Online Orthodontic Screening for Dental Education

Azrul Hafiz[1]*, Aws Hashim Ali Al-Kadhim[1], Muhammad Syafiq Alauddin[1], Syatirah Najmi Abdullah[1]

1. Faculty of Dentistry, Islamic Sciences University of Malaysia.

Abstract

Dental education around the world were being affected by the pandemic COVID-19. Patients could not come to received treatment and students could not performed dental clinical practical due to lockdown implementation. To overcome this, an online orthodontic screening for examination and diagnosis was developed to help dental students to practice and perform assessment on patients. The objective of this study was to assess the possibility of using online orthodontics screening as an alternative way to physical classes and orthodontic clinics. This cross-sectional study was conducted on clinical years dental students.

A total of seventy subjects participated in this study. All subjects were required to assess orthodontic patient extra-oral and intra-oral attributes base on the online orthodontic screening. The result shows that all subjects could identify correctly extra-oral features such as assessment of the skeletal pattern and soft tissue. While mixed result was noted on intra-oral characteristics such as teeth condition, teeth in occlusion and lower upper arches. As a conclusion, the implementation of orthodontic screening thru online method can be utilized as a feasible alternative in comparison to the traditional clinical setting.

Clinical article (J Int Dent Med Res 2022; 15(3): 1185-1188)

Keywords: Orthodontics, Online, Tele-Medicine, Dental Education.

Received date: 07 April 2022   **Accept date:** 15 May 2022

Introduction

The deadly COVID-19 virus has cause devastating effect on health, economic, tourism and education. Detrimental condition in Wuhan wet market and spike in protein mutation of SARS-CoV-2 during that time has turn this epidermic into worldwide pandemic[1]. Almost all countries effected by COVID-19 pandemic have introduced a total lockdown to curb the spread of the virus. Implementation of tough curfew in some places, physical distancing, face mask and hand sanitizer have become the new norm to reduce the spread.

Tele-medicine and virtual consultation could resolve the fear of COVID-19 transmission in hospital and clinic[2]. This intervention has become a reasonably practical solution to the delivery of healthcare facilities even to the remotest places [3]. With good internet connection and electronic device, the healthcare services could be disseminated to everyone. Patients also reported a higher satisfaction with online tele-medicine and more patient use internet to keep up to date regarding health information[4,5]. Moreover, the benefit of telehealth is the possibility of bridging doctors and patients virtually without physical contact and could relieve congestion in healthcare facilities [6]. The online tele-medicine technology can also be adopted in dental education.

There are many online applications developed for orthodontics purpose. However, most of the online application were built for games and patient self-management[7]. Thus, there is a pressing need to develop online orthodontic screening, which focused on student and education purpose. The development of any online dental application needs to be validated based on evidence and data[8]. Therefore, an academicians need to develop the online platform themselves to maintain the standard and quality. Orthodontic screening is one of the topics being taught in dental school as part of physical examination and diagnosis of orthodontics' patient. Patient with severe orthodontic malocclusion suffer low self-esteem and reduce confidence level in their life[9]. The COVID-19

Corresponding author:
Assoc. Prof. Dr. Azrul Hafiz bin Abdul Aziz
DDS(UKM), MSc Orthodontics (Ncl), MOrth (Edin)
Faculty of Dentistry, USIM, Pandan Indah, 55100, Kuala Lumpur, Malaysia.
E-mail: afizz80@usim.edu.my

pandemic has further cause negative impact on treatment, financial and wellbeing of orthodontics' patient [10]. These patients could not come for treatment due to the lockdown and dental student could not undergoes teaching and practical session. To overcome this, an online orthodontic screening was developed to help both patients and student.

Materials and methods

This cross-sectional study was approved by the University Medical Ethical Committee with the code number USIM/JKEP/2021-133. The sample size was calculated based on student's population size, margin of error (5%) and confidence level was set to be 95% for this study. In total, seventy subjects from one hundred and seventy-five dental students participated in this study. The inclusion criteria for this study were dental students age between 23 to 25 years old, have started orthodontics clinic and done several orthodontics screenings. The exclusion criteria were dental students in preclinical years and did not attend any orthodontic practical session. All the subjects were informed in detail regarding the study and consent were obtained.

Prior to the study, several samples were used as model patient and pretested on several orthodontists. All orthodontists agree with the standard answer except for some variations on the treatment plan. The same sample of model patients were then tested onto the clinical year dental students. The data collected were then analysed using Statistical Package for Social Sciences, version 24.0. An independent t-test was also done to compare between orthodontist and student's group. A p=value of below than 0.05 was deem as statistically significant with confident interval set at 95%. The data was express in percentage unit as to resemble the distribution of answers.

Results

The result shows that all subjects (100% (n=70]) answer all the questions given. The highest number of correct answers were on patient detail, medical history, family history, dental history and main concern. For extraoral examination, more than half answered correctly for sagittal plane, profile, vertical (LAFH) and transverse, vertical (FMPA), lip competency,

nasio-labial angle and tongue. The result is as shown in Table 1.

ITEM	CORRECT	WRONG	UNSURE
EXTRA-ORAL EXAMINATION			
1. Sagittal	0.8714	0.1142	0.0143
2. Profile	0.8714	0.1142	0.0143
3. Vertical (FMPA)	0.8143	0.1571	0.0286
4. Vertical (LAFH)	0.8571	0.100	0.0429
5. Transverse	0.9857	0.0143	
6. Lip Competency	1.000		
7. Nasio–labial Angle	0.9142	0.0714	0.0143
8. Tongue	0.7571	0.0714	0.1714

Table 1. Distribution answers on extra-oral examination.

ITEM	CORRECT	WRONG	UNSURE
INTRA-ORAL EXAMINATION			
1. Oral Hygiene	0.8143	0.1857	
2. Teeth Present	0.6286	0.3429	0.0286
3. Teeth with Poor Prognosis	0.9143	0.0429	0.0429
LOWER ARCH			
1. Lower Arch Shape	0.7571	0.2286	0.0143
2. Anterior Crowding / Spacing	0.7714	0.2286	
3. Incisor Angulation	0.7428	0.1857	0.0714
4. Canine Angulation	0.7000	0.300	
UPPER ARCH			
1. Upper Arch Shape	0.8226	0.1714	
2. Anterior Crowding / Spacing	0.8226	0.1571	0.0143
3. Incisor Angulation	0.9571	0.0143	0.0286
4. Canine Angulation	0.9000	0.0857	0.0143
TEETH IN OCCLUSION			
1. Incisor Relationship	0.9714	0.0286	
2. Canine Relationship	0.4571	0.5000	0.0429
3. Molar Relationship	0.3857	0.5714	0.0429
4. Overbite	0.9571	0.0429	
5. Crossbite	0.5429	0.4429	0.0143
6. Midline	0.8714	0.0857	0.0429

Table 2. Distribution answers on intra-oral examination.

However, intra-oral examination showed a mixed result. Oral hygiene, poor prognosis teeth, abnormal shape teeth and supernumerary were correctly answered by majority of the subjects. More than half of the subjects answered correctly for arch shape, crowding, upper incisor angulation and third molar condition. However, less than half gave the wrong answer for lower canine angulation, lower posterior teeth, and rotated teeth. The overall result is shown in Table 2. All subjects manage to answer correctly on the teeth in occlusion except for canine relationship and molar relationship and crossbite

condition. Lastly, almost all subjects correctly answered the incisor relationship, overjet, overbite, open bite and midline.

Discussion

Online application such as website, mobile apps and media social can be used in many ways in orthodontics. For clinicians, online methods can be used to share information, post interesting topics, medium for case discussion, access journal, prepare for examination and view orthodontic product [11]. For patients, it can be used as a motivator, elastics reminder and maintaining good oral hygiene [12]. For students, it can be used to improve attitude and practice among dentistry student towards patient's health [13]. During pandemic lockdown, an online orthodontic screening was developed to help student to learn and diagnosed patient. In this study, all subjects were required to assess patient virtually by using online screening. Almost all subjects could assess the patients accurately in extra-oral and in intra-oral examination. However, some areas were a bit difficult to assess as the image was not very sharp. This is one of the acceptable limitations in online method as reproducibility of treatment plan was greater with physical record compared to digital record [14].

A good clinical photograph is needed to make an accurate clinical examination and diagnosis. This is to reduce physical encounters and useful in training dental staff in assessment and referral of new patient [15]. Another study found that most diagnostic decision can be made between standard records and non-radiographic dentofacial photograph record [16]. Concur with the findings of our study, a good clinical photograph is required to be able to correctly diagnoses orthodontic patient. Another way of enhanced online diagnosis is to include video graphic. Video graphics can be used as a guideline for clinical assessment and comprehensive treatment plan [17]. In addition, to improve the accuracy of online orthodontics screening, an artificial intelligent technology can be adopted to predict orthodontic treatment. It can provide anatomical prediction and improve diagnosis accuracy than heavily dependent on individual human decision [18]. The potential used of artificial intelligent is tremendous in health and education. This kind of paradigm shift is needed in the era of COVID-19 pandemic [19]. In short, the use of online screening can reduce the need of patient to come to orthodontic clinic and help dental students to continue their education without interruption of pandemic lockdown.

Conclusions

The COVID-19 pandemic imposed several challenges on the delivery of dental education worldwide. New ways of online teaching and virtual pedagogy must be developed, adapted, and implemented to this era. Thus, this study has shown that, implementation of online orthodontic screening can be an alternative feasible method in comparison to the traditional clinical setting.

Acknowledgments

Declaration of Interest

The authors report no conflict of interest.

References

1. Sara P, Yanqing W, Jinfeng Z, Ernesto C. History of the COVID-19 pandemic: Origin, explosion, worldwide spreading. Biochemical and Biophysical Research Communications. 2021; 538: 14-23.
2. Alauddin MS, Baharuddin AS, Mohd Ghazali MI. The Modern and Digital Transformation of Oral Health Care: A Mini Review. In Healthcare. 2021; 9(2): 118.
3. Udhayvir SG, Abhishek S, Deepak S, Tulika S, Shubham R, Durre A, Dhiraj B, Pritanjali S. Tele-health and cancer care in the era of COVID-19: New opportunities in low- and middle-income countries (LMICs). Cancer Treatment and Research Communications. 2021; 27: 1-3.
4. Clemens SK, Nicole K, Blanca R, Lan T, Jackeline V, Matthew B. Telehealth and patient satisfaction: a systematic review and narrative analysis. BMJ Open. 2017; 7(8).
5. Alizae MF, Syed M, Balqis Z, Tanti Irawati R. Orthodontic Postgraduates Satisfactions and Expectations: A Qualitative Study. Journal of International Dental and Medical Research. 2021; 14(3): 1093-1099.
6. Leite H, Gruber T, Hodgkinson IR. Flattening the infection curve – understanding the role of telehealth in managing COVID-19. Leadership in Health Services. 2019; 33(2): 221-226.
7. Nausheen RS, Samantha H, Mohammad OS. Availability of orthodontic smartphone apps. Journal of Orthodontics. 2019; 4(3): 235-241.
8. Faria IM, Sancas MC, Pintor AVB and Primo LSG. Dental Apps for Smartphones: New Way of Providing Services and Education. Creative Education. 2018; 9: 687-696.
9. Azrul H, Diana Z, Ainuddin Y, et al. The Psychosocial Impact of Dental Aesthetics on Orthodontics Patients. Journal of

International Dental and Medical Research. 2019; 12 (2): 563-568.

10. Onyinye DU, Ifeoma LU, Ikenna GI and Emmanuel TA. Impact of the coronavirus disease 2019 pandemic on orthodontic patients and their attitude to orthodontic treatment. American Journal of Orthodontics and Dentofacial Orthopedics 2021; 159(5): 399-409.

11. Baheti MJ, Toshniwal N. Orthodontic apps at fingertips. Prog Orthod. 2014; 15(1): 36

12. Janneke FMS, Pepijn VE, Cor VL, Berno vM. Mobile App (WhiteTeeth) to Promote Good Oral Health Behavior Among Dutch Adolescents with Fixed Orthodontic Appliances: Intervention Mapping Approach. JMIR Mhealth Uhealth. 2018; 6(8): 163.

13. Sharare K, Khaled R, Vahid V, Abdorrahim A. Effects of Social Networking Education on HIV/AIDS Knowledge, Attitude and Practice in Dentistry Students. Journal of International Dental and Medical Research. 2019; 12 (2): 617-621.

14. Dunbar AC, Bearn D, McIntyre G. The influence of using digital diagnostic information on orthodontic treatment planning - A pilot study. Journal of Healthcare Engineering. 2014; 5(4): 411-428.

15. Anna D, Ryan H, Sharon MGL, Chris JS, Susana DG. Implementation of photographic triage in a paediatric dental, orthodontic, and maxillofacial department during COVID-19. International Journal of Paediatric Dentistry. 2021; 31(4): 547-533.

16. Amornrut M, Arshan H, Veerasathpurush A, Mohamed IM. Diagnosis and treatment planning of orthodontic patients with 3-dimensional dentofacial records. American Journal of Orthodontics and Dentofacial Orthopedics. 2017; 151(6): 1083-1091.

17. Adithi R, Anand B, Aditya A. An orthodontic analysis of the smile dynamics with videography. Journal of Oral Biology and Craniofacial Research. 2021; 11(2): 174-179.

18. Shan T, Tay FR, Gu L. Application of Artificial Intelligence in Dentistry. Journal of Dental Research. 2021; 100(3): 232-244.

19. Azrul H. Paradigm Shift in Dental Education due to COVID-19. Mod Res Dent. 2021; 6(2): 605-606.