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**Oral Health Behaviour and  
Compliance of Nigerian Adolescents  
to Orthodontic Treatment**



**Occlusal Relationships in the Primary  
Dentition of Senegalese aged 5-6  
years**

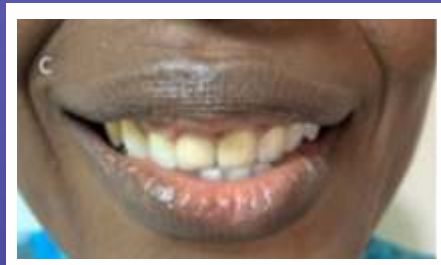


**Evidence-based Orthodontic Practice  
in Nigeria**



**Strategic Advantage for Sustainable  
Success in Orthodontics**

**CASE REPORT**  
**Management of a Severe Gummy Smile  
with TADs**



# Evidence-based Orthodontic Practice among Nigerian Orthodontists and Orthodontic Residents

Isiekwe IG<sup>a</sup>, Umeh OD<sup>a</sup>, Adeyemi TE<sup>b</sup>, Aikins EA<sup>c</sup>.

## Abstract

**Background:** Evidence-based Orthodontics (EBO) is gradually being recognized as the gold standard for orthodontic care worldwide. It focuses on providing the best level of care, validated by current research findings, in conjunction with clinical experience and the patient's preference. The aim of this study was to assess the awareness, attitude to,<sup>n</sup> and level of practice of EBO among Nigerian Orthodontists and Orthodontic residents.

**Methods:** This was a cross-sectional study involving Orthodontists and Orthodontic residents attending the 11th Annual Scientific Conference of the Nigerian Association of Orthodontists, which took place in Ile-Ife, Osun State, in September 2017. Data collection was via self-administered questionnaires and data analyses were carried out using SPSS version 19.

**Results:** The study population consisted of 21 (42%) orthodontic consultants and 29 (58%) orthodontic residents. Forty-four (88%) respondents had previously read or heard about EBOs. A total of 50 respondents participated in the study, comprising 32 (64%) females and 18 (36%) males. Forty-four (88%) respondents had previously read or heard about EBO. Thirty-six (72%) respondents reported that research findings influenced their daily work, while 34(68%) reported that they read peer reviewed journals in Orthodontics, at least monthly. When faced with clinical uncertainties, 25 (50%) reported that they would consult colleagues and 30(60%) would consult the literature, including textbooks.

**Conclusion:** A large majority of the respondents were aware and interested in EBO and considered it very beneficial to orthodontic practice, however, its practice is still limited among the Nigerian orthodontists and orthodontic residents surveyed.

**Key words:** Evidence-based Orthodontics, Nigerian Orthodontists, Orthodontic residents

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## Introduction

The new paradigm in medical and dental practice worldwide is the 'Evidence based approach.' Evidence-based practice is an approach that emphasizes finding and using the best, current research evidence to help make health-care decisions.<sup>1</sup> An evidence-based approach to clinical decision taking focuses on the integration of good judgment with the best available evidence and patient's values in clinical decision making.<sup>1-3</sup> Evidence-based dentistry (EBD) is "an approach to oral health care that requires the judicious integration of systemic assessment of clinically relevant scientific evidence relating to the patient's oral and medical condition and history, with the dentist's clinical expertise and patient's treatment needs and preferences."<sup>4</sup>

Evidence-based orthodontics means to be familiar with the best information and data available, be aware of its limitations, and judiciously use it in patient care. It is critical to know which information is available, but it is equally critical to know the limitations of this information.<sup>5</sup> Evidenced-based orthodontic practice is gradually being recognized as the gold standard for orthodontic care worldwide. This is in contrast to 'tradition-based care' which places a high value on the clinician's accumulated knowledge and experience. Using an evidence based approach allows clinicians to monitor and improve clinical performance and routinely upgrade their knowledge base.<sup>1,3</sup>

Nigeria is the largest country in Sub-Saharan Africa with a population of over 200 million people. Orthodontics as a dental specialty in Nigeria has steadily grown over the past few years, however, there are currently only about 60 practicing orthodontists attending to the large population. Considering the large patient to orthodontist ratio and the importance of making the right clinical judgment for each patient, it is important to assess the level of practice of evidence based orthodontics by Nigerian orthodontists and orthodontic residents in training. Thus, the aim of this study was to assess the awareness, understanding, and current practice of evidence based orthodontics among Nigerian orthodontists and orthodontic residents. It is hoped that the findings from this study will be used as a guide to improve on the current level of orthodontic care and post-graduate orthodontic training in Nigeria

### Material and Methods

This was a cross-sectional study involving Orthodontists and Orthodontic residents attending the Annual Scientific Conference of the Nigerian Association of Orthodontists in Ile-Ife, Osun State, Nigeria, in September, 2017. The study was carried out in accordance with the World Medical Association Declaration of Helsinki.<sup>6</sup>

Data collection was via self-administered questionnaires (Appendix I). The questionnaire assessed the knowledge, awareness, and level of application of evidence based orthodontics by respondents. The questionnaire was modified from that used in a previous study by Madhavji et al.<sup>3</sup> Data analysis was done using SPSS version 19. Results were presented in tables and figures. Fisher's exact was used to test for associations while the level of statistical significance was set at  $p < 0.05$ .

### Results

Fifty orthodontists and orthodontic residents in Nigeria made up of 32 (64.0%) females and 18 (36.0%) males participated in this study. The participants (54.0%) were mainly between 31 – 40 years of age and most (58.0%) of them were either post fellowship Senior Residents or Consultants. (Table 1)

Table 2 shows that the majority of participants 36 (72.0%) were currently involved in research or teaching at a university and most (66.0%) of them read peer-reviewed articles weekly/monthly. Majority (66.0%) of them had used PubMed/Medline in the past year to answer a clinical question. However, only some of the overall respondents (40%) had participated in a course about EBO which was considered useful in the day-to-day practice by majority (88.0%) of the participants. About half (54.0%) of them felt that the attitude of their colleagues towards evidence based orthodontics was positive.

The opinion of respondents on different aspects of practice of EBO is presented in Table 3, with about three-quarter of the respondents (74%) reporting that research influenced their daily work. Over 90% (46) of the respondents reported that an evidence based approach improves care, while about 62% (31) felt that they could practice EBO through a careful observation of what does and does not work in their practice. Almost all the respondents reported that they were interested in EBO (96%, 48), although slightly over a third (36%, 18) reported that they had very little knowledge of the concept.

Table 4 shows that a significantly large proportion (83.4%) of the respondents who were currently involved in research/teaching at a university strongly agreed/agreed that research influenced their daily work ( $p=0.004$ ). Furthermore, a significantly high number of participants currently involved in research/teaching at a university, strongly disagreed or disagreed that EBO was only best suited for the younger generation of orthodontists (77.8%,  $p=0.038$ ) and that the benefit to patient treatment was questionable (86.1%  $p=0.040$ ).

Figure 1 shows that half 25(50.0%) of the total respondents reported that when faced with clinical uncertainties, they would consult their colleagues, while only 1 (2.0%) would refer the patient.

Figure 2 shows that more than half of the participants 26 (52.0%) felt that the best method to increase evidence based practice in orthodontics was to

provide evidence based practice guidelines for orthodontists to use. Only 1 (2.0%) felt that evidence based practice should not be promoted. Figure 3 shows that majority of the participants 29

(58.0%) changed their practice philosophy based primarily on expert advice, while only a few (6.0%) rely on information from conferences to change their practice philosophy.

**Table 1: Sociodemographic characteristics of respondents:**

	Frequency (50)	Percent (100.0)
<b>Gender</b>		
Female	32	64.0
Male	18	36.0
<b>Age (Years)</b>		
21-30	3	6.0
31-40	27	54.0
41-50	13	26.0
51-60	7	14.0
<b>Level of training</b>		
Orthodontic residents	13	26.0
Orthodontic senior residents	8	16.0
Post fellowship senior residents	8	16.0
Consultant orthodontist (< 10 years post specialist training)	14	28.0
Consultant orthodontist (> 10 years post specialist training)	7	14.0

**Table 2: Involvement and attitude towards research/teaching**

Involvement in and attitude to research and EBO	Frequency (50)	Percent (100.0)
<b>Current involvement in research/teaching at university</b>		
Involved	36	72.0
Not involved	14	28.0
<b>I read scientific peer-reviewed journals</b>		
Daily	3	4.0
Weekly	13	26.0
Monthly	20	40.0
Rarely	13	26.0
Not at all	1	2.0

<b>I have used PubMed/Medline in the past year to answer a clinical question.</b>		
Yes	33	66.0
No	13	26.0
Uncertain	4	8.0
<b>I have participated in a course about evidence based orthodontics</b>		
No	30	60.0
Yes	20	40.0
<b>The attitudes of my colleagues to evidence based orthodontics:</b>		
Welcoming	27	54.0
Unwelcoming	23	46.0
<b>Evidence based orthodontics in day –to-day practice is:</b>		
Useful	44	88.0
Not useful	61	2.0

**Table 3: Opinions of respondents on different aspects of evidenced based orthodontics practice**

Opinions of respondents	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total
	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)
Research influences my daily work.	10(20.0)	27(54.0)	10(20.0)	2(4.0)	1(2.0)	50(100.0)
Peer-reviewed journals provide the best current evidence for me to incorporate into my practice.	6(12.0)	32(64.0)	11(22.0)	1(2.0)	0 (0)	50(100.0)
I would be interested in more clinical practice guidelines that help guide treatment decision making.	30(60.0)	18(36.0)	1(2.0)	0(0)	1(2.0)	50(100.0)
The practical demands of work make it difficult for me to keep up to date with current best evidence relating to practice.	3(6.0)	25(50.0)	12(24.0)	10(20.0)	0(0)	50(100.0)
I have previously heard or read about evidence based orthodontics.	14(28.0)	30(60.0)	2(4.0)	3(6.0)	1(2.0)	50(100.0)
An evidence based approach to practice improves patient care.	22(44.0)	24(48.0)	4(8.0)	0(0)	0(0)	50(100.0)
Evidence based orthodontics is more appropriate for research settings not the clinical practice of orthodontics.	5(10.0)	2(4.0)	11(22.0)	24(48.0)	8(16.0)	50(100.0)
Evidence based orthodontics sounds good in theory but it is not practically useful.	0(0)	0(0)	8(16.0)	35(70.0)	7(14.0)	50(100.0)
Evidence based orthodontics is best suited for the next younger, generation of orthodontists.	1(2.0)	11(22.0)	5(10.0)	22(44.0)	11(22.0)	50(100.0)
I can practice evidence based orthodontics through careful observation of what does and does not work in my practice.	6(12.0)	25(50.0)	7(14.0)	11(22.0)	1(2.0)	50(100.0)

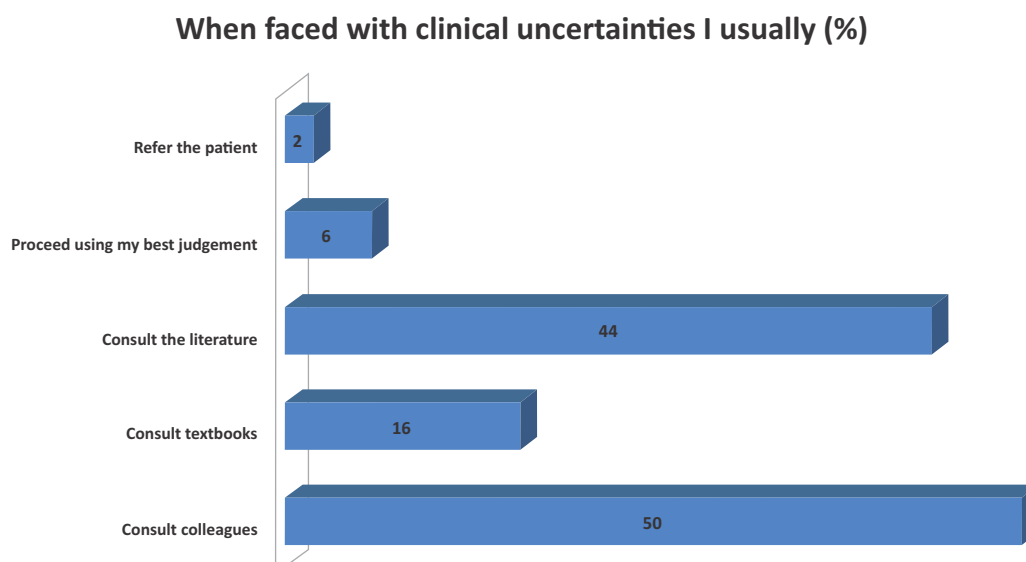
The benefit of evidence based orthodontics to patient treatment is questionable.	0 (0)	5(10.0)	7(14.0)	32(64.0)	6(12.0)	50(100.0)
There is no financial gain to practicing evidence based orthodontics.	0 (0)	0(0)	16(32.0)	30(60.0)	4(8.0)	50(100.0)
Evidence based orthodontics is a threat to a clinician's autonomy and experience.	0(0)	9(18.0)	8(16.0)	25(50.0)	8(16.0)	50(100.0)
I am not interested in evidence based orthodontics.	0(0)	0(0)	2(4.0)	38(76.0)	10(20.0)	50(100.0)
I have very little knowledge of evidence based orthodontics.	1(2.0)	17(34.0)	12(24.0)	17(34.0)	3(6.0)	50(100.0)
There are not enough clinical practice guidelines in the literature.	1(2.0)	14(28.0)	13(26.0)	19(38.0)	3(6.0)	50(100.0)
I am satisfied with my current knowledge and practice and feel it is sufficient.	0(0)	6(12.0)	7(14.0)	22(44.0)	15(30.0)	50(100.0)

**Table 4: Relationship between being currently involved in research/teaching at a university and opinions concerning research and EBO among respondents.**

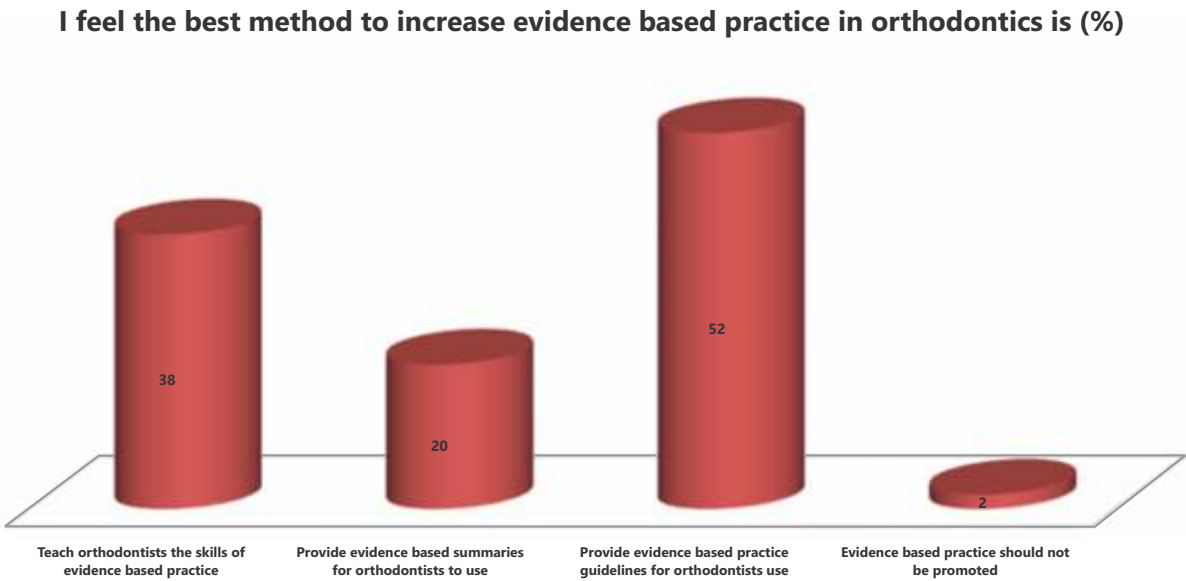
Current involvement in research/teaching at a university		Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total	Fisher's Exact
		Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)	
Research influences my daily work.	No	0(0.0)	6(42.9)	5(35.7)	2(14.3)	1(7.1)	14(100.0)	0.004*
	Yes	10(27.8)	20(55.6)	6(16.7)	0(0.0)	0(0.0)	36(100.0)	
Peer-reviewed journals provide the best current evidence for me to incorporate into my practice.	No	0(0.0)	8(57.1)	5(35.7)	1(7.1)	0(0.0)	14(100.0)	0.093
	Yes	6(16.7)	23(63.9)	7(19.4)	0(0.0)	0(0.0)	36(100.0)	
I would be interested in more clinical practice guidelines that help guide treatment decision making.	No	7(50.0)	7(50.0)	0(0.0)	0(0.0)	0(0.0)	14(100.0)	0.655
	Yes	23(63.9)	11(30.6)	1(2.8)	0(0.0)	1(2.8)	36(100.0)	
The practical demands of work make it difficult for me to keep up to date with current best evidence relating to practice.	No	0(0.0)	4(28.6)	7(50.0)	3(21.4)	-0(0.0)	14(100.0)	0.146
	Yes	3(8.3)	19(52.8)	7(19.4)	7(19.4)	-0(0.0)	36(100.0)	
I have previously heard or read about EBO.	No	5(35.7)	6(42.9)	0(0.0)	2(14.3)	1(7.1)	14(100.0)	0.124
	Yes	9(25.0)	24(66.7)	2(5.6)	1(2.8)	0(0.0)	36(100.0)	
An evidence based approach to practice improves patient care.	No	4(28.6)	9(64.3)	1(7.1)	0(0.0)	0(0.0)	14(100.0)	0.315
	Yes	18(50.0)	15(41.7)	3(8.3)	0(0.0)	0(0.0)	36(100.0)	
EBO is more appropriate for research settings not the clinical practice of orthodontics.	No	0(0.0)	1(7.1)	3(21.4)	8(57.1)	2(14.3)	14(100.0)	0.616
	Yes	5(13.9)	1(2.8)	8(22.2)	16(44.4)	6(16.7)	36(100.0)	

EBO sounds good in theory but it is not practically useful.	No	0(0.0)	0(0.0)	5(35.7)	7(50.0)	2(14.3)	14(100.0)	0.437
	Yes	0(0.0)	0(0.0)	7(19.4)	24(66.7)	5(13.9)	36(100.0)	
EBO is best suited for the next younger, generation of orthodontists	No	0(0.0)	4(28.6)	5(35.7)	3(21.4)	2(14.3)	14(100.0)	0.038*
	Yes	1(2.8)	3(8.3)	4(11.1)	19(52.8)	9(25.0)	36(100.0)	
I can practice EBO through careful observation of what does and does not work in my practice.	No	0(0.0)	6(42.9)	6(42.9)	2(14.3)	0(0.0)	14(100.0)	0.130
	Yes	6(16.7)	15(41.7)	5(13.9)	9(25.0)	1(2.8)	36(100.0)	
The benefit of EBO to patient treatment is questionable.	No	0(0.0)	1(7.1)	6(42.9)	6(42.9)	1(7.1)	14(100.0)	0.040
	Yes	0(0.0)	0(0.0)	5(13.9)	26(72.2)	5(13.9)	36(100.0)	
There is no financial gain to practicing EBO.	No	0(0.0)	0(0.0)	7(50.0)	6(42.9)	1(7.1)	14(100.0)	0.788
	Yes	0(0.0)	0(0.0)	13(36.1)	20(55.6)	3(8.3)	36(100.0)	
EBO is a threat to a clinician's autonomy and experience.	No	0(0.0)	2(14.3)	6(42.9)	5(35.7)	1(7.1)	14(100.0)	0.145
	Yes	0(0.0)	1(2.8)	8(22.2)	20(55.6)	7(19.4)	36(100.0)	
I am not interested in EBO.	No	0(0.0)	0(0.0)	3(21.4)	10(71.4)	1(7.1)	14(100.0)	0.388
	Yes	0(0.0)	0(0.0)	5(13.9)	22(61.1)	9(25.0)	36(100.0)	
I have very little knowledge of EBO.	No	1(7.1)	4(28.6)	4(28.6)	4(28.6)	1(7.1)	14(100.0)	0.557
	Yes	0(0.0)	8(22.2)	13(36.1)	13(36.1)	2(5.6)	36(100.0)	
There are not enough clinical practice guidelines in the literature.	No	0(0.0)	4(28.6)	7(50.0)	3(21.4)	0(0.0)	14(100.0)	0.275
	Yes	1(2.8)	6(16.7)	10(27.8)	16(44.4)	3(8.3)	36(100.0)	
I am satisfied with my current knowledge and practice and feel it is sufficient.	No	0(0.0)	0(0.0)	4(28.6)	7(50.0)	3(21.4)	14(100.0)	0.762
	Yes	0(0.0)	2(5.6)	7(19.4)	15(41.7)	12(33.3)	36(100.0)	

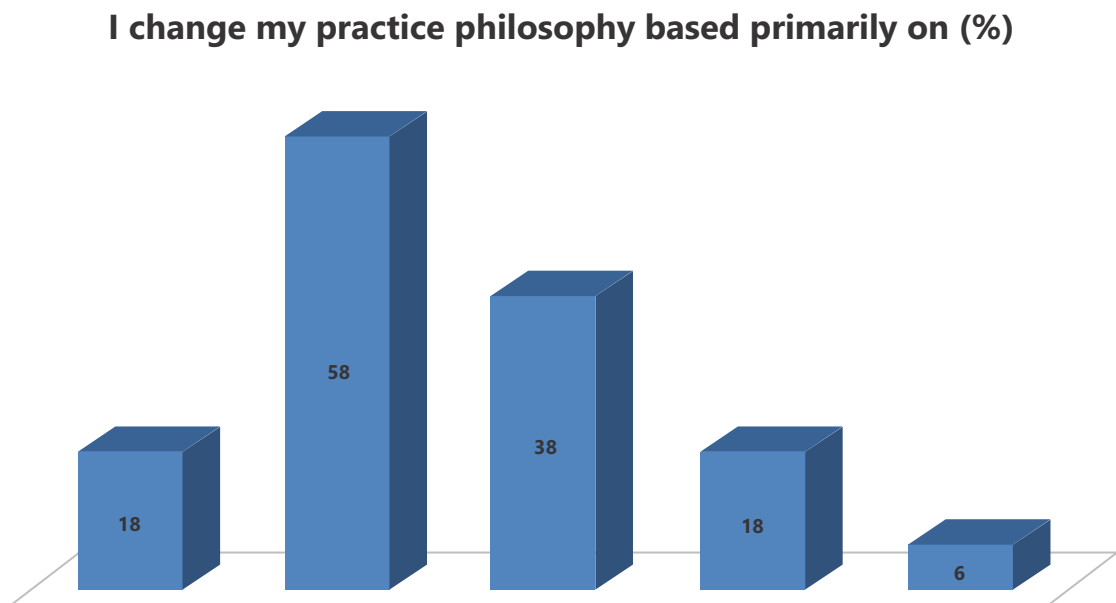
**Figure 1: Respondents' Actions When Faced With Clinical Challenges.**



**Figure 2: Respondents' perceptions on the best method to increase evidence Based practice.**



**FIGURE 3: Factors that can influence change in practice philosophy.**



**Discussion**

Evidence based orthodontics can be described as one of the key principles required for the successful practice of orthodontics. It can be considered as one of the main contributors to the changing scenario of orthodontic practice in the 21<sup>st</sup> century.<sup>7</sup> However, one of the major challenges currently facing orthodontists is the integration of accrued scientific evidence into clinical practice.<sup>8,9</sup>

The findings from this study show that a large majority of respondents believe in the practice of evidence based orthodontics. It is interesting to note that over seventy percent of the respondents were currently involved in the research or teaching of orthodontics. This is not surprising as most of them were residents at different stages of training. In addition, a majority of all practicing orthodontists in Nigeria are employed in universities and tertiary

healthcare training institutions. They are therefore involved in training undergraduate dental students and/or postgraduate residents in the specialty of orthodontics.

It is noteworthy that a large majority of respondents read scientific journals at least monthly and had recently consulted Pubmed to answer a scientific question. This is reflective of the fact that 90 per cent of the respondents consider research findings and published literature very important to their practices. This corroborates the findings in a study by Madhavji et al.<sup>3</sup> among American Orthodontists.

An evidence based approach involves using the best available evidence from literature for patient care while also bearing in mind the clinician's expertise and patient's preference.<sup>4</sup> The views of respondents in this study show that almost all of them had previously read about EBO, were interested in practicing it, and felt that the approach would improve patient care. Similar findings were reported in a study carried out among American orthodontists.<sup>3</sup> However, the belief by majority of the respondents that they could practice EBO by observing what works and does not work in their practice implies a limited understanding of what the concept really means. Using information obtained from your practice does not reflect an evidence based approach to practice. The respondents further demonstrated their limited practice of the concept by reporting that they would consult colleagues when faced with a clinical problem, as compared with consulting the literature. A similar finding was reported among orthodontists in the United States<sup>3</sup> and general dental practitioners.<sup>8</sup> The evidence based approach would have been to critically appraise available literature from online data sources such as Pubmed or Cochrane review, to obtain results of systematic reviews, meta-analyses or any other reliable scientific option on the evidence pyramid. This is in order to find the best possible solution to the problem, while also taking into consideration the clinician's expertise and patient's preference.<sup>3,10</sup> However, the practice is also fraught with some challenges, such as the time demands for a thorough literature search, the ambiguity of the literature on certain topics in orthodontics, and limited clinical guidelines.<sup>3</sup> Thus, all these have to be overcome to ensure an evidence based approach is successfully practiced.

The majority of respondents also stated that they depend on 'expert advice' to change their practice

philosophy. A similar finding was reported for orthodontists practicing in the United States.<sup>3</sup> Although this is a very convenient method of acquiring information, 'expert advice' ranks very low on the pyramid for evidence based practice and cannot substitute a thorough literature search, and critical appraisal of any subject matter. Indeed, expert opinion actually ranks at the bottom of the list for acceptable evidence, according to Voudrous' Iceberg evidence for viable clinical applications.<sup>11</sup> The concept of EBO evolved as a more reliable scientific alternative to "expert-based", "eminence-based" or "opinion-based" orthodontics.<sup>12</sup> Thus, although only about a third of the respondents thought that they had a limited knowledge of the concept of EBO, in actual fact, majority of respondents do not fully understand this concept and therefore are not actually practicing it.

It is instructive to note that although most of the respondents reported that research influences their daily work, this response was significantly more among those in teaching and research institutions. This is quite understandable bearing in mind the nature of these institutions and the fact that clinical practice in such institutions is expected to be guided by research findings. Furthermore, respondents involved in teaching or research had significantly more positive belief in the benefit of EBO to patient care, which has also been previously reported.<sup>3</sup> Research forms an important aspect of evidence based approach and respondents from teaching hospitals or academic institutions routinely teach and utilize research findings. Thus, they are more accustomed to the importance of this approach to patient care as they routinely use it in the course of patient management and are more likely to understand the benefit to patient care.

Almost all the respondents reported that they would be interested in having evidence based clinical practice guidelines which would help guide their treatment decisions. This is necessary, in their viewpoint, as they admitted that the practical demands of work make it difficult for them to have time to stay up to date with current literature. The use of guidelines was also recommended by orthodontists in the United States;<sup>3</sup> it will reduce the need for extensive review of literature and thus save the practitioners some time. Also, guidelines will be very helpful for those who may not be inclined towards research, but desire to practice based on the most recently available and validated evidence.

Bearing in mind the very busy clinical nature of orthodontic practice, also alluded to by respondents in this study, these guidelines will help to eliminate some of the barriers to the practice of evidence based approach, as previously reported by Madhavji et al.<sup>3</sup> Indeed, the need to address the issue of guidelines has led to the development of 'pre-appraised evidence' - the summary of evidence based guidelines obtained from the critical appraisal of literature by experts well versed in evidence based practice. These are then disseminated to practitioners e.g via Orthodontic journals such as the American Journal of Orthodontics and Dentofacial Orthopedics in a simple and clinically usable form.<sup>12, 13</sup>

A number of limitations were encountered in the course of this study. The heterogeneous nature of the study population, which comprised both orthodontists and orthodontic residents may have affected the research findings. However, this population was selected because of the small sample size of both groups and although they have different levels of experience, they share similar professional training and practices. Thus, for the purpose of this study, the respondents were considered a homogenous population and the findings of this study can provide a baseline for future studies in each of the respective groups. Another limitation of the study is the possibility of some bias in respondents' answers to the anonymous questionnaire. Some of the respondents may have recorded a more positive attitude than actually perceived, in order to appear to have a better appreciation of the concept.

### Conclusion

The findings of this study show that a vast majority of Nigerian orthodontists and orthodontic residents are aware of EBO and are interested in its practice. They consider it useful in their day to day practice and believe it would positively impact on patient

care, particularly those involved in teaching and research. However, there is limited understanding and practice of the concept of EBO among respondents, with the majority of them depending on expert opinion to change their practice philosophy and consulting colleagues when faced with clinical challenges.

### Recommendations

There is a need for further training of Nigerian orthodontists and orthodontic residents in the concept of EBO. In particular, the teaching of this concept should form an important part of the postgraduate orthodontic training curriculum for Orthodontic residents in Nigeria. It is also recommended that evidence based clinical guidelines be frequently disseminated and published in local journals such as West African Journal of Orthodontics, to enhance up to date clinical practice among orthodontists in the country.

### Authors' Contributions

Isiekwe IG contributed to the conceptualization, study design, literature search, data acquisition, data analysis, statistical analysis, manuscript preparation, manuscript review, and was the guarantor.

Umeh OD contributed to the study design, literature search, data acquisition, data analysis, manuscript preparation, and manuscript review.

Adeyemi TE contributed to the literature search, data analysis, statistical analysis, manuscript preparation, and manuscript review.

Aikins EA contributed to the manuscript preparation and manuscript review.

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### Conflict of Interests

Nil

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