that few teeth may have to be removed for aligning irregular teeth? Yes No	352(76.4%) 109(23.6%)

Knowledge assessment of participants Toward orthodontics treatment:

As shown in Table 2, overall knowledge levels were high. Most respondents (87%) had heard of an orthodontist, and more than 90% knew that orthodontists correct irregular teeth. Awareness of tooth irregularity and its effects was also high (91.5%–92%). However, only **48.6%** recognized heredity as a

contributing factor, and **43.8%** were aware of tongue thrusting as a cause of malalignment. Conversely, **73.3%** and **70.7%** correctly identified thumb sucking and mouth breathing, respectively, as contributing habits. Regarding the consequences of malaligned teeth, **68.1%** agreed that it could affect speech, and **54.9%** believed it could affect chewing ability. Almost all participants (**97%**) believed early dental check-ups were essential, and **93.9%** acknowledged that early treatment improves facial appearance. About **76.4%** were aware that some teeth may need to be extracted for alignment.

Attitude assessment of participants Toward orthodontics treatment:

Table (3) shows attitude assessment of participants Toward orthodontics treatment.

Table 3: Attitude assessment of participants Toward orthodontics treatment.

Questions (13questions related for Attitude assessment)	N (%)
Has anyone advised you to get your teeth aligned? Yes No	166(36%) 295(64%)
Do you think irregular teeth can affect appearance? Yes No	444(96.3%) 17(3.7%)
Do you believe teeth should be properly aligned for a better facial appearance? Yes No	419(90.9%) 42(9.1%)
Have you ever felt the need to wear braces? Yes No	240(52.1%) 221(47.9%)
Would you do orthodontic treatment if it takes 1-2 years? Yes NO	315(68.3%) 146(31.7%)
Will you agree, if some teeth have to be removed for orthodontic treatment? Yes No	304(65.9%) 157(34.1%)
Will you wear additional retainer appliance for 6-12 months after treatment completion? Yes No	325(70.5%) 136(29.5%)
Will you continue treatment if you experience slight pain, ulcerations or discomfort? Yes No	360(78.1%) 101(21.9%)
Do you know that orthodontic treatment is costly? Yes No	404(87.6%) 57(12.4%)
Have you undergone any treatment for irregular teeth in the past? Yes No	73(15.8%) 388(84.2%)
Was the treatment completed as planned? Yes No	45(61.6%) 28(38.3%)
Did you wear retainer for the entire duration specified by your doctor? Yes No	31(42.4%) 42(57.5%)
Did you consult your doctor for any complaints after completion of treatment? Yes No	31(42.4%) 42(57.5%)

Table 3 presents participants' attitudes. The majority (**96.3%**) believed irregular teeth affect appearance, and **90.9%** considered alignment important for facial aesthetics. More than half (**52.1%**) expressed willingness to wear braces, and **68.3%** were willing to undergo treatment lasting 1–2 years. Regarding treatment compliance, **70.5%** were willing to wear a retainer after treatment, and **78.1%** would continue treatment despite discomfort. Only **15.8%** had undergone orthodontic treatment; among them, **61.6%** completed it as planned, and **42.4%** adhered to retainer use and post-treatment follow-up.

Comparison of knowledge and attitude according to type of school Toward orthodontics treatment:

No significant difference was found in knowledge between public (11.89 ± 2.01) and private (11.71 ± 2.19) university students ($p = 0.477$). Similarly, the difference in attitude scores between public (6.75 ± 2.36) and private (7.29 ± 2.48) students was not statistically significant ($p = 0.064$) (Table 4).

Table (4): Comparison of knowledge and attitude according to type of school Toward orthodontics treatment

	Type of school (N)	Mean SD	P-value
Knowledge	Government (379)	11.89±2.01	0.477*
	Private (82)	11.71±2.19	
Attitude	Government (379)	6.75±2.36	0.064*
	Private (82)	7.29±2.48	

*Independent Sample T Test, statistically significant at $p < 0.05$

Comparison of knowledge and attitude according to gender Toward orthodontics treatment:

Female students showed slightly higher mean knowledge (11.92 ± 2.05) and attitude (6.94 ± 2.35) scores than males (11.75 ± 2.04 and 6.65 ± 2.45 , respectively), but these differences were not significant ($p > 0.05$) (Table 5).

Table (5): Comparison of knowledge and attitude according to gender Toward orthodontics treatment

	Gender (N)	Mean SD	P-value
Knowledge	Male (158)	11.75±2.04	0.423*
	Female (303)	11.92±2.05	
Attitude	Male (158)	6.65±2.45	0.219*
	Female (303)	6.94±2.35	

*Independent Sample T Test, statistically significant at $p < 0.05$

Comparison of knowledge and attitude according to type of Department Toward orthodontics treatment:

Science students had significantly higher knowledge scores (12.01 ± 2.10) than art students (11.26 ± 1.70 , $p < 0.001$). However, attitude scores did not differ significantly between the two groups ($p = 0.804$) (Table 6).

Table (6): Comparison of knowledge and attitude according to type of Department Toward orthodontics treatment.

	Type of Department (N)	Mean SD	P-value
Knowledge	Science (368)	12.01±2.10	0.000*
	Art (93)	11.26±1.70	
Attitude	Science (368)	6.83±2.33	0.804*
	Art (93)	6.90±2.64	

*Independent Sample T Test, statistically significant at $p < 0.05$

Discussion:

This study evaluated the knowledge and attitudes of students at the university of Derna, Libya, regarding orthodontic treatment. The overall findings revealed a generally high level of awareness concerning orthodontic care, particularly regarding its role in improving dental aesthetics and function. However, certain misconceptions and limited understanding of etiological factors persisted, indicating areas where educational efforts could be strengthened.

Participants demonstrated strong general knowledge of orthodontic treatment, with most recognizing that orthodontists correct irregular teeth and enhance facial appearance. This high level of awareness aligns with earlier studies that reported similar findings among university populations (18, 19). Despite this, fewer participants identified genetic and habitual factors such as heredity and tongue thrusting, as causes of malocclusion, with only 48.6% and 43.8% acknowledging these associations, respectively. Comparable results have been noted by Liu and Li (20), who found limited understanding of the etiological role of oral habits among adolescents and young adults.

In terms of attitudes, the majority of students held positive views toward orthodontic care, with more than 90% believing that properly aligned teeth contribute to better aesthetics and overall appearance. Nevertheless, only 15.8% of participants had previously undergone treatment, and less than half adhered to post-treatment retainer use and follow-up visits. This discrepancy between positive attitude and actual behaviour reflects what previous KAP (Knowledge, Attitude, Practice) studies have termed

the “knowledge–action gap” (21). It suggests that awareness and favourable perceptions do not necessarily translate into active treatment-seeking or compliance behaviours.

No statistically significant differences in knowledge or attitude were observed between male and female participants or between students from public and private universities. These findings are consistent with prior research that reported similar trends across demographic subgroups (22). However, a significant difference in knowledge was noted between science and arts students, with science students demonstrating higher mean scores. This outcome is likely attributable to the greater exposure of science students to biological and health-related content, which may enhance their understanding of orthodontic concepts. The absence of a corresponding difference in attitude suggests that aesthetic perception and general awareness of dental appearance transcend disciplinary boundaries.

The relatively high level of knowledge among students may also reflect the growing visibility of orthodontic treatment through media and social networks, which increasingly emphasize cosmetic and dental health awareness. However, the lower recognition of etiological factors such as tongue thrusting and heredity indicates that public knowledge may be more oriented toward outcomes (e.g., straight teeth, improved looks) than causes or prevention. As understanding of these causal elements can influence early consultation and preventive actions, educational programs should aim to provide more comprehensive information on malocclusion aetiology.

The low rate of treatment uptake and poor adherence to post-treatment recommendations—despite strong positive attitudes, suggests potential barriers such as cost, duration, discomfort, and perceived necessity. Similar obstacles have been documented in orthodontic patient populations across different contexts (19, 22).

Addressing these factors through awareness campaigns, cost transparency, and university-based dental services could help bridge the gap between attitude and behaviour.

From a public health perspective, the significant difference in knowledge by academic discipline underlines the importance of integrating dental health education into non-scientific curricula. Universities could consider implementing short lectures, workshops, or awareness campaigns that focus on the causes of malocclusion, the benefits of early detection, and the importance of retention post-treatment. Enhancing access to orthodontic screening within university settings may also promote early intervention and adherence to care.

Conclusion

This study demonstrated that university students in Derna, Libya, possess generally high levels of knowledge and positive attitudes toward orthodontic treatment. Most participants understood the functional and aesthetic benefits of orthodontic care, although notable gaps remained regarding the genetic and habitual causes of dental malocclusion. While the overall perception of orthodontic treatment was favourable, actual treatment experience and adherence to post-treatment recommendations were limited, highlighting a gap between awareness and behaviour.

Differences in knowledge were found between science and arts students, suggesting that academic background influences awareness levels, whereas gender and university type did not significantly affect outcomes. These results emphasize the need for targeted educational initiatives that address not only the aesthetic outcomes of orthodontic care but also its preventive and etiological aspects. Encouraging early orthodontic assessment and improving access to treatment through university-based health programs may enhance both awareness and compliance.

References:

1. Dhar V, Jain A, Van Dyke TE KA. Prevalence of gingival diseases, malocclusion and fluorosis in school-going children of rural areas in Udaipur district. *J Indian Soc Pedod Prev Dent.* 2007;25(2):103–15.
2. Stomatologic S. Worldwide prevalence of malocclusion in the different stages of dentition: A systematic review and meta-analysis. *Eur J Pediatr Dent.* 2020;21(115).
3. Liu D, Li H. Knowledge, attitude, and practice of adolescents and parents toward malocclusion and orthodontic treatment. *Sci Rep.* 2024;14(1):1–9.
4. WR P. Contemporary Orthodontics. Mo, USA: Mosby, St. Louis; .; 2007.
5. Choi SH, Kim JS, Cha JY HC. Effect of malocclusion severity on oral health-related quality of life and food intake ability in a Korean population. *Am J Orthod Dentofac Orthop [Internet].* 2016;149(3):384–390. Available from: doi:10.1016/j.ajodo.2015.08.019%0A
6. Helm S, Kreiborg S SB. Psychosocial implications of malocclusion: a 15-year follow-up study in 30-year-old Danes. *Am J Orthod [Internet].* 1985;87:110–118. Available from: doi:10.1016/0002-9416(85)90020-X
7. Talpos S, Pricop M, Szuhaneck C, Avramut R N-SN. Age-Related Quality of Life and Psychosocial Impact of Chin Asymmetry in Adolescents and Young Adults Undergoing Orthodontic and

- Orthognathic Correction. *Healthc (Basel)* [Internet]. 2023;11(13):1855. Available from: doi: 10.3390/healthcare11131855.
8. Huang T, Wang Z LJ. Efficiency of photobiomodulation on accelerating the tooth movement in the alignment phase of orthodontic treatment-A systematic review and meta-analysis. *Heliyon*. 2023 [Internet]. 9AD;2. Available from: doi: 10.1016/j.heliyon.2023.e13220.
 9. Fleming PS. Timing orthodontic treatment: Early or late? *Dent J*. 2017;62(1):11–19.
 10. Almoammar S, Asiri E, Althogbi SI, Saad R, Al-Shahrani A, Hassan N, et al. Knowledge and attitude of general population towards orthodontic treatment in Aseer Region, Kingdom of Saudi Arabia. *World J Dent*. 2017;8(6):483–9.
 11. Nobre, R. & Pozza DH. Parental influence in orthodontic treatment: A systematic review. *Med Pharm Rep*. 2023;96:28–34.
 12. Shrestha RM, Bhattarai P, Dhakal J SS. Knowledge, attitude and practice of patients towards orthodontic treatment : A multi-centric study. *Orthod J Nepal*. 2014;4(1):6–11.
 13. Shrestha RM SS. Perception and practice of Nepalese adult and adolescent patients towards orthodontic treatment. *Orthod J Nepal*. 2015;5(1):7–11.
 14. Jyoti Dhakal, Manish Shrestha, Meenu Shrestha, Asal Acharya. Comparison of Knowledge and Attitude Towards Orthodontic Treatment Among High School Students. *Orthodontic Journal of Nepal*, Vol. 9 No. 2, July-December 2019
 15. Acharya A, Mishra P, Shrestha RM, Shah P. Orthodontic treatment knowledge among general dentists and non-orthodontic specialists. *Orthod J Nepal*. 2019;9(1):39-43.
 16. Shekar S, Chandrashekar BR, Bhagyalakshmi A, Avinash BS, Girish MS. Knowledge, attitude, and practices related to orthodontic treatment among college students in rural and urban areas of Mysore, India: A cross-sectional questionnaire study. *Indian J Oral Heal Res*. 2017;3(1):9-14.
 17. Zakirulla M, Almubarak H, Fageeh SN, Alghothimi AA, Alqahtani SK, Alqahtani FM, et al. . Awareness and behaviour related to orthodontic treatment among school children in Aseer region, Kingdom of Saudi Arabia. *Open J Stomatol* 2019;9:87-94.
 18. Agrawal, R. Knowledge, attitude and perception of orthodontic treatment among dental students. *International Journal of Dental Research* 2018; 6(1), 3-5.
 19. Singh, K. K., Sah, B., & Singh, R. J.. Knowledge, attitude and practice regarding orthodontic treatment among medical students of a teaching hospital, Birgunj, Nepal. *Science International* 2021; 33, 45-49.
 20. Liu, D., & Li, H. Knowledge, attitude, and practice of adolescents and parents toward malocclusion and orthodontic treatment. *Scientific Reports* 2024); 14, 26553. <https://doi.org/10.1038/s41598-024-77474-8>.
 21. Zhang, Y., Gu, L., Du, B., Xu, J., & Du, S. Knowledge, attitude, and practice of orthodontic treatment among student patients preparing for or undergoing treatment. *Scientific Reports* 2025; 15, 17838. <https://doi.org/10.1038/s41598-025-97801-x>.
 22. Mishra, J., et al. Determining orthodontic knowledge and awareness in college-going and working adults of Lucknow, Uttar Pradesh. *Journal of Orthodontic Science* 2022; 11, 25. <https://doi.org/10.1177/03015742211022157>