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A web-based assessment of Iraqi orthodontists' perception and utilization of orthodontic mobile apps and social media

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Abstract. Objectives: The integration of smartphones and mobile applications (apps) into healthcare has significantly reshaped orthodontic practice. However, limited research exists on how orthodontists utilize these tools. This study examines the awareness, adoption, and perceptions of orthodontic apps and social media among Iraqi orthodontists as clinical aids. **Materials and methods.** A web-based, cross-sectional survey of 132 respondents assessed demographics, app and social media usage, and perceived benefits. **Results.** Findings indicated that 54% of respondents were unaware of orthodontic apps, and only 11% of those aware used them, primarily for clinical tools such as WebCeph. Patient-focused apps showed minimal adoption, with 95% of participants not recommending these tools to patients. Financial constraints and knowledge gaps were identified as major barriers to adoption. Despite the limited use of apps, 75% of respondents actively used social media for practice promotion, with Instagram* and Facebook* being the preferred platforms. Approximately 67% directed patients to orthodontic content on social media, highlighting its role in patient education. However, concerns about misinformation underscore the need for professional guidelines. The study revealed significant interest (89%) in introductory courses on orthodontic apps, presenting an opportunity to address knowledge gaps through education. **Conclusions.** These findings emphasize the importance of targeted training and policy initiatives to support the integration of digital tools, improve patient outcomes, and promote the adoption of innovative practices in orthodontics. Further research is recommended to evaluate the long-term impact of these technologies.

Key words: smartphone, applications, orthodontics, social media

* *Legal notice: The operations of Meta Platforms Inc. (owner of Instagram and Facebook) are banned as extremist in the Russian Federation.*

Веб-оценка восприятия и использования мобильных ортодонтических приложений и социальных сетей среди иракских ортодонтов

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Реферат. Интеграция смартфонов и мобильных приложений в здравоохранение значительно изменила ортодонтическую практику. Однако существует ограниченное количество исследований о том, как ортодонты используют эти инструменты. Данное исследование изучает осведомленность, внедрение и восприятие ортодонтических приложений и социальных сетей в качестве клинических помощников среди иракских ортодонтов. **Материалы и методы.** Было проведено перекрестное исследование 132 респондентов, оценивающее демографические данные, использование приложений и социальных сетей, а также воспринимаемые преимущества. **Результаты.** 54% респондентов не знали о существовании ортодонтических приложений, и только 11% из тех, кто знал, использовали их, в основном такие клинические инструменты, как WebCeph. Приложения, ориентированные на пациентов, показали минимальное внедрение: 95% участников не рекомендовали эти инструменты пациентам. Финансовые ограничения и пробелы в знаниях были определены как основные барьеры для внедрения. Несмотря на ограниченное использование приложений, 75% респондентов активно использовали социальные сети для продвижения своей практики, причем предпочтительными платформами были Instagram* и Facebook*. Примерно 67% направляли пациентов на ортодонтический контент в социальных сетях, что подчеркивает их роль в образовании пациентов. Однако опасения по поводу дезинформации подчеркивают необходимость разработки профессиональных рекомендаций. Исследование выявило значительный интерес (89%) к вводным курсам по ортодонтическим приложениям, что представляет возможность устранить пробелы в знаниях с помощью образования. **Заключение.** Полученные данные подчеркивают важность целенаправленного обучения и политических инициатив для поддержки интеграции цифровых инструментов, улучшения результатов лечения пациентов и внедрения инновационных методов в ортодонтии. Рекомендуется дальнейшее исследование для оценки долгосрочного влияния этих технологий.

Ключевые слова: смартфон, приложения, ортодонтия, социальные сети

* *Принадлежит компании Meta, признанной экстремистской и запрещённой на территории РФ.*

INTRODUCTION

Improvements in technology, especially the incorporation of smartphones and mobile applications (apps), have transformed orthodontic healthcare and patient management. Such digital methods have reformed the practice, education, and management of orthodontics by improving patient engagement, education, and compliance through new treatment methods [1]. The flexibility and availability offered by mobile applications have made them a useful tool for both orthodontists and patients by enhancing the dissemination of orthodontic knowledge and treatment procedures [2].

The rapid advancement of smartphone technology has broadened its scope beyond traditional means of communication. Today's smartphones and tablets have special-purpose software referred to as "apps", designed for various functions, including healthcare. In medicine, these applications have been particularly helpful in providing assistance with diagnosis, treatment planning, patient education, and practice management [3—5]. In orthodontics, applications have started to emerge as an innovative means of addressing some of the challenges faced by clinical practitioners and patients with specific orthodontic concerns [6].

Orthodontic apps have been developed to facilitate easy information retrieval, communication, and decision-support tasks based on specific patient factors. Their effectiveness depends on orthodontists' experience with these apps. The issue of how to incorporate orthodontic apps into everyday practice to ensure effectiveness from health, compliance, and economic perspectives remains an open question [5, 6].

Phatak and Daokar (6) classified orthodontic apps as patient education apps, patient management apps, diagnostic apps, and updating apps, while Rao et al. [7] grouped them into three categories: clinician-focused apps, clinician/patient-focused apps, and practice-centered apps. Research demonstrates that educational tools supporting orthodontic app usage should focus on overcoming obstacles in patient health management, compliance, and cost.

The growth of smartphone health apps has streamlined the process of obtaining valuable health information and services. However, the quality of this information and these services fluctuates alongside overall app accessibility, making it crucial to evaluate these apps critically [8, 9].

Table 1. Demographical data of the 132 participants

Parameters		abs.	%
Gender	Male	47	35.6
	Female	85	64.4
Qualification	Diploma	1	0.8
	Certificate	13	9.8
	Master	97	73.5
	PhD	21	15.9
Years of experience	Less than 5 years	49	37.1
	5—10 years	25	18.9
	More than 10 years	58	43.9
Place of work	Governmental	12	9.1
	Private	31	23.5
	Both	89	67.4

Orthodontic professionals now use social media as an essential platform to educate patients and promote their practices while building professional connections. Through Instagram, Facebook, and YouTube, orthodontists can distribute scientific information while building their professional image and interacting with patients [10]. Research indicates that social media platforms improve both patient compliance and satisfaction through the availability of online educational content and enhanced communication channels. Data privacy and misinformation threats continue to exist, which makes ethical guidelines necessary. Social media functions as an important asset for orthodontists, benefiting patient outcomes and practice exposure when applied with responsibility and strategic planning [11].

Orthodontic apps are becoming more available, but studies about orthodontists using these tools remain scarce [12]. According to the authors, no study has assessed Iraqi orthodontists' awareness of orthodontic apps and social media usage; therefore, this questionnaire was designed.

METHODS

Study design

This study employed a cross-sectional, web-based survey design to collect data from Iraqi orthodontists. The survey was distributed via Google Forms and sent through social media groups specific to Iraqi orthodontists. Responses were collected and analyzed between October 2023 and January 2024, with reminders sent twice during this period.

The study was approved by the ethical and scientific committees in the Department of Orthodontics, College of Dentistry, University of Baghdad (Ref no. 73 on 1/10/2023).

Participants

The study included Iraqi orthodontists from various regions of Iraq. Participants were selected based on their professional qualifications and experience in orthodontic practice. The sample size was calculated using SurveyMonkey based on the total registered members in the Iraqi Orthodontic Society, which consisted of 150 members. Using a 95% confidence interval and a 5% margin of error, the estimated sample size required for the study was calculated to be 109 participants. The final number of participants was 132.

Survey instrument

The survey consisted of 12 multiple-choice questions and one open-ended question. The questionnaire was divided into three main sections:

1) Demographic information (e.g., gender, qualifications, years of experience, place of work).
2) Awareness and usage of orthodontic apps (e.g., types of apps used, frequency of use, perceived benefits).
3) Awareness and usage of social media (e.g., platforms used, purposes of use, perceived benefits).

RESULTS

Table 1 demonstrates the demographic data of the participants. Females represented the main bulk, accounting for 64.4%, and most participants were awarded a master's

degree in orthodontics with more than 10 years of experience. The majority (67.4%) were working in both governmental and private clinics.

Table 2 represents the participants' responses to the questions. All of them had a smartphone, with nearly equal distribution between iPhone (Apple, USA) and Galaxy (Samsung, South Korea).

Regarding awareness of applications related to orthodontics (concerning the orthodontist and the patients) in application stores, 54% responded negatively, indicating they were unaware. Of the 46% who were aware of these apps, only 11% used them, and most of those users utilized the WebCeph application (80%).

Concerning whether they instructed their patients to download and utilize any orthodontic apps, 95% responded negatively. The same percentage gave a negative response regarding not using these apps in scientific research.

Regarding interest in orthodontic applications that are not free, 40% would pay for them, while 60% would not. About 89% preferred an introductory course about orthodontic apps and their uses, benefits, and utilization.

The approximate rate of benefit from orthodontic applications among participants ranged from 39% reporting no benefit to 43% gaining a benefit of 10—40%.

Concerning the second part of the research, social media, 67% of the participants instructed their patients to follow social media regarding orthodontics, concentrating mainly on YouTube, Instagram, and Facebook. Using social media to promote orthodontic practice was reported by 75%, who preferred Instagram and Facebook for that purpose, with varying rates of benefit.

DISCUSSION

The rapid integration of apps into healthcare has revolutionized the way clinicians and patients interact with medical information and treatment protocols. This study assessed the awareness and utilization of orthodontic apps and social media among Iraqi orthodontists, revealing critical insights into the adoption of digital tools in orthodontic practice. The findings highlight both opportunities and challenges in leveraging technology to enhance patient care and professional development.

According to the study by Gupta and Vaid (2017), there were 354 orthodontic apps [2], whereas in Siddiqui et al. study (2019), 305 apps were surveyed [3]. This shows a sudden decrease in these apps over two years. These apps aimed to elicit behavior change, such as improving oral hygiene, reducing treatment breakages, and providing reminders for brushing, appliance use, and elastic wear. On the other hand, those focused on orthodontists were designed for diagnosis, study models, and cephalometric analyses. Others were specific to scientific journals, news, and conferences.

Regarding the findings of the current study, all participants were smartphone users, mainly iPhone and Galaxy. The study found that 54% of Iraqi orthodontists were unaware of orthodontic apps available in application stores, and only 11% of those who were aware of such apps had used them. This low adoption rate is concerning, given the growing evidence supporting the efficacy of apps in improving patient compliance and treatment outcomes.

Randomized controlled trials (RCTs) and systematic reviews have shown that apps can significantly improve patient compliance, resulting in reduced plaque levels, gingival

Table 2. Responses of the 132 participants on questions

Questions	Response	abs.	%
Do you have a smart phone?	Yes	132	100
	No	0	0
Which type do you have?	Galaxy	54	41
	Huawei	11	8
	Iphone	56	42
	Xiaomi	8	6
	more than one	3	2
Do you aware about applications related to orthodontics (concerning the orthodontist and the patients) in application stores	Yes	61	46
	No	71	54
If the answer is Yes, did you use any of these applications?	Yes	15	11
	No	117	89
If the answer is Yes, what application did you use?	WebCeph	12	80
	Cephx	1	6.6
	OneCeph	1	6.7
	Ceph ninja	1	6.7
Did you instruct your patients to download and use any orthodontic application?	Yes	6	5
	No	126	95
Did you use any application in research previously?	Yes	7	5
	No	125	95
If you interested in an orthodontic application that is not free, did you pay for getting it?	Yes	53	40
	No	79	60
Would you prefer to get an introductory lecture on orthodontic applications in smart phones?	Yes	118	89
	No	14	11
What is the approximate rate about your benefit from the orthodontic applications?	10—20%	31	23
	30—40%	27	20
	50—60%	14	11
	70—80%	7	5
	90—100%	2	2
	No benefit	51	39
Did you instruct your patients to follow the social media with regard to orthodontics?	Yes	89	67
	No	43	33
Do you use social media to promote your practice?	Yes	99	75
	No	33	25
Give an approximate rate about your benefit from the social media	10—20%	45	34
	30—40%	29	22
	50—60%	26	20
	70—80%	18	14
	90—100%	5	4
	No benefit	9	7

bleeding, white spot lesions, and treatment time [13—18]. In Iraq, the underutilization of these tools may be due to a lack of awareness, limited access to technology, or skepticism about their efficacy.

The most frequently used app among respondents was WebCeph (80%), a cephalometric analysis application. This indicates that orthodontists prefer apps that facilitate clinical decision-making rather than patient-facing tools. This is consistent with results from other studies, which show that clinicians value apps that improve diagnostic accuracy or workflow efficiency [19, 20]. However, this application should be used with caution in automated analysis due to concerns regarding poor landmark identification, inaccuracy of soft tissue tracing, and inconsistency in measurements [19].

The potential of patient-facing apps to improve treatment in this population is underutilized [21]. Reminder-based applications (for example, reminding patients to attend appointments, brush their teeth, and wear elastics.) have previously been shown to improve attendance and adherence, as well as reduce treatment-related issues [13—18].

This study revealed several barriers to the adoption of orthodontic apps. Approximately 60% of respondents were unwilling to pay for apps, even if they were not free. This reluctance might be due to a lack of funds or the belief that free alternatives are sufficient. Moreover, 89% expressed interest in an introductory lecture on orthodontic apps, suggesting the necessity of clear educational programs to address this knowledge gap. Similar results have been found in other areas, with clinicians citing a lack of training and awareness as the most frequently reported barriers to adopting digital tools [22].

The low rate of app usage in research (5%) highlights the importance of capacity-building initiatives. Mobile apps create unique opportunities for data collection, patient monitoring, and clinical research, but their potential remains underutilized. Robotic applications allow remote monitoring of treatment progress, providing orthodontists with real-time information about patient compliance and outcomes [23]. Integrating apps into research protocols could improve the quality and efficiency of orthodontic studies, especially in low-resource settings.

Compared to the limited use of orthodontic applications, social media was extensively used by orthodontists in Iraq; 75% indicated they used it to promote their practices. The most popular platforms were Instagram and Facebook, mirroring the international trend in healthcare marketing. Social media offers a cost-effective and accessible way for clinicians to interact with patients, disseminate educational content, and develop their professional brand. However, the quality and accuracy of information shared on these platforms vary, raising concerns about misinformation [24].

Interestingly, 67% of the respondents directed their patients to follow social media related to orthodontics. YouTube, Instagram, and Facebook were the most recommended platforms. This shows that orthodontists are aware of the possibilities that social media has as an educational platform. On the other hand, dependence on social media to educate patients is fraught with danger, as patients can be exposed to erroneous or misleading information. Research has shown that patients frequently use social media for health advice; however, the quality of information obtained is highly variable. For this reason, orthodontists must actively guide their patients toward reliable sources and correct misconceptions [25—28].

The findings from this study have significant implications for orthodontic practice and policy in Iraq. First, it emphasizes the necessity of education to increase awareness of the benefits of orthodontic applications and training on their use. This can be organized by professional initiatives together with academic institutions through workshops, webinars, and continuing education courses on digital tools. Second, policymakers need to consider subsidizing the cost of quality orthodontic applications to encourage clinicians to use them more and patients to seek them more. This would be especially beneficial in low-resource settings, where financial barriers constitute a significant constraint. Third, with social media being widely used, there is a need for guidelines on ethical and effective social media usage in orthodontic practice. Professional associations should establish best practices related to information dissemination, patient engagement strategies, and confidentiality maintenance on online platforms. In addition, orthodontists must also be motivated to develop and distribute evidence-based materials that will combat misinformation while promoting public health.

LIMITATIONS AND FUTURE SUGGESTIONS

This study has several limitations inherent in the use of self-reported data, which are susceptible to response bias. Studies with larger, more diverse samples are needed to include objective measurements of app and social media usage. Furthermore, qualitative research could provide deeper insights into the factors that facilitate or hinder technology adoption among orthodontists.

Further research is needed on the effect of orthodontic apps and social media on patient outcomes. RCTs could be designed to test the effectiveness of different apps in promoting treatment adherence and improving outcomes. Longitudinal studies could examine the effects of social media on patient satisfaction and treatment success over time. Lastly, comparative studies across different regions would help identify contextual factors influencing the usage and impact of digital tools in orthodontic practice.

CONCLUSIONS

This research provides valuable insights into Iraqi orthodontists' awareness and utilization of social media and orthodontic apps. Even though many use social media to promote their practice and educate patients, the usage of orthodontic apps remains low. Addressing the underlying reasons for this, such as lack of awareness and financial constraints, is critical to unlocking the potential of digital tools in orthodontic practice. By adopting technology more widely, orthodontists can enhance patient care, achieve better treatment outcomes, and help advance the field.

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