

The Perception of Fixed Orthodontic Treatment and Components amongst a Sample of Specialist Orthodontists in Baghdad City

Dheaa H. Abd Awn Al-Groosh¹, Mustafa M. Al-Khatieeb², Layla Ahmed Akrem³

¹Assistant Professor, Department of Orthodontics, College of Dentistry, University of Baghdad, Baghdad- Iraq

²Assistant Professor, Department of Orthodontics, College of Dentistry, University of Baghdad, Baghdad- Iraq

³Dentist, Ministry of Health, Baghdad- Iraq

Abstract: ***Background:** Fixed appliances (braces) remain the most popular type of orthodontic appliance and are able to produce very precise tooth movement to achieve ideal results. The aim of the current study was to investigate the trends in using fixed orthodontic appliance components and preference among a sample of specialist orthodontists living in Baghdad city. **Subjects and Methods:** A questionnaire was developed and distributed to 69 orthodontist specialists with postgraduate qualifications; PhD degree, Master degree, Diploma and Certificate issued by the Ministry of Health. **Results:** The response rate was 58% and the majority of the participants used 0.022 of an inch bracket's slot size, while few of them especially those with more than 15 years' experience seem to prefer a 0.018 of an inch. Molar bands were preferred by 55% of the participants, mainly the female orthodontists, whereas there is a high correlation found between specialists using light cure adhesives (55%) and molar tubes. Although straight wire technique was claimed to be the dominated treatment approach, only 27% of those used heavy gauge stainless steel wires that is compatible with straight wire technique. **Conclusion:** Most of the participant orthodontists used 0.022 of an inch preadjusted brackets bonded using standard etching technique. It is important to find that the concept of straight wire technique is not fully embraced. Raising the awareness of the orthodontist through continuing program development and training courses is required.*

Keywords: Perception of fixed orthodontic treatment, Specialist orthodontists, Baghdad city

1. Introduction

Comprehensive fixed orthodontic mechanotherapy appliances are orthodontic devices which have attachments that are fixed on the surface of the teeth, where forces are utilized via these attachments using arch wires and/or other auxiliaries. The appliance cannot and should not be removed or adjusted by the patient himself [1, and 2].

In 1900, Angle introduced the modern fixed orthodontic appliance and philosophy. Although, the concept of orthodontic therapy which was based on the standards edgewise appliance has not changed dramatically, several techniques have evolved to easily complying the treatment objectives [1].

The query for orthodontic treatment is increasing rapidly due to the increasing dental and aesthetic demand shown by the people and the increased satisfactoriness to these appliances. This is particularly true among the adult patients who may not have had ready admittance to orthodontic treatment during teenage period. Additionally, the introduction of the less visible appliances including ceramic braces, Invisalign, and lingual fixed appliances has great impact on its popularity nowadays [3].

One of the advantages of the straight wire technique is that the use of comprehensive finishing procedure, that was used during standards edgewise, sectional and Begg techniques, not necessary. With judicious treatment planning, the clinical orthodontist using straight wire appliance can reduce the need for multiple bending, and fewer final torque adjustment at the end of the treatment [4].

The aim of study was to investigate the trends in using fixed orthodontic appliance components and the preference among a sample of specialists living in Baghdad city.

2. Subjects and Methods

Sample

In this study, a questionnaire was developed and used to assess the orthodontists' preference regarding the different components of fixed orthodontic appliance. The questionnaire was distributed to orthodontist specialists with the following qualifications; PhD degree, Master degree, Diploma, Certificate issued by the Ministry of Health.

The survey carried out for three months from February to April 2016. The participants were free to contact the researchers when doubts while answering the questionnaire. The questionnaire designed to collect information about the orthodontist preference regarding fixed orthodontic material components and clinical method of treating patient with malocclusion. The survey composed of several questions including:

- 1) Gender, age, post graduate degree and the awarded year of the Participant.
- 2) Type of stainless steel brackets, and bracket prescription.
- 3) Banding versus bonded molar attachment (tubes or bands for the first molars), and whether involving the second molars.
- 4) Nickel Titanium (NiTi) and stainless-steel wire gauges.
- 5) Type of etching and adhesive used.
- 6) Type of fixed orthodontic technique used.

Open questions were included regarding the participant belief on the use of molar tubes, anchorage types and fixed orthodontic method that most often used. A copy of the survey questionnaire is included in Appendix.

Methods

This research was approved by the Department of Orthodontics- College of Dentistry/ University of Baghdad in December 2015.

The questionnaire was distributed and collected from the two Baghdadian sectors "Karkh and Risafah". Two major academic institutes and two specialized orthodontic centres belong to the Ministry of Health and private orthodontic clinics were targeted as highlighted below.

- Department of Orthodontics- Collage of Dentistry/ University of Baghdad.
- Department of Orthodontics- Collage of Dentistry/ University of Al-Mustansiriyah.
- AL-Dawoodi, AL-Ameriya and Bab Al-muaa'dham Specialized Orthodontic Centres.
- Smiles, Ishraqa and green apple dental centres.
- Private clinics in Al- Jami'aa and AL-Mansour.

A letter of recommendation, to facilitate an access to the Ministry of Health centres, was issued by the College of Dentistry/ University of Baghdad.

3. Results

Response rate

Forty participants have replied to the questionnaire. The distribution of the respond rate is shown in table 1 and figure 1.

The rate of participants who positively react to the survey was relatively low (58%). Orthodontists work at the academic setting represented the majority of the participants (66%), followed by those who are working at the Ministry of Health centres. The response rate of orthodontists worked at the private sector represented 53% of the respondents. Male orthodontists, on the other hand, represented 48% of the total number of the participants.

Bracket slot size and prescription

Table 2 shows that the majority of orthodontists routinely used the 0.022-inch fixed appliance with Roth prescription, being chosen by nearly half of the respondents. Very few clinicians with more than 15-years' experience used the 0.018-inch slot size. MBT prescription was used more in male orthodontists with more than 10-years' experience.

Molar bands versus Molar tubes

Banding the first molars preferred by 55% of the participants (Figure 2). Male orthodontists preferred the use molar tubes and involving the second molars in the treatment; however, the difference was not significant. There is a significant correlation between orthodontist using molar bands and the type of adhesives (Table 3). Participants using light cure adhesive used molar tubes more oftenly, while those who used chemical adhesives preferred banding the molars.

Orthodontic technique

Regarding the question about the type of fixed orthodontic mechanics used routinely by the orthodontist, about 53% of

the respondents preferred the use of straight wire technique. However, only 27% of them used full range of arch wires including the heavy gauges, i.e. 0.018 and 0.019x0.025 of an inch stainless steel arch wires. The majority of the respondents preferred using light arch wires "less" including 0.016x0.022of an inch stainless steel arch wires. Mixed technique including auxiliaries, looped and utility wires has been used by 40% of the orthodontists; finally, 25% of the respondents have used the straight wire technique with other techniques. However, very few of them used heavy arch wires (15%), as seen in table 4.

4. Discussion

Many different brands of fixed appliance components are available, which can be very confusing, but they all essentially perform the same function. The current study was designed to determine the trends in using fixed orthodontic appliance and materials among a sample of specialists living in Baghdad city.

Response rate

The rate of participants who positively react to the survey was relatively low (58%). This was much lower than the response rate reported by the US and the UK orthodontists' surveys which ranged from 60-70% [5]. Some of the responders were cooperative, friendly and pleased to help; it is probably the routine work load and the way of contacting the orthodontist is different, since in the US and the UK studies, they contacted the orthodontist by using emails.

Bracket's slot size

The majority of orthodontists, in the current study, routinely used the 0.022of an inchfixed appliance with Roth prescription. The 0.022of an inchsystem has mechanical advantages in some clinical situations over the 0.018of an inchslot brackets, such as during sliding mechanics when a 0.019 × 0.025 of an inch stainless steel archwire is used, nevertheless, few clinicians, especially those with more than 15 years' experience, used the 0.018of an inchslot size, this comes in accordance with many clinical studies on the final outcome of 0.018 and 0.022of an inchsystems , which reported a non-significant difference, as the operator experience seems to be the fundamental parameter [6]. However, in order to express the bracket prescription values, a 0.017 × 0.025 of an inch stainless steel archwire must engaged0.018of an inchsystem [7].

It was suggested that the final finishing wire brings each tooth to its desired faciolingual angulation by a torque prescription/wire size combination that minimised the slot play at the crown's final inclination [8].

Archwires &orthodontic technics:

As have been mentioned earlier, in the straight-wire technique, brackets are pre-programmed with first-, second- and third-order information, which is expressed, thanks to the interplay between the archwire and slot, a function of their respective geometries and sizes. These bracket prescription values can be only obtained when heavy, large gauge wires are in use, i.e. 0.017x0.025 of an inch wires with 0.018 of an inch slot or 0.021x0.025 of an inch wires with 0.022 of an inch slot size [9-11].

When an undersized archwire is inserted into a bracket slot, the wire can rotate clockwise or anticlockwise. The angle of freedom of the wire within the bracket slot increases as the difference in size between the archwire and the slot increases [12]. Within this range of rotation, no dental movement occurs, so to transmit third-order information to the tooth, the archwire must come into contact with the walls of the slot, and then undergoes further torsion, generating a force couple through which a moment, or torque, is expressed [13].

It has been reported that when 0.018 of an inch stainless steel bracket slot is used, the engagement angle ranges from 31 degrees with a 0.016 x 0.016 of an inch stainless steel archwire, which is used in Ricketts technique, to 4.6 degrees with a 0.018 x 0.025 of an inch stainless steel archwire in straight wire technique.

On the other hand, in a 0.022 of an inch stainless steel bracket slot, the engagement angle ranges from 18 degrees with a 0.018 x 0.025 of an inch stainless steel archwire to 6 degrees with a 0.021 x 0.025 of an inch stainless steel archwire, i.e. for every thou there is a 6 degrees loss of the third order prescription [6]. The engagement angle depends on archwire, the shape of the edge of the wire, wire dimension, and the bracket slot dimension. It is worth to know that the as received brackets is usually larger than the published values and, hence, an extra torque may be added to the wire to obtain a clinically effective value [6].

The 0.022 of an inch bracket slot allows higher range of arch wire selection choice which in turn has a positive impact on the periodontium which comes in accordance with most of the orthodontist preference.

However, due to the built-in characteristics of the three orders within the brackets, the use of straight wire technique demands more anchorage compared to other technique and the involvement of the second molar is becoming a routine practice.

Having said that, the results obtained showed that only half of the participants who answered yes for using straight wire technique have used heavy gauge wires and very fewer of them included the second molar during their bonding procedure. This contradicted result may be due to the participant misunderstanding of the straight wire technique concept or confliction in bracket prescription interpretation. Indeed, they all used preadjusted appliances with Roth or MBT prescription, but very few are using the straight wire technique.

Molar bands versus bonded molar tubes

Banding the first molars preferred by 55% of the participant. Although there are hygienic concern and cross-infection issues related to molar band selection, in addition to damaging the periodontal and/or dental tissues, when the banding procedure is not performed with utmost care, many orthodontists continue to favour molar bands due to their beliefs regarding the lower failure rates of band loosening. This agrees with a Mandall et al., [14], who found that failure in molar tube bond was higher than that of the bands.

On the other hand, despite the advantages provided by direct bonding of molar tubes, which includes saving the chair time,

as it does not require prior band selection and fitting [15], the ability to maintain good oral hygiene, aesthetics improvement, decrease the chance of enamel decalcification caused by leakage beneath the bands and ease the attachment to crowded and partially erupted teeth [14], only 45% of orthodontists used molar tubes. The results of the current study have showed that the majority of the participants preferred molar bands mostly due to multiple debonding issues relating to molar tubes. This comes in accordance with a research [16], who reported that the failure rate of molar tubes bonded with chemically cured adhesives was considerably higher than that of molar bands cemented with glass ionomer cement. However, during recently, great innovations and improvements have been implied in improving tube's material and design, bonding materials and etching technique that enhance the bonding characteristics [16]. It has been reported that shear bond strength of light cure adhesives is significantly higher than the chemically cured ones [17] with less chance of tubes debonding phenomenon. This comes in accordance with the participants' adhesives preference, which showed a high correlation between the use of molar tubes and the light cure adhesives.

5. Conclusions

- 1) Most of the respondents used 0.022 of an inch preadjusted stainless steel bracket bonded using standard etching technique.
- 2) Banding the first molar preferred by 55% of the orthodontists whereas banding the second molar was routinely done by 13%.
- 3) There was a high association between the use of molar tube and light cure adhesives, which was used by 55% of the orthodontists.
- 4) The majority of the orthodontists used straight wire technique yet using light gauge wires. Mixed techniques were used by 47%; over 80% of those using light stainless-steel wires with a maximum gauge of 0.016x0.022 of an inch.

References

- [1] Mohammad K A. A to Z Orthodontics (Fixed Appliances). Volume 13, PPSP Publication, Universiti Sains Malaysia; 2012, p3.
- [2] Singh VP, Pokhareal, RoyDK, Singla A, Biswas KP, Koirala BP. Elastic in orthodontics: A review. health reassurance. 2012;10(1):49-56.
- [3] Laura M. An introduction to orthodontics. Oxford University Press; 2013, 4th edition, p.222-225.
- [4] McLaughlin, R. P., Bennett, J., and Trevesi, H. J. Systemised Orthodontic Treatment Mechanics. Mosby, Edinburgh; 2001, p4, p203.
- [5] Phil B, Victoria E, Yvonne J, Peter R, Serena D, Lang'o O. The use of fixed appliances in the UK: a survey of specialist orthodontists. Journal of Orthodontics. 2010;37(1):43-55.
- [6] Dettlerline DA, Isikbay SC, Brizendine EJ, Kula KS. Clinical outcomes of 0.018-inch and 0.022-inch bracket slot using the ABO objective grading system. Angle Orthod. 2010; 80(3):528-32.

[7] Sifakakis I, Pandis N, Makou M, Eliades T, Katsaros C, Bourauel C. Torque expression of 0.018 and 0.022-inch conventional brackets. *Eur J Orthod.* 2013; 35(5):610–4.

[8] Johnson E. Selecting custom torque prescriptions for the straight-wire appliance, *AJO-DO.* 2013;143(4) Supplement, P.161–167.

[9] Proffit,WR. Fields HW, Sarver DM.,Contemporary Orthodontics, 5th edition, 2013.

[10] Jian F, Lai W, Furness S, McIntyre GT, Millett DT, Hickman J, Wang Y. *Cochrane Database Syst Rev.* 2013 Apr 30;4.

[11] Andrews L F. the six keys to normal occlusion. *American Journal of Orthodontics* 1972; 62:296-307.

[12] Meling, T, Ødegaard, J, Holte, K, Meling, E, Segner, D. A formula for the deflection of an arch wire when subjected to a second-order moment. A formula for the deflection of an arch wire when subjected to a second-order moment. *Am J Orthod Dentofac Orthop.* 1997.

[13] Eliades T.Torque efficiency of square and rectangular archwires into 0.018 and 0.022 in. conventional brackets,*Prog Orthod.* 2016; 17: 5.

[14] Mandall NA, Millett DT, Mattick CR, Hickman J, Worthington HV, Macfarlane TV.Orthodontic adhesives: a systematic review.*J Orthod.* 2002 Sep;29(3):205-10.

[15] Millet, D.T , Glenny AM, Mattick RC, Hickman J, Mandall NA. Adhesives for fixed orthodontic bands.*Cochrane Database Syst Rev.* 2016; Oct 25;10.

[16] Boyd R. L. and Baumrind S.: Periodontal considerations in the use of bonds or bands on

molars in adolescents and adults. *Angle Orthod. J* 1992;62(2):117-126.

[17] Toledano M., Osorio R, Erhardt M., F. Pimenta L, Osorio E. EDTA Treatment Improves Resin-Dentin Bonds' Resistance to Degradation. *J DENT RES* 2005 84: 736.

Author Profile



Dheaa H. Al-Groosh received his B.D.S. and M.Sc. in Orthodontics from the College of Dentistry, University of Baghdad in 1996 and 2000 respectively. In 2014, he received the PhD degree in orthodontics from the Eastman Dental Institute/ UCL/UK. Now, he is an assistant professor in the Department of Orthodontics, College of Dentistry /University of Baghdad.



Mustafa M. Al-Khatieeb received the B.D.S. and M.Sc. degrees in Orthodontics from the College of Dentistry, University of Baghdad in 2000 and 2006, respectively. During 2000-2004, he was a resident in the same college. In 2004, he joined the higher studies to get the M.Sc. degree in 2006. Now, he is an assistant professor and the Co-head in the Department of Orthodontics, College of Dentistry/ University of Baghdad.

Layla Ahmed Akrem received the B.D.S. from the College of Dentistry, University of Baghdad in 2016, then she joined the vocational training program of the Ministry of Health in Baghdad/Iraq.

Table 1: Distribution of participant according to their response rate

	Total respondent	Academic institutes	Health centres	Private clinics	Male participant
Response rate	58	66	56	53	48

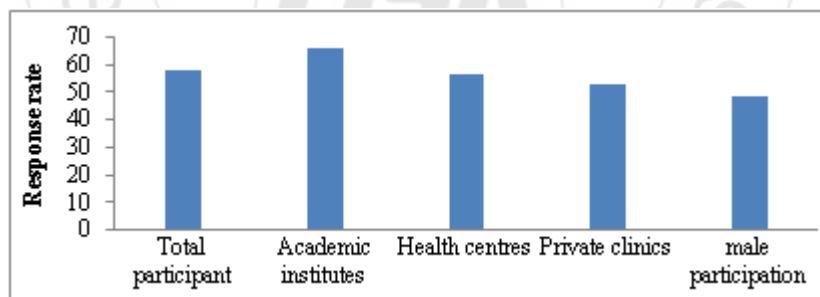


Figure 1: The response rate of participants

Table 2: The use of stainless steel bracket among orthodontics

	Stainless steel bracket slot 0.022 inch		Prescription			Stainless steel bracket slot 0.018 inch
	Less than 5 years	More than 5 years	Roth	MBT	Both	
Male	100	85	46	23	31	15
Female	100	93	56	7	37	7

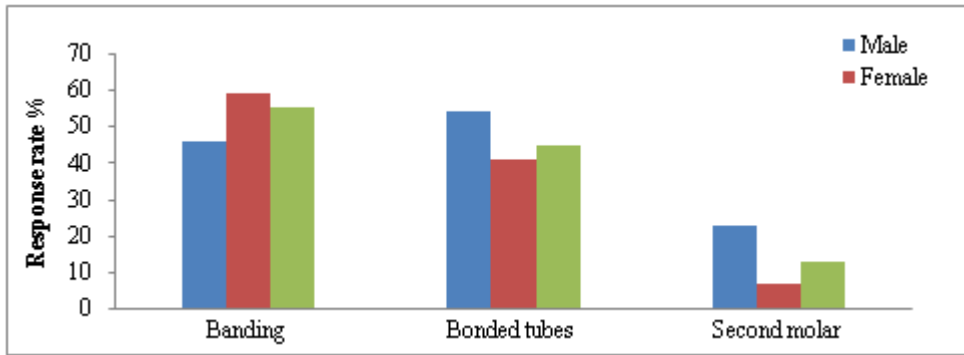


Figure 2: The use of molar bands and bonded tubes between orthodontists

Table 3: The correlation between molar band vs bonded tube preference and the type of adhesives.

	Chemical cure	Light cure	total	X ²	p
Bonding tubes	4	14	18	8.68	0.003
Bands	21	11	32		
Total	25	25	50		

Table 4: The percentage of using different orthodontic mechanics and the range of arch wire use

		Orthodontic techniques			
		Straight wire	Looped	Utility	Mixed
Rate of usage		53	5	25	40
Arch wire usage	Few	10	75	100	5
	Less	63	0	0	80
	Heavy	27	25	0	15

Appendix

5th year graduation project College of Dentistry/University of Baghdad
Department of orthodontics
 A survey on fixed orthodontic appliance

Please answer the following questions

1. Gender Male Female
2. Age
3. Postgraduate degree Master Diploma Certificate
4. Postgraduate degree awarded year
5. Where do you practice Academic institute Specialised centre Part time private practice
6. Fixed orthodontic appliance
- A. Stainless steel bracket 0.018" 0.022" Company name(s)
- B. Bracket prescription Standard edgewise Roth MBT other
- C. Banding of first molar Rarely More often Why?
- Company name(s)
- D. Bonded molar tubes Rarely more often Why?
- Company name(s)
- E. Banding/bonding the second molars Never Rarely More often
- F. NiTi wire gauges
- 0.012" 0.014" 0.016" 0.018" 0.020" Company name.....
- G. Stainless steel wires
- 0.016" 0.018" 0.020" 0.016x0.022 0.017x0.025"
- 0.018x0.025" 0.019x0.025" others..... Company name(s).....
- H. Type of adhesive Chemical cure Light cure
- I. Type of etching acid etch Self-etch primer other.....
7. Type of anchorage/distalizer used Head gear TADs TPA other.....
8. Fixed orthodontic technique
- Looped arch wires Utility wires Auxiliary wires Straight wire technique other.....

Thank you for your participation