AMJ Australasian Medical Journal [AMJ 2023;16(12):1112-1129]

Evaluation of Orthodontic Treatment Need Among Saudi Population: A Cross-Sectional Study

Rania Adel Mitwally[1],Joud Essam Jalloun[2], Sara Hussain Alessa[2], Ghadah Mustafa Aljohani[2], Khadijah Abdulrahman Alamoudi[3], Shaher Musaad Alsharari[3], Nouf Nazzal Alenazi4 and Hoda Jehad Abousada[5*]

[1] Department of Orthodontics, King Abdulaziz University, MOrth, Royal College of surgeons of Edinburgh, UK

[2] General Dentist, BDS, KSA.

[3] Dental Intern, BDS, KSA

[4]Dental Assistant, KSA

[5] Department of Obstetrics & Gynecology, Master SA, KSA, Saudi Arabia

RESEARCH

Please cite this paper as: Mitwally RA, Jalloun JM, Alessa SH, Aljohani GM, Alamoudi KA, Alsharari SM, Alenazi NN, Abousada HJ. Evaluation of Orthodontic Treatment Need Among Saudi Population: A Cross-Sectional Study. AMJ 2023;16(12):1112-1129.
https://doi.org/10.21767/AMJ.2023.4008

Corresponding Author:
Hoda Jehad Abousada
Department of Obstetrics & Gynecology,
Master SA,
KSA, Saudi Arabia
dr.huda1992@outlook.com

ABSTRACT

Objective

To assess the orthodontic treatment needs among the Saudi population through a cross-sectional study, providing a comprehensive understanding of the prevalence and factors influencing treatment needs.

Methods

This research employs a cross-sectional study design to assess the orthodontic treatment needs among the Saudi population. Cross-sectional studies provide a snapshot of the population at a given point in time and are suitable for determining the prevalence of a specific condition or treatment need in a defined population.

Results

The study included 480 participants. The most frequent age among them was 18-28 years (n= 199, 41.5 Per Cent) followed by 29-239 years (n= 191, 39.8 Per Cent). The most frequent gender among study participants was Male (n= 297, 61.9 Per Cent) followed by Female (n= 183, 28.1 Per Cent). The most frequent nationality among study participants was Saudi (n= 450, 93.8 Per Cent) followed by non-Saudi (n= 30, 6.3 Per Cent). Participants were asked if they think they need orthodontics. There were 194 participants not need it (40.4 Per Cent), followed by 151 maybe with (31.5 Per Cent), and 135 participants think definitely needed it (28.1 Per Cent).

Conclusion

Study results showed that most of the study participants are from the university according to their educational level. The most common nationality was Saudi. Most of them were male. Most of the participants think they don't need orthodontics. In addition, most of the study participants had good social connections.

Key Words

Orthodontic Treatment

Introduction

Malocclusion is a noticeable divergence from a perfect occlusion [1]. Many of these variances are within the range of what is to be defined as typical physiological variation. However, certain aberrations may have a deleterious impact on dento-facial development, leading to reduced oral functions, susceptibility to facial traumatic injuries, and the development of caries and periodontal diseases [2,3]. In addition, malocclusion might create psychosocial difficulties connected to impaired/altered dento-facial esthetics [4,5]. Orthodontic treatments include a substantial fraction of

dental therapy and in most instances, they are carried out throughout adolescence and early adulthood to cure malocclusion concerns.

The planning of orthodontic treatment within a public health system involves information on the orthodontic treatment requirements of the community [6,7]. With the increased need for orthodontic treatment, a range of clinician based indices have been created to identify different forms of malocclusion, and assess their orthodontic treatment requirement [8]. These indices may be employed in evaluating orthodontic treatment demand, prioritizing treatment need in patients referred for orthodontics especially when there are limited resources for orthodontics among public health care facilities, and protecting for the patients [9]. One of the most often used indices that measure the orthodontic treatment requirements among children and adults is the Index of Orthodontic Treatment Need (IOTN), which was established by Brook and Shaw. The IOTN comprises two different components, the aesthetic (AC) and dental health components (DHC), which rank malocclusion in increasing importance according to aesthetic concerns and dental health consequence [10].

Various studies have employed the index of orthodontic treatment need (IOTN) for assessing the degree of malocclusion and the requirement for orthodontic treatment in various demographic categories. For instance, the prevalence of orthodontic treatment requirement using IOTN-DHC was 21.3 Per Cent in France [11], 22 Per Cent in Tanzania [12], 28 Per Cent in Kuwait [13], 34.2 Per Cent in Brazil [14], 34 Per Cent in Jordan [15], 36.1 Per Cent in Iran [16], 38.8 Per Cent in Turkey [17], and 71.6 Per Cent in Saudi Arabia [18].

With the development of the socio-economic condition, the demand for orthodontic treatment is expanding rather quickly. Many people with malocclusion disorders attend dental clinics in both government and private health institutions [19-20]. However, orthodontic concern like other oral health care treatments is given low priority in the health care system due to the high cost of treatment and the dearth of orthodontists. It is crucial to collect epidemiological data to assess the entire demand for orthodontic treatment in this area for the reasons stated above and since no prior research on Saudi population has been undertaken.

The evaluation of orthodontic treatment need among the Saudi population is a crucial research problem with significant implications for public health and healthcare planning. Saudi Arabia, like many other countries, has witnessed a growing demand for orthodontic services due to an increasing awareness of the importance of dental aesthetics and oral health. However, there is a lack of comprehensive, up-to-date data regarding the prevalence and severity of malocclusions and the overall orthodontic treatment needs of the Saudi population. This research problem seeks to address this gap by conducting a cross-sectional study to determine the orthodontic treatment needs of various age groups and demographics within Saudi Arabia.

Understanding the orthodontic treatment needs in Saudi Arabia is essential for developing effective public health policies, allocating resources, and improving access to orthodontic care. Moreover, this research problem holds the potential to shed light on cultural and socioeconomic factors that may influence orthodontic treatment decisions in the Saudi context. By investigating the prevalence of malocclusions and assessing the desire for orthodontic treatment among different segments of the population, this study can guide the development of targeted education and intervention programs to promote oral health and address orthodontic concerns.

Furthermore, the research problem can contribute valuable insights to the broader field of orthodontics by comparing the findings in Saudi Arabia with global trends. This cross-sectional study can serve as a basis for international comparisons and provide valuable data to assist in the development of standardized assessment tools and treatment guidelines. Ultimately, the evaluation of orthodontic treatment needs among the Saudi population is not only a local concern but also a research problem with the potential for significant contributions to oral health research and public policy both within and beyond the Kingdom of Saudi Arabia.

Methods

Study design

This research employs a cross-sectional study design to assess the orthodontic treatment need among the Saudi population. Cross-sectional studies provide a snapshot of the population at a given point in time and are suitable for determining the prevalence of a specific condition or treatment need in a defined population.

Study approach

The study will be conducted in various urban and rural areas across different regions of Saudi Arabia to ensure a

representative sample. The choice of settings will be guided by the need to capture the diversity in the population's geographic, socio-economic, and cultural characteristics.

Study population

The target population for this study comprises individuals residing in Saudi Arabia of varying age groups, ethnic backgrounds, and socio-economic status. Participants will be selected from both urban and rural areas to ensure a comprehensive representation of the Saudi population.

Study sample

The sample size will be determined using statistical techniques to ensure adequate power and precision for the study. A minimum of 1000 participants will be recruited to provide a robust dataset for analysis.

Study tool

The questionnaire will include standardized items to measure perceptions and attitudes towards orthodontic treatment. For clinical assessments, established orthodontic indices such as the Dental Aesthetic Index (DAI) and the Index of Orthodontic Treatment Need (IOTN) will be used to evaluate malocclusions and treatment need.

Data collection

Data will be collected through structured interviews and clinical examinations. Trained interviewers will administer a questionnaire to assess participants' perception of orthodontic treatment need, their motivations for seeking treatment, and any barriers they face. Clinical examinations will be conducted to assess malocclusions and treatment needs.

Data analysis

Data will be analyzed using appropriate statistical software. Descriptive statistics, including means, frequencies, and percentages, will be used to summarize the data. Chi-square tests, t-tests, and regression analyses will be employed to explore associations and factors influencing orthodontic treatment needs. The significance level will be set at $p < 0.05$.

Ethical considerations

This study will adhere to ethical principles, including informed consent from participants, anonymity, and confidentiality of collected data. Ethical approval will be obtained from the relevant institutional review board. Participants will be informed about the study's objectives, and their participation will be entirely voluntary. They will have the right to withdraw from the study at any time without any adverse consequences. The research team will ensure that the study complies with the ethical guidelines established by the Declaration of Helsinki and local regulations governing human research.

Results

The study included 480 participants. The most frequent age among them was 18-28 years (n= 199, 41.5 Per Cent) followed by 29-239 years (n= 191, 39.8 Per Cent). Figure 1 shows the age distribution among study participants. The most frequent gender among study participants was Male (n= 297, 61.9 Per Cent) followed by Female (n= 183, 28.1 Per Cent). Figure 2 shows the age distribution among study participants. The most frequent nationality among study participants was Saudi (n= 450, 93.8 Per Cent) followed by non-Saudi (n= 30, 6.3 Per Cent). Figure 3 shows the nationality of the study participants.

Participants were asked if they think they need orthodontics. There were 194 participants not need it (40.4 Per Cent), followed by 151 maybe with (31.5 Per Cent), and 135 participants think definitely needed it (28.1 Per Cent). Figure 4 shows the percentage of participants who answered about the need for orthodontics.

Participants were asked to assess the Characteristics of the plates according to the level of need for orthodontic treatment. Their responses and results are presented in Table 1.

Discussion

Long-term effects on psychological and social health have been linked to the prevalence of malocclusion [21]. Comprehensive data on malocclusion, including prevalence, is important for the prevention and treatment of this developmental disease [22,23]. This requires a well-thought-out strategy for oral health centered on orthodontic care. In order to determine the incidence of malocclusion in a population, researchers can only look at the range of deviations from normal occlusion [24], some of which may not even need treatment. However, the need of orthodontic treatment becomes more apparent when deviations in normal occlusion influence function and aesthetics [25]. As a result, it seems that indices are required for determining whether or not orthodontic treatment is required. There are a number of indices that have been established for this purpose [26], but the index of orthodontic treatment need (IOTN) [27] and the dental aesthetic index (DAI) are the most often used and accepted. To determine which patients would most benefit from orthodontic treatment, the IOTN assesses malocclusion based on the relative importance of

different occlusal features to oral health and perceived aesthetic impairment. Aesthetic and oral health are two of the factors included in the ranking. The IOTN aesthetic component is a self-reported assessment of dental beauty that may be used to assess the impact of malocclusions on one's own sense of aesthetic appeal[28]. The DAI computationally connects the clinical and aesthetic components to provide a single score that indicates malocclusion severity and orthodontic treatment requirement by combining physical and cosmetic elements of occlusion.

This topic has been the focus of several epidemiological research, many of which have been conducted in Iran. According to a survey of Iranian government statistics, the percentage of the population in need of orthodontic treatment ranged from 1.58 percent in Tehran to 48.2 percent in Shiraz. Among 5200 Tehran teenagers ages 14–16, 20 Per Cent had a clear need for orthodontic treatment as determined by the Iranian Orthodontic Treatment Need Index (IOTN) [29]. 36 Per Cent of Isfahan's teenagers, according to research by Borzabadi-Farahani et al. [30], need orthodontic care. Twenty-four percent of 1818 teenagers in another Shiraz DAI research reported a strong need for orthodontic treatment [31]. Additionally, Eslamipour et al. [32] utilizing DAI found that 20 Per Cent of 728 teenage patients in Isfahan required orthodontic treatment.

This research indicated that the prevalence of the need for orthodontic treatment using the DAI was 16.1 Per Cent. According to DAI, the orthodontic treatment demand in India [33] and Malaysia [34] was 12.8 Per Cent and 24.1 Per Cent, respectively, comparable to the figures observed in Iran [35]. However, this figure rose to 44.7 Per Cent in African nations [36-39]. Studies have revealed rates of prevalence in the United States (53.2 Per Cent; 40) and Brazil (32.8 Per Cent; [40,41] that are greater than the prevalence rate in Iran. The prevalence of orthodontic treatment requirement in Iran was comparable to that of other European nations such as Italy (27.3 Per Cent) [42], Serbia (27.4 Per Cent) [43], and Spain (21.8 Per Cent) [44], according to the findings of DHC-IOTN. According to AC-IOTN studies, the prevalence of the requirement for orthodontic treatment was 4.8 Per Cent in Iran, 2.2 Per Cent in London [45], 7.1 Per Cent in Brazil [40], and 4.4 Per Cent in Spain [44]. Eastern Asian nations like Malaysia (22.8 Per Cent) [38] and Africa (above 10 Per Cent) [46,47] have greater incidence rates than Iran.

The findings indicate a discrepancy between how individuals and professionals rate their own oral health and attractiveness. This is due to the fact that all dental characteristics, such as gaps, crowding, crossbite, overjet, and open bite, are taken into account when using professional measurements (DHC-IOTN and DAI). The AC-IOTN self-assessment tool, however, is only concerned with the smile's frontal appeal. Thus, these indices reveal many facets of the need for orthodontic treatment, and they may all be employed to supplement one another in epidemiologic surveys and diagnostic processes [48-52].

AC (IOTN) and DAI have both been proven to have a good degree of diagnostic agreement and correlation [50,51]. The correlation between DAI and AC scores (rho = 0.795) was found to be statistically significant in the Iranian research conducted by Borzabadi-Farahani et al. This finding seems sense, given that both indexes depend substantially on occlusion's aesthetic qualities.

Conclusion

Study results showed that most of the study participants are from the university according to their educational level. The most common nationality was Saudi. Most of them were male. Most of the participants think they don’t need orthodontics. In addition, most of the study participants had good social connections.

References

1. Houston WJB, Stephens C, Tulley W. A textbook of orthodontics. Great Britain: Wright; 1992. p. 1–13.
2. Proffit WR, Fields HW, Sarver DM. Contemporary Orthodontics. 5th ed. St Louis: Mosby Elsevier; 2013. p. 15–23.
3. Shaw WC, O'brien KD, Richmond S, Brook P. Quality control in orthodontics: risk/benefit considerations. British dental journal. 1991;170(1):33-7. Doi: https://doi.org/10.1038/sj.bdj.4807399
4. Helm S, Kreiborg S, Solow B. Psychosocial implications of malocclusion: a 15-year follow-up study in 30-year-old Danes. Am J Orthod. 1985;87(2):110-8. Doi: https://doi.org/10.1016/0002-9416(85)90020-X
5. Shaw WC, Richmond S, Kenealy PM, et al. A 20-year cohort study of health gain from orthodontic treatment: psychological outcome. Am J Orthod Dentofac Orthop. 2007;132(2):146-57. Doi: https://doi.org/10.1016/j.ajodo.2007.04.009
6. Foster TD, Menezes DM. The assessment of occlusal features for public health planning

purposes. American Journal of Orthodontics. 1976;69(1):83-90. Doi: https://doi.org/10.1016/0002-9416(76)90100-7
7. Thilander B, Pena L, Infante C, et al. Prevalence of malocclusion and orthodontic treatment need in children and adolescents in Bogota, Colombia. An epidemiological study related to different stages of dental development. Eur J Orthod. 2001;23(2):153-68. Doi: https://doi.org/10.1093/ejo/23.2.153
8. Available from: http://www.intechopen.com/books/principles-in-contemporary-orthodontics/an-overview-of-selectedorthodontic-treatment-need-indices.
9. Shaw WC, Richmond S, O'Brien KD. The use of occlusal indices: a European perspective. Am J Orthod Dentofac Orthop. 1995;107(1):1-0. Doi: https://doi.org/10.1016/S0889-5406(95)70151-6
10. Brook PH, Shaw WC. The development of an index of orthodontic treatment priority. Eur J Orthod. 1989;11(3):309-20.
11. Souames M, Bassigny F, Zenati N, et al. Orthodontic treatment need in French schoolchildren: an epidemiological study using the Index of Orthodontic Treatment Need. Eur J Orthod. 2006;28(6):605-9. Doi: https://doi.org/10.1093/ejo/cjl045
12. Mugonzibwa EA, Kuijpers-Jagtman AM, Van't Hof MA, et al. Perceptions of dental attractiveness and orthodontic treatment need among Tanzanian children. Am J Orthod Dentofac Orthop. 2004;125(4):426-34. Doi: https://doi.org/10.1016/j.ajodo.2003.11.002
13. Al-Azemi R, Årtun J. Orthodontic treatment need in adolescent Kuwaitis: prevalence, severity and manpower requirements. Med Princ Pract. 2010;19(5):348-54. Doi: https://doi.org/10.1159/000316371
14. Dias PF, Gleiser R. Orthodontic treatment need in a group of 9-12-year-old Brazilian schoolchildren. Braz Oral Res. 2009;23:182-9. Doi: https://doi.org/10.1590/S1806-83242009000200015
15. Alhaija ES, Al-Nimri KS, Al-Khateeb SN. Orthodontic treatment need and demand in 12–14-year-old north Jordanian school children. Eur J Orthod. 2004;26(3):261-3. Doi: https://doi.org/10.1093/ejo/26.3.261
16. Borzabadi-Farahani A, Borzabadi-Farahani A, Eslamipour F. Orthodontic treatment needs in an urban Iranian population, an epidemiological study of 11-14 year old children. Eur J Paediatr Dent. 2009;10(2):69.
17. Üçüncü N, Ertugay E. The use of the Index of Orthodontic Treatment need (IOTN) in a school population and referred population. J Orthod. 2001;28(1):45-52. Doi: https://doi.org/10.1093/ortho.28.1.45
18. Hassan AH. Orthodontic treatment needs in the western region of Saudi Arabia: a research report. Head Face Med. 2006;2:1-6. Doi: https://doi.org/10.1186/1746-160X-2-2
19. Erik VE, Douglas GA, Mathias E, et al. The strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. Lancet. 2007;370(9596):1453–7.
20. Crowther P, Harkness M, Herbison P. Orthodontic treatment need in 10-year-old Dunedin schoolchildren. N Z Dent J . 1997;93(413):72-8.
21. Borzabadi-Farahani A. A review of the oral health-related evidence that supports the orthodontic treatment need indices. Prog Orthod. 2012;13(3):314-25. Doi: https://doi.org/10.1016/j.pio.2012.03.002
22. Jenny J, Cons NC. Comparing and contrasting two orthodontic indices, the Index of Orthodontic Treatment Need and the Dental Aesthetic Index. Am J Orthod Dentofac Orthop. 1996;110(4):410-6. Doi: https://doi.org/10.1016/S0889-5406(96)70044-6
23. Väkiparta MK, Kerosuo HM, Nyström ME, et al. Orthodontic treatment need from eight to 12 years of age in an early treatment oriented public health care system: a prospective study. Angle Orthod. 2005;75(3):344-9. Doi: https://doi.org/10.1043/0003-3219(2005)75[344:OTNFET]2.0.CO;2
24. Sandhu S, Bansal N, Sandhu N. Incidence of malocclusions in India: A review. J Oral Health Community Dent. 2012;6:21–4.
25. Traebert ES, Peres MA. Do malocclusions affect the individual's oral health-related quality of life?. Oral Health Prev Dent. 2007;5(1).
26. Shaw WC, Richmond S, O'Brien KD. The use of occlusal indices: a European perspective. Am J Orthod Dentofacial Orthop. 1995 1;107(1):1-0.Doi: https://doi.org/10.1016/S0889-5406(95)70151-6
27. Brook PH, Shaw WC. The development of an index of orthodontic treatment priority. Eur J Orthod. 1989 1;11(3):309-20.
28. Hunt O, Hepper P, Johnston C, et al. The aesthetic component of the index of orthodontic treatment need validated against lay opinion. Eur J Orthod. 2002 1;24(1):53-9.Doi: https://doi.org/10.1093/ejo/24.1.53
29. Safavi SM, Sefidroodi A, Nouri M, et al. Orthodontic treatment need in 14-16 year-old Tehran high school students. Aust Orthod J. 2009;25(1):8-11.

30. Farahani AB, Eslamipour F. The relationship between ICON index and dental and aesthetic components of IOTN index. World J Orthod. 2010;11(1):43-8.
31. Oshagh M, MOUMENI DS, OMID KM, et al. Evaluation of orthodontic treatment need according to Dental Aesthetic Index in 14-18 year old students in the city of Shiraz In 2007.
32. Eslamipour F, Borzabadi-Farahani A, Asgari I. Assessment of orthodontic treatment need in 11-to 20-year-old urban Iranian children using the dental aesthetic index (DAI). World J Orthod. 2010 1;11(4):e125-32.
33. Jha K, Saha S, Jagannatha GV, et al. Prevalence of malocclusion and its psycho-social impact among 12 To 15-year-old school children in Lucknow city. J. Clin Diagn Res: JCDR. 2014;8(10):ZC36.
34. Abdullah MS, Rock WP. Assessment of orthodontic treatment need in 5,112 Malaysian children using the IOTN and DAI indices. Comm dental health. 2001 1;18(4):242-8.
35. Koochmeshgi L, Hosseinzadeh Nik T, Kharrazi Fard M. Assesment of prevalence of dentofacial deformity and orthodontic treatment need in 12 year old students of Karaj. Iran J Epidemiol. 2007;3(4):29-34.
36. Danaee SM, Fijan S, Mohammadi N, et al. Evaluation of relationship between orthodontic treatment need according Dental Aesthetic Index (DAI) and student's perception in 11-14 year old students in the city of Shiraz in 2012. Int J Res Med Sci. 2015;3(5):1056-60.Doi: 10.5455/2320-6012.ijrms20150505
37. Danaei SM, Amirrad F, Salehi P. Orthodontic treatment needs of 12-15-year-old students in Shiraz, Islamic Republic of Iran. EMHJ-Eastern Mediterr Health J. 13(2), 326-334, 2007. 2007.
38. Khanehmasjedi M, Bassir L, Haghighizadeh M. Evaluation of relationship between orthodontic treatment need according dental aesthetic index (DAI) and Student's Perception in 11-14 year old students in the city of Ahwaz in 2005. J Mashhad Dent Sch. 2007 21;31(1, 2):37-46.
39. Utomi IL, Onyeaso CO. Malocclusion and orthodontic treatment need of patients attending the Lagos University Teaching Hospital, Lagos, Nigeria. Actual Odonto Estomatol Esp. 2015;38(150).
40. Almeida AB, Leite IC. Orthodontic treatment need for Brazilian schoolchildren: Astudy using the dental aesthetic index. Dent Press J Orthod. 2013;18:103-9. Doi: https://doi.org/10.1590/S2176-94512013000100021
41. Freitas CV, Souza JG, Mendes DC, et al. Need for orthodontic treatment among Brazilian adolescents: Evaluation based on public health. Rev Paul Pediatr. 2015;33:204-10.Doi: https://doi.org/10.1016/j.rpped.2014.04.006
42. Perillo L, Masucci C, Ferro F, et al. Prevalence of orthodontic treatment need in southern Italian schoolchildren. Eur J Orthod. 2010 1;32(1):49-53.
43. Janošević P, Stošić M, Janošević M, et al. Index of orthodontic treatment need in children from the Niš region. Vojnosanit Pregl. 2015;72(1):12-5.Doi: https://doi.org/10.1093/ejo/cjp050
44. Manzanera D, Montiel-Company JM, Almerich-Silla JM, et al. Orthodontic treatment need in spanish schoolchildren: An epidemiological study using the index of orthodontic treatment need. Eur J Orthod. 2009 1;31(2):180-3.Doi: https://doi.org/10.1093/ejo/cjn089
45. Alkhatib MN, Bedi R, Foster C, et al. Ethnic variations in orthodontic treatment need in London schoolchildren. BMC Oral Health. 2005;5:1-7.
46. Mugonzibwa EA, Kuijpers-Jagtman AM, Van't Hof MA, et al. Perceptions of dental attractiveness and orthodontic treatment need among Tanzanian children. Am J Orthod Dentofacial Orthop. 2004 1;125(4):426-34.Doi: https://doi.org/10.1016/j.ajodo.2003.11.002
47. Puertes Fernández N, Montiel Company JM, Almerich-Silla JM, et al. Orthodontic treatment need in a 12-year-old population in the Western Sahara. Eur J Orthod. 2011 1;33(4):377-80. Doi: https://doi.org/10.1093/ejo/cjq086
48. Van Wyk PJ, Drummond RJ. Orthodontic status and treatment need of 12-year-old children in South Africa using the Dental Aesthetic Index. SADJ: J South African Dentl Associ. 2005 1;60(8):334-6.
49. Josefsson E, Bjerklin K, Lindsten R. Malocclusion frequency in Swedish and immigrant adolescents influence of origin on orthodontic treatment need. Eur J Orthod. 2007 1;29(1):79-87.Doi: https://doi.org/10.1093/ejo/cjl054
50. Otuyemi OD, Noar JH. A comparison between DAI and SCAN in estimating orthodontic treatment need. Intern Dental J. 1996 1;46(1):35-40.
51. Shue Te Yeh M, Koochek AR, Vlaskalic V, et al. The relationship of 2 professional occlusal indexes with patients' perceptions of aesthetics, function, speech, and orthodontic treatment need. Am J Orthod Dentofacial Orthop. 2000 1;118(4):421-8.Doi https://doi.org/10.1067/mod.2000.107008
52. Borzabadi Farahani A, Eslamipour F, Asgari I. A comparison of two orthodontic aesthetic indices. Aust Orthod J. 2012;28(1):30-6.

Tables & Figures

Table 1: Characteristics of the plates according to the level of need for orthodontic treatment.

	I have this condition, and I think it does not need orthodontics	I have this condition, and I think it needs orthodontics	I have this condition, and I think it does not need orthodontics	I have this condition, and I think it needs orthodontics
Protrusion of the upper jaw	40 (8.3 Per Cent)	84 (17.5 Per Cent)	106 (22.1 Per Cent)	250 (52.1 Per Cent)
Retracted upper front incisors	23 (4.8 Per Cent)	29 (6 Per Cent)	115 (24 Per Cent)	313 (65.2 Per Cent)
Asymmetrical contact points for the back teeth	30 (6.3 Per Cent)	65 (13.5 Per Cent)	114 (23.8 Per Cent)	271 (56.5 Per Cent)
Open bite	30 (6.3 Per Cent)	55 (11.5 Per Cent)	94 (19.6 Per Cent)	301 (62.7 Per Cent)
Teeth crowding, increasing their number	37 (7.7 Per Cent)	38 (7.9 Per Cent)	130 (27.1 Per Cent)	275 (57.3 Per Cent)
Case of permanent tooth loss	40 (8.3 Per Cent)	59 (12.3 Per Cent)	148 (30.8 Per Cent)	233 (48.5 Per Cent)
Are any of the teeth in the jaws partially visible	37 (7.7 Per Cent)	58 (12.1 Per Cent)	125 (26 Per Cent)	260 (54.2 Per Cent)
Completely inapparent teeth	28 (5.8 Per Cent)	17 (3.5 Per Cent)	130 (27.1 Per Cent)	305 (63.5 Per Cent)
Abnormal occlusion of teeth against each other	39 (8.1 Per Cent)	53 (11 Per Cent)	113 (23.5 Per Cent)	275 (57.3 Per Cent)

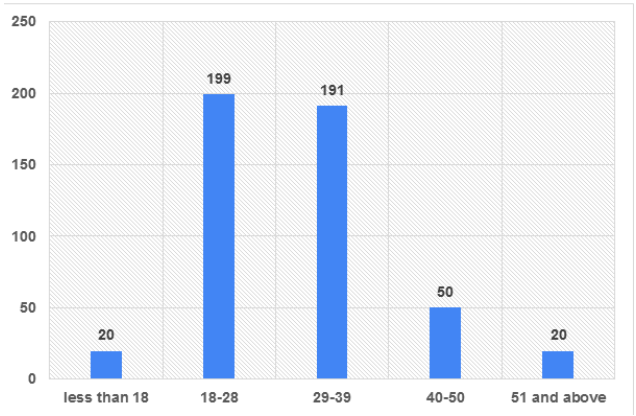

Figure 1: Age distribution among study participants.

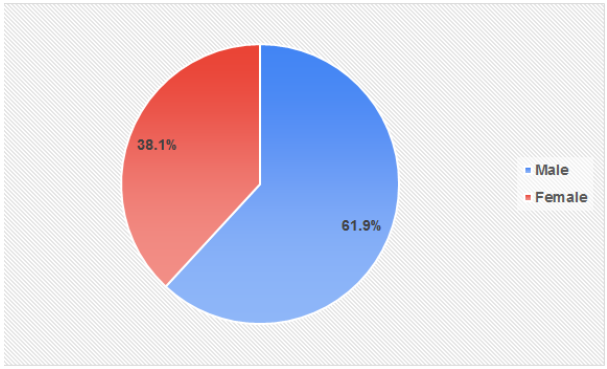

Figure 2: Gender distribution among study participants.

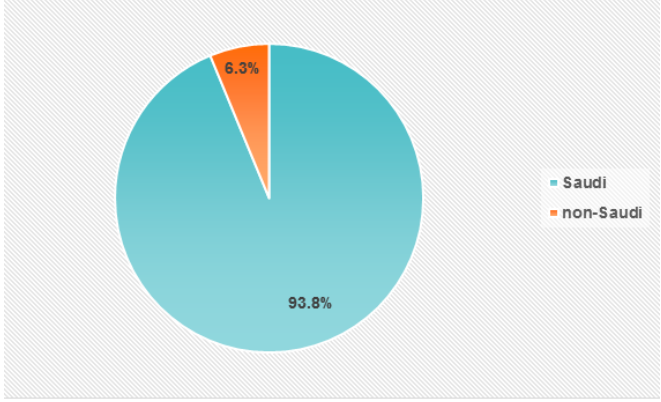

Figure 3: Nationality distribution among study participants.

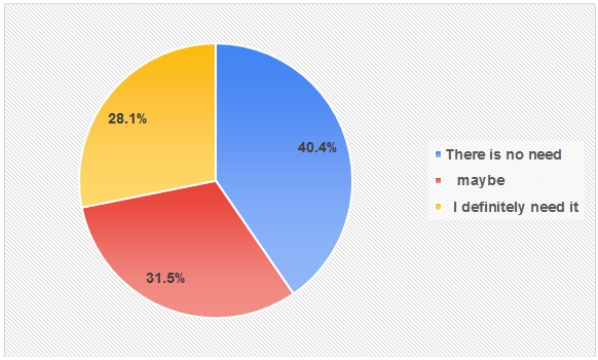

Figure 4: Need Orthodontics distribution among study participants.

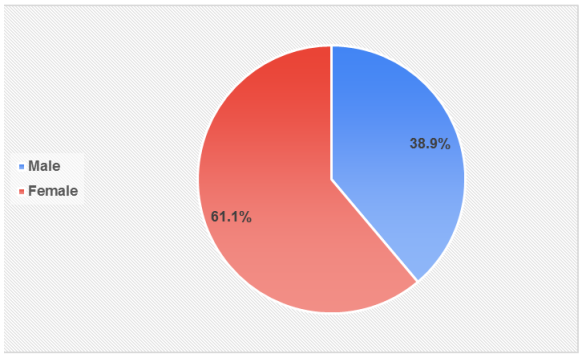

Figure 5: Gender distribution among study participants.

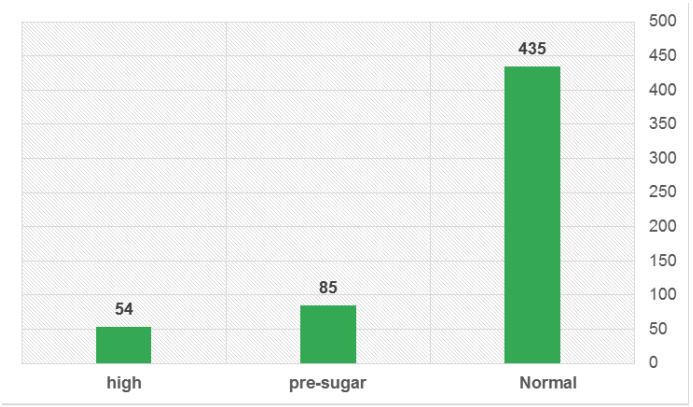

Figure 6: blood sugar level distribution among study participants.

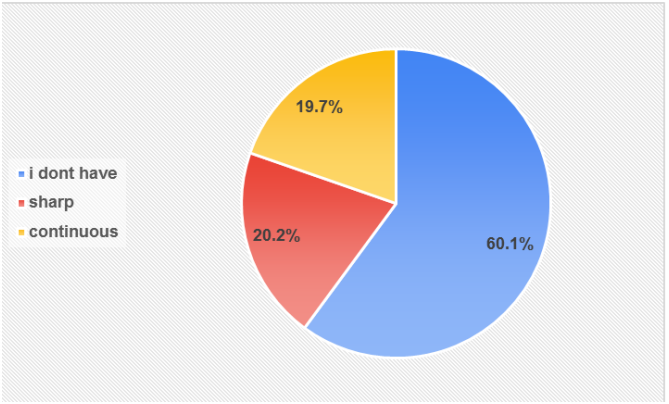

Figure 7 shows the participants' nature of the headache.

ANNEX 1: Data Collection Tool

1. What is your age?
   - Less than 18
   - 18-28
   - 29-39
   - 40-50
   - 51 and more

2. What is your gender?
   - Male
   - Female
3. What is your educational level?
   - uneducated
   - Primary stage
   - Intermediate stage
   - High school
   - the university
4. What is your Nationality?
   - Saudi
   - Non-Saudi
5. Do you think you need orthodontics?
   - There is no need

- maybe
- I definitely need it

Characteristics of the plates according to the level of need for orthodontic treatment

6. Protrusion of the upper jaw or protrusion of the front incisors in the upper jaw
    - I have this condition, and I think it does not need orthodontics
    - I have this condition, and I think it needs orthodontics
    - I have this condition, and I think it does not need orthodontics
    - I have this condition, and I think it needs orthodontics
7. Retracted upper front incisors (when the upper front incisors are occluded in reverse towards the oral cavity away from the lower incisors)
    - I have this condition, and I think it does not need orthodontics
    - I have this condition, and I think it needs orthodontics
    - I do not have this condition, and I think it does not need orthodontics
    - I do not have this condition, and I think it needs orthodontics
8. Asymmetrical contact points for the back teeth (this is when the back teeth meet in an inconsistent direction, such that some teeth are displaced from the natural direction of the dental plates)
    - I have this condition, and I think it does not need orthodontics
    - I have this condition, and I think it needs orthodontics
    - I do not have this condition, and I think she does not need braces
    - I don't have this condition, and I think she needs orthodontics

9. Open bite (when the teeth are not completely occluded so that a gap appears between both jaws)
    - I have this condition, and I think it does not need orthodontics
    - I have this condition, and I think it needs orthodontics
    - I do not have this condition, and I think she does not need braces
    - I don't have this condition, and I think she needs orthodontics
10. Teeth crowding, increasing their number, and unnaturally stacking them on top of each other
    - I have this condition, and I think it does not need orthodontics
    - I have this condition, and I think it needs orthodontics
    - I do not have this condition, and I think she does not need braces
    - I don't have this condition, and I think she needs orthodontics
11. Case of permanent tooth loss
    - I have this condition, and I think it does not need orthodontics
    - I have this condition, and I think it needs orthodontics
    - I do not have this condition, and I think she does not need braces
    - I don't have this condition, and I think she needs orthodontics
12. Are any of the teeth in the jaws partially visible
    - I have this condition, and I think it does not need orthodontics
    - I have this condition, and I think it needs orthodontics
    - I do not have this condition, and I think she does not need braces
    - I don't have this condition, and I think she needs orthodontics
13. Completely inapparent teeth (this is a condition in which the teeth do not erupt completely naturally)
    - I have this condition, and I think it does not need orthodontics
    - I have this condition, and I think it needs orthodontics
    - I do not have this condition, and I think she does not need braces
    - I don't have this condition, and I think she needs orthodontics
14. Abnormal occlusion of teeth against each other
    - I have this condition, and I think it does not need orthodontics

- I have this condition, and I think it needs orthodontics
- I do not have this condition, and I think she does not need braces

I don't have this condition, and I think she needs orthodontics

Appendix 2: Participants responses to scale items

variable		Frequency	Percent
Age	less than 18	20	4.2 Per Cent
	18-28	199	41.5 Per Cent
	29-39	191	39.8 Per Cent
	40-50	50	10.4 Per Cent
	51 and above	20	4.2 Per Cent
Gender	Male	297	61.9 Per Cent
	Female	183	38.1 Per Cent
educational level	uneducated	0	0.0 Per Cent
	Primary stage	0	0.0 Per Cent
	Intermediate stage	5	1.0 Per Cent
	High school	89	18.5 Per Cent
	the university	386	80.4 Per Cent
Nationality	Saudi	450	93.8 Per Cent
	non-Saudi	30	6.3 Per Cent

Do you think you need orthodontics?		
	Frequency	**Percent**
There is no need	194	40.4 Per Cent
maybe	151	31.5 Per Cent
I definitely need it	135	28.1 Per Cent

Characteristics of the plates according to the level of need for orthodontic treatment				
	I have this condition, and I think it does not need orthodontics	I have this condition, and I think it needs orthodontics	I have this condition, and I think it does not need orthodontics	I have this condition, and I think it needs orthodontics
Protrusion of the upper jaw	40 (8.3 Per Cent)	84 (17.5 Per Cent)	106 (22.1 Per Cent)	250 (52.1 Per Cent)

Retracted upper front incisors	23 (4.8 Per Cent)	29 (6 Per Cent)	115 (24 Per Cent)	313 (65.2 Per Cent)
Asymmetrical contact points for the back teeth	30 (6.3 Per Cent)	65 (13.5 Per Cent)	114 (23.8 Per Cent)	271 (56.5 Per Cent)
Open bite	30 (6.3 Per Cent)	55 (11.5 Per Cent)	94 (19.6 Per Cent)	301 (62.7 Per Cent)
Teeth crowding, increasing their number	37 (7.7 Per Cent)	38 (7.9 Per Cent)	130 (27.1 Per Cent)	275 (57.3 Per Cent)
Case of permanent tooth loss	40 (8.3 Per Cent)	59 (12.3 Per Cent)	148 (30.8 Per Cent)	233 (48.5 Per Cent)
Are any of the teeth in the jaws partially visible	37 (7.7 Per Cent)	58 (12.1 Per Cent)	125 (26 Per Cent)	260 (54.2 Per Cent)
Completely inapparent teeth	28 (5.8 Per Cent)	17 (3.5 Per Cent)	130 (27.1 Per Cent)	305 (63.5 Per Cent)
Abnormal occlusion of teeth against each other	39 (8.1 Per Cent)	53 (11 Per Cent)	113 (23.5 Per Cent)	275 (57.3 Per Cent)

Chi-Square

Protrusion of upper jaw or protrusion front incisors upper jaw * need orthodontics

Crosstab

			Need orthodontics			Total
			There is no need	maybe	I definitely need it	
Protrusion of upper jaw or protrusion front incisors upper jaw	I have this condition, and I think it does not need orthodontics	Count	20	10	10	40
		Per Cent of Total	4.2 Per Cent	2.1 Per Cent	2.1 Per Cent	8.3 Per Cent
	I have this condition, and I think it needs orthodontics	Count	25	44	15	84
		Per Cent of Total	5.2 Per Cent	9.2 Per Cent	3.1 Per Cent	17.5 Per Cent
	I have this condition, and I think it does not need orthodontics	Count	39	37	30	106
		Per Cent of Total	8.1 Per Cent	7.7 Per Cent	6.3 Per Cent	22.1 Per Cent
	I have this condition, and I think it needs orthodontics	Count	110	60	80	250
		Per Cent of Total	22.9 Per Cent	12.5 Per Cent	16.7 Per Cent	52.1 Per Cent
Total		Count	194	151	135	480
		Per Cent of Total	40.4 Per Cent	31.5 Per Cent	28.1 Per Cent	100.0 Per Cent

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	26.071[a]	6	0.000
Likelihood Ratio	25.111	6	0.000
Linear-by-Linear Association	0.348	1	0.555
N of Valid Cases	480		

Retracted.upper.front.incisors * need.orthodontics

Crosstab						
			Need orthodontics			
			There is no need	maybe	I definitely need it	Total
Retracted.upper.front.incisors	I have this condition, and I think it does not need orthodontics	Count	9	9	5	23
		Per Cent of Total	1.9 Per Cent	1.9 Per Cent	1.0 Per Cent	4.8 Per Cent
	I have this condition, and I think it needs orthodontics	Count	10	14	5	29
		Per Cent of Total	2.1 Per Cent	2.9 Per Cent	1.0 Per Cent	6.0 Per Cent
	I do not have this condition, and I think it does not need orthodontics	Count	45	35	35	115
		Per Cent of Total	9.4 Per Cent	7.3 Per Cent	7.3 Per Cent	24.0 Per Cent
	I do not have this condition, and I think it needs orthodontics	Count	130	93	90	313
		Per Cent of Total	27.1 Per Cent	19.4 Per Cent	18.8 Per Cent	65.2 Per Cent
Total		Count	194	151	135	480
		Per Cent of Total	40.4 Per Cent	31.5 Per Cent	28.1 Per Cent	100.0 Per Cent

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.602[a]	6	.469
Likelihood Ratio	5.440	6	.489
Linear-by-Linear Association	.024	1	.877
N of Valid Cases	480		

Asymmetrical.contact.points.for.the.back.teeth * need.orthodontics

Crosstab						
			Need orthodontics			
			There is no need	maybe	I definitely need it	Total
Asymmetrical.contact.points.for.the.back.teeth	I have this condition, and I think it does not need orthodontics	Count	15	10	5	30
		Per Cent of Total	3.1 Per Cent	2.1 Per Cent	1.0 Per Cent	6.3 Per Cent
	I have this condition, and I think it needs orthodontics	Count	15	35	15	65
		Per Cent of Total	3.1 Per Cent	7.3 Per Cent	3.1 Per Cent	13.5 Per Cent
	I do not have this condition, and I think she does not need braces	Count	49	35	30	114
		Per Cent of Total	10.2 Per Cent	7.3 Per Cent	6.3 Per Cent	23.8 Per Cent
	I don't have this condition,	Count	115	71	85	271

	and I think she needs orthodontics	Per Cent of Total	24.0 Per Cent	14.8 Per Cent	17.7 Per Cent	56.5 Per Cent
Total		Count	194	151	135	480
		Per Cent of Total	40.4 Per Cent	31.5 Per Cent	28.1 Per Cent	100.0 Per Cent

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	21.903[a]	6	0.001
Likelihood Ratio	21.294	6	0.002
Linear-by-Linear Association	.228	1	0.633
N of Valid Cases	480		

Open bite * need orthodontics

Crosstab						
			Need orthodontics			
			There is no need	maybe	I definitely need it	Total
Open bite	I have this condition, and I think it does not need orthodontics	Count	10	10	10	30
		Per Cent of Total	2.1 Per Cent	2.1 Per Cent	2.1 Per Cent	6.3 Per Cent
	I have this condition, and I think it needs orthodontics	Count	10	30	15	55
		Per Cent of Total	2.1 Per Cent	6.3 Per Cent	3.1 Per Cent	11.5 Per Cent
	I do not have this condition, and I think she does not need braces	Count	44	30	20	94
		Per Cent of Total	9.2 Per Cent	6.3 Per Cent	4.2 Per Cent	19.6 Per Cent
	I don't have this condition, and I think she needs orthodontics	Count	130	81	90	301
		Per Cent of Total	27.1 Per Cent	16.9 Per Cent	18.8 Per Cent	62.7 Per Cent
Total		Count	194	151	135	480
		Per Cent of Total	40.4 Per Cent	31.5 Per Cent	28.1 Per Cent	100.0 Per Cent

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	22.169[a]	6	0.001
Likelihood Ratio	22.420	6	0.001
Linear-by-Linear Association	1.806	1	0.179
N of Valid Cases	480		

Teeth.crowding.increasing.number.unnaturally.stacking * need orthodontics

Crosstab						
			Need orthodontics			Total
			There is no need	maybe	I definitely need it	
Teeth.crowding.increasing.number.unnaturally.stacking	I have this condition, and I think it does not need orthodontics	Count	9	23	5	37
		Per Cent of Total	1.9 Per Cent	4.8 Per Cent	1.0 Per Cent	7.7 Per Cent
	I have this condition, and I think it needs orthodontics	Count	10	18	10	38
		Per Cent of Total	2.1 Per Cent	3.8 Per Cent	2.1 Per Cent	7.9 Per Cent
	I do not have this condition, and I think she does not need braces	Count	50	40	40	130
		Per Cent of Total	10.4 Per Cent	8.3 Per Cent	8.3 Per Cent	27.1 Per Cent
	I don't have this condition, and I think she needs orthodontics	Count	125	70	80	275
		Per Cent of Total	26.0 Per Cent	14.6 Per Cent	16.7 Per Cent	57.3 Per Cent
Total		Count	194	151	135	480
		Per Cent of Total	40.4 Per Cent	31.5 Per Cent	28.1 Per Cent	100.0 Per Cent

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	26.674[a]	6	0.000
Likelihood Ratio	25.264	6	0.000
Linear-by-Linear Association	1.056	1	0.304
N of Valid Cases	480		

Case of permanent tooth loss * need orthodontics

Crosstab						
			Need orthodontics			Total
			There is no need	maybe	I definitely need it	
Case of permanent tooth loss	I have this condition, and I think it does not need orthodontics	Count	15	5	20	40
		Per Cent of Total	3.1 Per Cent	1.0 Per Cent	4.2 Per Cent	8.3 Per Cent

	I have this condition, and I think it needs orthodontics	Count	25	24	10	59
		Per Cent of Total	5.2 Per Cent	5.0 Per Cent	2.1 Per Cent	12.3 Per Cent
	I do not have this condition, and I think she does not need braces	Count	69	39	40	148
		Per Cent of Total	14.4 Per Cent	8.1 Per Cent	8.3 Per Cent	30.8 Per Cent
	I don't have this condition, and I think she needs orthodontics	Count	85	83	65	233
		Per Cent of Total	17.7 Per Cent	17.3 Per Cent	13.5 Per Cent	48.5 Per Cent
Total		Count	194	151	135	480
		Per Cent of Total	40.4 Per Cent	31.5 Per Cent	28.1 Per Cent	100.0 Per Cent

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	20.612[a]	6	0.002
Likelihood Ratio	20.975	6	0.002
Linear-by-Linear Association	.041	1	0.840
N of Valid Cases	480		

Any.teeth.in.jaws.partially.visible * need.orthodontics

Crosstab

			Need orthodontics			Total
			There is no need	maybe	I definitely need it	
any.teeth.in.jaws.partially.visible	I have this condition, and I think it does not need orthodontics	Count	9	23	5	37
		Per Cent of Total	1.9 Per Cent	4.8 Per Cent	1.0 Per Cent	7.7 Per Cent
	I have this condition, and I think it needs orthodontics	Count	25	23	10	58
		Per Cent of Total	5.2 Per Cent	4.8 Per Cent	2.1 Per Cent	12.1 Per Cent
	I do not have this condition, and I think she does not need braces	Count	45	35	45	125
		Per Cent of Total	9.4 Per Cent	7.3 Per Cent	9.4 Per Cent	26.0 Per Cent
	I don't have this condition, and I think she needs orthodontics	Count	115	70	75	260
		Per Cent of Total	24.0 Per Cent	14.6 Per Cent	15.6 Per Cent	54.2 Per Cent
Total		Count	194	151	135	480
		Per Cent of Total	40.4 Per Cent	31.5 Per Cent	28.1 Per Cent	100.0 Per Cent

Completely.inapparent.teeth * need.orthodontics

Crosstab

			Need orthodontics			Total
			There is no need	maybe	I definitely need it	
Completely inapparent	I have this condition, and I	Count	14	9	5	28

teeth	think it does not need orthodontics	Per Cent of Total	2.9 Per Cent	1.9 Per Cent	1.0 Per Cent	5.8 Per Cent
	I have this condition, and I think it needs orthodontics	Count	0	12	5	17
		Per Cent of Total	0.0 Per Cent	2.5 Per Cent	1.0 Per Cent	3.5 Per Cent
	I do not have this condition, and I think she does not need braces	Count	50	40	40	130
		Per Cent of Total	10.4 Per Cent	8.3 Per Cent	8.3 Per Cent	27.1 Per Cent
	I don't have this condition, and I think she needs orthodontics	Count	130	90	85	305
		Per Cent of Total	27.1 Per Cent	18.8 Per Cent	17.7 Per Cent	63.5 Per Cent
Total		Count	194	151	135	480
		Per Cent of Total	40.4 Per Cent	31.5 Per Cent	28.1 Per Cent	100.0 Per Cent

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	18.054[a]	6	.006
Likelihood Ratio	22.850	6	.001
Linear-by-Linear Association	.056	1	.813
N of Valid Cases	480		

Abnormal occlusion teeth against each other * need orthodontics

Crosstab

			Need orthodontics			Total
			There is no need	maybe	I definitely need it	
Abnormal occlusion teeth against each other	I have this condition, and I think it does not need orthodontics	Count	15	19	5	39
		Per Cent of Total	3.1 Per Cent	4.0 Per Cent	1.0 Per Cent	8.1 Per Cent
	I have this condition, and I think it needs orthodontics	Count	14	29	10	53
		Per Cent of Total	2.9 Per Cent	6.0 Per Cent	2.1 Per Cent	11.0 Per Cent
	I do not have this condition, and I think she does not need braces	Count	45	33	35	113
		Per Cent of Total	9.4 Per Cent	6.9 Per Cent	7.3 Per Cent	23.5 Per Cent
	I don't have this condition, and I think she needs orthodontics	Count	120	70	85	275
		Per Cent of Total	25.0 Per Cent	14.6 Per Cent	17.7 Per Cent	57.3 Per Cent
Total		Count	194	151	135	480
		Per Cent of Total	40.4 Per Cent	31.5 Per Cent	28.1 Per Cent	100.0 Per Cent

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	25.410[a]	6	0.000

Likelihood Ratio	24.795	6	0.000
Linear-by-Linear Association	.152	1	0.697
N of Valid Cases	480		

Age * need orthodontics

Crosstab

			Need orthodontics			Total
			There is no need	maybe	I definitely need it	
Age	1	Count	10	10	0	20
		Per Cent of Total	2.1 Per Cent	2.1 Per Cent	0.0 Per Cent	4.2 Per Cent
	2	Count	50	64	85	199
		Per Cent of Total	10.4 Per Cent	13.3 Per Cent	17.7 Per Cent	41.5 Per Cent
	3	Count	89	62	40	191
		Per Cent of Total	18.5 Per Cent	12.9 Per Cent	8.3 Per Cent	39.8 Per Cent
	4	Count	40	5	5	50
		Per Cent of Total	8.3 Per Cent	1.0 Per Cent	1.0 Per Cent	10.4 Per Cent
	5	Count	5	10	5	20
		Per Cent of Total	1.0 Per Cent	2.1 Per Cent	1.0 Per Cent	4.2 Per Cent
Total		Count	194	151	135	480
		Per Cent of Total	40.4 Per Cent	31.5 Per Cent	28.1 Per Cent	100.0 Per Cent

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	76.211[a]	8	.000
Likelihood Ratio	81.584	8	.000
Linear-by-Linear Association	19.153	1	.000
N of Valid Cases	480		

Regression

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.317[a]	0.101	0.076	0.788

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	32.378	13	2.491	4.011	0.000[b]
	Residual	289.369	466	0.621		
	Total	321.748	479			

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.417	.533		8.295	0.000
	age	-0.021	0.004	-0.243	-5.005	0.000
	gender	-0.132	0.087	-.0078	-1.518	0.130
	Educational level	-0.326	0.086	-0.171	-3.779	0.000
	nationality	-0.012	0.157	-0.004	-.078	0.938
	Protrusion of upper jaw or protrusion front incisors upper jaw	0.058	0.044	0.071	1.310	0.191
	Retracted upper front incisors	0.127	0.075	0.125	1.694	0.091
	Asymmetrical contact points for the back teeth	0.038	0.053	0.043	.716	0.474
	Open bite	-0.185	0.055	-.208	-3.343	0.001
	Teeth crowding increasing number unnaturally stacking	-0.143	0.066	-.160	-2.161	0.031
	Case of permanent tooth loss	-0.013	0.045	-.015	-.288	0.774
	Teeth in jaws partially visible	0.037	0.048	.043	.776	0.438
	Completely inapparent teeth	-.074	0.080	-.074	-.924	0.356
	Abnormal occlusion teeth against each other	0.121	0.058	.142	2.088	0.037

Received: *27-Nov-2023, Manuscript No. AMJ-23-4008;* ***Editor assigned:*** *30-Nov-2023, PreQC No. AMJ-23-4008(PQ);* ***Reviewed:*** *14-Dec-2023, QC No. AMJ-23-4008;* ***Revised:*** *19-Dec-2023, Manuscript No. AMJ-23-4008(R);* ***Published:*** *26-Dec-2023*