



# **The Influence of Demographic Factors of Nigerian Dentists on their Satisfaction with Duration of Orthodontic Treatment and Knowledge of Accelerated Orthodontics**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

**Background:** The duration of orthodontic treatment and the knowledge of accelerated orthodontics are very important to the dental practitioner but there are limited information on the relationship between their satisfaction with duration of orthodontic treatment and knowledge of accelerated orthodontics.

**Aim:** To assess the associations between the demographics of the Nigerian dental practitioners and their satisfactions with the duration of orthodontic treatment and their knowledge of accelerated orthodontics.

**Materials and Methods:** Electronic and physical methods of surveying the Nigerian dental practitioners were carried out between January and June 2023. The contents of the questionnaire involving satisfaction with duration of orthodontic treatment and the knowledge of accelerated orthodontics were analysed for associations with the participants' demographics, using the IBM SPSS version 25. Descriptive statistics, the ANOVA and independent t-test were used with the significance level set at  $P < .05$ .

**Results:** No statistically significant associations were found between the dentists' satisfaction with duration of orthodontic treatment and their age, gender and years of practice as dentists ( $P > .05$ ). Also, no statistically significant associations were found between the dentists' knowledge of the methods of accelerated orthodontics and age ( $P > .05$ ). Statistically significant associations were found between the male gender and knowledge of administration of biological substances and piezocision, while the highest number of methods of accelerated orthodontics was statistically significantly associated with the years of practice of dentistry ( $P < .05$ ).

**Conclusion:** Although no significant associations were found between the participants' demographics and satisfaction with duration of orthodontic treatment, gender gave significant associations with knowledge of two methods of accelerated orthodontics, while years of practice of dentistry revealed the most significant associations with knowledge of accelerated orthodontics.

*Keywords: Associations; dentists' demographics; duration of orthodontic treatment; knowledge; accelerated orthodontics.*

## 1. INTRODUCTION

According to Al-Attar et al [1], no consensus about the duration of orthodontic treatment has been reached. However, a long term of orthodontic treatment is considered as a primary concern for most orthodontists and patients looking for treatment [2].

Accelerated orthodontics could be possible by mechanical stimulation or device assisted therapy, surgical therapy and by the use of pharmacological agents [3]. Both orthodontists and patients were interested in techniques that can decrease the treatment duration. Non-invasive accelerating procedures were more preferable by orthodontists and patients than invasive surgical procedures [1].

Not much is known about the role of socioeconomic and psychosocial factors in the predictions of the duration of orthodontic treatment [4]. Maternal emotional support was found to be an important predictor of duration of orthodontic treatment. This was attributed to higher maternal involvement in the orthodontic

treatment, which could have facilitated achieving the required orthodontic treatment outcome in shorter treatment duration [4]. According to Mavreas and Athanasiou [5], various factors, such as the technique employed, the skill and number of operators involved, the compliance of the patients, and the severity of the initial malocclusion, all seem to play a role. Moresca [6] concluded that treatment time varies according to the type of malocclusion and treatment options, and orthodontist's influence, patient's characteristics and compliance are all decisive in determining treatment time, while the effects provided by orthodontic appliances and methods used to speed tooth movement up seem little effective. Based on the results of a recent study [7], missed sessions, treatment plan, and bracket debonding gave the greatest effect on the duration of fixed orthodontic treatment.

Although much progress has been made concerning accelerated orthodontics globally [1-3,6-25], only two related reports have come from Nigeria [26,27]. In addition, not much is known about the impact or influence of gender, age and years of practice experience could have

on dental practitioners' view on the relatively long period of orthodontic treatment and the new methods of shortening it. Therefore, this study aimed at assessing the influence of gender, age and years of practice as dental practitioners on the satisfaction of some Nigerian dental practitioners with duration of orthodontic treatment, as well as their knowledge of accelerated orthodontics. It was hypothesized that there would not be any statistically significant associations between their satisfaction with duration of orthodontic treatment and the demographic factors, as well as between their knowledge of accelerated orthodontics and the same demographic factors.

## 2. MATERIALS AND METHODS

### 2.1 Study Design

A national self-administered questionnaire-based cross-sectional survey of Nigerian dentists was carried out, which targeted the teaching hospitals across the nation, as well as other hospitals where dentists work.

### 2.2 Data Collection

This national survey was carried out using Google forms through the Nigerian Dental Association social platform and other different social platforms of Nigerian dentists such as the Consultants' and Resident doctors' platforms. According to the Nigerian Dental Association (NDA), the estimated number of dentists in Nigeria is currently about 4000 to 4500. While ensuring that no dentist filled the questionnaire more than once, some of the teaching hospitals were visited with the questionnaire physically. In all, one hundred and twenty five (125) dentists filled and returned the questionnaire, giving a response rate of 50% previously reported [27]. This report is part of a major Nigerian study part

of which had earlier been published [27]. The aspect of the questionnaire used in the present report is attached as an Appendix.

### 2.3 Null Hypotheses

The following null hypotheses were generated and tested:

**Ho1** - that there would not be any statistically significant association between the dentists' satisfaction with duration of orthodontic treatment and their demographic factors (age group, gender and their years of practice as dentists).

**Ho2** – that there would not be any statistically significant association between their knowledge of accelerated orthodontics and the same demographic factors (age group, gender and their years of practice as dentists)

### 2.4 Data Analysis

Using the SPSS version 25, the whole data was analysed descriptively, as well as using independent t-test and ANOVA statistics for the hypotheses. The significance level was set at  $P < .05$ .

## 3. RESULTS

Table 1 provides the descriptive statistics of the participants' demographics, which shows that majority of the Nigerian dentists, were aged between 30 and 39, followed by the 40-49 age groups. Slightly over 55% were male, while 36% of them have practiced over 10 years.

Table 2 shows the participants' demographics against their satisfaction with duration of orthodontic treatment, which did not reveal any statistically significant relationships or associations ( $P > .05$ ).

**Table 1. Descriptive statistics of the participants' demographics**

		n	%
<b>Age group</b>	<b>20-29</b>	<b>21</b>	<b>16.8</b>
	30-39	62	49.6
	40-49	30	24.0
	50-59	10	8.0
	60-69	2	1.6
Gender	Male	69	55.2
	Female	56	44.8
Years of Practice	0-5	36	28.8
	6-10	44	35.2
	>10	45	36.0
	<b>Total</b>	<b>125</b>	<b>100.0</b>

**Table 2. Statistical analysis of the participants' demographics against satisfaction with duration of orthodontic treatment using ANOVA and Independent T-test**

		Satisfied with duration of active orthodontic treatment		p-value	
		Mean	(SD)		
Age group	20-29	2.71	(1.06)	0.418	0.796
	30-39	2.81	(1.11)		
	40-49	2.87	(1.04)		
	50-59	3.20	(1.03)		
	60above	2.50	(.71)		
Gender	Male	2.91	(1.16)	0.886	0.348
	Female	2.73	(.94)		
Year of Practice	0-5	2.61	(1.13)	1.204	0.303
	6-10	2.98	(1.05)		
	>10	2.87	(1.04)		

1...very satisfied, 5.....very dissatisfied

**Table 3. ANOVA statistics of the age groups of the participants against their knowledge of the different methods of accelerated orthodontics**

	Age group										F	P-value
	20-29		30-39		40-49		50-59		60-69			
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)		
Use of some medications	.48	(.51)	.61	(.49)	.80	(.41)	.80	(.42)	.50	(.71)	1.86	.122
Administration of biological substances	.67	(.48)	.48	(.50)	.63	(.49)	.70	(.48)	.50	(.71)	0.96	.430
Direct light electric current	.43	(.51)	.39	(.49)	.57	(.50)	.30	(.48)	.50	(.71)	0.86	.491
Low level laser therapy	.52	(.51)	.55	(.50)	.67	(.48)	.50	(.53)	.50	(.71)	0.41	.802
Resonance vibration	.52	(.51)	.71	(.46)	.80	(.41)	.60	(.52)	.50	(.71)	1.31	.272
Corticotomies	.57	(.51)	.73	(.45)	.80	(.41)	.70	(.48)	.50	(.71)	0.91	.464
Piezocision	.6	(.50)	.6	(.50)	.6	(.50)	.8	(.42)	.5	(.71)	0.54	.709

0=No, 1=Yes

**Table 4. Independent T-test statistics of the gender of the participants against their knowledge of the different methods of accelerated orthodontics**

	Gender				T-Test	P-value
	Male		Female			
	Mean	(SD)	Mean	(SD)		
Use of some medications	.70	(.46)	.59	(.50)	1.52	0.219
Administration of biological substances	.65	(.48)	.46	(.50)	4.53	0.035*
Direct light electric current	.51	(.50)	.34	(.48)	3.59	0.060
Low level laser therapy	.58	(.50)	.55	(.50)	.08	0.771
Resonance vibration	.68	(.47)	.70	(.46)	.03	0.856
Corticotomies	.77	(.43)	.64	(.48)	2.37	0.126
Piezocision	.7	(.45)	.4	(.50)	12.12	0.001*

0=No, 1=Yes; \*statistically significant

**Table 5. ANOVA statistics of the years of practice of the participants against their knowledge of the different methods of accelerated orthodontics**

	Year of practice						F	P-value
	0-5		6-10		>10			
	Mean	(SD)	Mean	(SD)	Mean	(SD)		
Use of some medications	.50	(.51)	.59	(.50)	.82	(.39)	5.35	0.006*
Administration of biological substances	.61	(.49)	.50	(.51)	.60	(.50)	0.64	0.531
Direct light electric current	.42	(.50)	.39	(.49)	.49	(.51)	0.49	0.612
Low level laser therapy	.39	(.49)	.59	(.50)	.69	(.47)	3.88	0.023*
Resonance vibration	.47	(.51)	.77	(.42)	.78	(.42)	5.86	0.004*
Corticotomies	.58	(.50)	.68	(.47)	.84	(.37)	3.59	0.030*
Piezocision	.6	(.50)	.6	(.49)	.6	(.50)	0.14	0.866

0=No, 1=Yes; \*statistically significant

Table 3 has the ANOVA statistics of the age groups of the participants against their knowledge of the different methods of accelerated orthodontics with no statistically significant relationship observed ( $P > .05$ ).

The T-test analysis of the gender of the participants against their knowledge of the different methods of accelerated orthodontics is provided in Table 4, which reveals statistically significant associations in relation to administration of substances ( $P = .035$ ) and piezocision ( $P = .001$ ) for male gender.

Table 5 provides the ANOVA statistics of the years of practice of the participants against their knowledge of the different methods of accelerated orthodontics, confirming statistically significant associations ( $P < .05$ ) in four out of the seven methods of accelerated orthodontics tested.

#### 4. DISCUSSION

This first African study that examined the influence or impact of some demographic factors of Nigerian dentists on their satisfaction with duration of orthodontic treatment and their knowledge of accelerated orthodontics has revealed no significant associations between gender, age and years of practice as dentists with their satisfaction with the duration of orthodontic treatment. It has also revealed no significant association between the participants' age and their knowledge of accelerated orthodontics but some significant associations were found with knowledge of some the methods of accelerated orthodontics (administration of some biological substances and piezocision) with male gender. Over 10 years of practice as dentists produced significant associations with knowledge of some of the methods of accelerated orthodontics (use of some medications, low level laser therapy, resonance vibration and corticotomies).

A systemic review of factors affecting orthodontic treatment duration by Mavreas and Athanasiou [5] revealed that, among other factors, the technique employed, the skill and number of operators involved, the compliance of the patients, and the severity of the initial malocclusion, all seem to play a role. In addition, Moresca [6] found that treatment time varied according to the type of malocclusion and treatment options, and orthodontist's influence, patient's characteristics and compliance were all

decisive in determining treatment time, while the effects provided by orthodontic appliances and methods used to speed tooth movement up seemed little effective. The present Nigerian study did not find any of the assessed dentists' demographic factors playing any significant role in their satisfaction level with the duration of active orthodontic treatment. According to Gabada et al [28], the protracted timeline associated with conventional orthodontic care has been a persistent concern for both patients and practitioners. In that comprehensive review, they embarked on an exploration of innovative strategies aimed at expediting orthodontic tooth movement (OTM). By doing so, they aspired to curtail treatment duration and mitigate potential risks, ultimately culminating in an elevated and more fulfilling patient experience. Onyeaso and BeGole [29] found statistically significant associations between orthodontic treatment outcomes and pre-treatment age ( $p = 0.010$ ), as well as between orthodontic treatment outcome and treatment time ( $p = 0.035$ ).

Mitwally et al [30], in their review article, concluded that increasing knowledge and experience of the orthodontist might increase the level of satisfaction as it has been reported to reduce the treatment duration significantly. However, this should be accompanied by adequate patient compliance, which was also reported to be a significant predictor for prolonged treatment duration. The finding in this present first Nigerian and African study that the dentists with over 10 years of practice had significantly better knowledge of the different methods of accelerated orthodontics seems to suggest that the senior dentists who are most likely to be consultants and senior registrars must have out of experience and further studies and readings come to have learnt of the accelerated orthodontics methods. It is important to note that not all the methods of accelerated orthodontics were indicated in the questionnaire for this investigation. A recent review by Gabada et al [28] put these methods or techniques of accelerated orthodontics into categories and subcategories as follows: Invasive techniques - Interseptal alveolar surgery (Distraction Osteogenesis), Conventional Corticotomy, regional acceleratory phenomenon (RAP) or periodontally accelerated osteogenic orthodontics (PAOO)) (Wilckodontics); Minimally invasive techniques - piezocision and discision, microosteoperforation (alveocentesis); Non-invasive techniques (subcategory - Device-assisted treatments) - cyclic vibrations, low-level

laser therapy (photobiomodulation), direct light electric current, and static or pulsed magnetic field), (subcategory – Biologic Approach) - systemic and local administration of biological substances and hormones such as Parathyroid hormone, prostaglandins, thyroxine, and calcitonin, relaxin, 1,25 dihydroxycalciferol (vit D3 or calciferol), Neurotransmitters; (subcategory – medications) – NSAIDS, Acetaminophen (paracetamol), corticosteroids, Bisphosphonates, Herbal medicine biomaterials (Asperosaponin VI), (subcategory – synthetic biomaterials) – Graphene oxide.

It is noteworthy that there is paucity of literature on impact or association of dentists or orthodontists' demographics with their views on duration of active orthodontic treatment or their knowledge of accelerated orthodontics for comparison with this present Nigerian study. However, Al-Attar et al [1] reported that both orthodontists and patients were interested in techniques that can decrease the treatment duration, and non-invasive accelerating procedures were more preferable by orthodontists and patients than invasive surgical procedures. The current Nigerian study has shown that male gender gave significant association with knowledge of administration of biological substances as well as with piezocision. Also, dentists with over 10 years of working experience in this present Nigerian study gave significant associations with the use of some medications orally locally, low level laser therapy, resonance vibration and corticotomies. According to Paul et al [31], most of the orthodontists were not very satisfied with the conventional orthodontic treatment time duration, and they were familiar and aware of the accelerated orthodontic procedures. However, these accelerated techniques were less adopted in their clinical practice possibly due to patient compliance, cost, invasiveness, complications, etc. The present Nigerian study did not find any significant associations between any of the demographic factors of the dentists and their satisfaction with duration of active orthodontic treatment.

Meanwhile, the findings of this present Nigeria study has affirmed the first null hypothesis, while the second hypothesis was accepted by age and partly accepted by gender because significant associations were found with respect to age and two out of the seven methods investigated, and much more by years of practice as dentists.

#### **4.1 Strengths and Challenges of this Present Study**

This present first Nigerian and African study on the impact or association of dentists' demographics on their satisfaction with conventional orthodontic treatment duration and their knowledge of the methods of accelerated orthodontics has the strength of originality, as well as the good representativeness of the study sample. As mentioned earlier, this study has the challenge of not having much previous literature for discussion and comparison of data.

#### **5. CONCLUSIONS**

1. No statistically significant association was found between the dentists' satisfaction with duration of orthodontic treatment and their age, gender and their years of practice as dentists.
2. No statistically significant association was found between the dentists' knowledge of the methods of accelerated orthodontics and their age.
3. Statistically significant associations were found between the male gender with knowledge of two methods of accelerated orthodontics – administration of biological substances and piezocision.
4. Much more statistically significant associations were found in relation to the number of years of practice of the profession – highest number of associations (three methods of accelerated orthodontics – low level laser therapy, resonance vibration and corticotomies) was found between the dentists who have practiced dentistry for over 10 years, followed by those who have been in practice between 6 and 10 years with one significant association for the use of some medications.

#### **6. RECOMMENDATION**

There is need to carry out similar studies in the dental community across the globe involving both the dental practitioners and the orthodontic patients for purposes of comparison of data, at least

#### **CONSENT**

As per international standards or university standards, Participants' written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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## APPENDIX

### QUESTIONNAIRE ON ACCELERATED ORTHODONTICS

Please, we need your help to respond to the questions below. This is purely for academic purposes and your responses will be confidentially handled. Questions 7 and 8 are for Orthodontists or orthodontic residents only. Please, provide honest responses as much as possible. Thank you.

#### SECTION A (Please, tick your choice out of any of the options)

- (1) Age ----- (2) Gender: Male / Female (3) Duration of Practice ----- (4) Specialty. -----  
(5) Qualification: (a) BDS only (b) Part I or Membership/Masters (c) Fellowship

#### SECTION B

- (6) Are you satisfied with the duration of active orthodontic treatment for patients?  
(a) very satisfied (b) somewhat satisfied (c) neutral (d) somewhat dissatisfied (e) very dissatisfied  
(7) Which of these do you know form(s) part of accelerated orthodontics?

Procedure	Yes	No
Use of some medications injected locally intraoral:		
Administration of Biological Substance and Hormones (local or systemic):		
Direct Light Electric Current-electric current application of about 20 $\mu$ A for 5 h daily:		
Low Level Laser Therapy (LLLTT):		
Resonance Vibration:		
Corticotomies:		
Piezocision:		

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