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Kertas Asli/*Original Articles*

Periodontitis Patients' Oral Health Experience and Quality of Life during the Malaysian Movement Control Order-2020

(Pengalaman Kesihatan Pergigian dan Kualiti Hidup Pesakit Periodontitis semasa Perintah Kawalan Pergerakan Malaysia-2020)

ABSTRACT

The coronavirus disease 2019 (COVID-19) has sparked concerns among dental patients due to its high infectivity. The implementation of the Movement Control Order in 2020 by the Malaysian government (MMCO-2020) has added constraints to access to dental clinics and may affect the patients' status of oral disease. This study aims to investigate the impact of MMCO-2020 on the periodontal health and oral health-related quality of life (OHRQoL) of periodontitis patients with/out non-communicable diseases (NCDs). A cross-sectional study involving 139 patients with periodontitis was conducted to assess patients' OHRQoL, oral health problems, and their perceived barriers to access dental treatment during MMCO-2020 using the Oral Health Impact Profile (OHIP-14) and questionnaire on oral health-related problems. The overall mean OHIP-14 score was relatively low (10.08 ± 8.861), suggesting that the OHRQoL is generally good during MMCO-2020. However, 44 (31.7%) periodontitis patients score ADD ≥14, indicating poorer oral health status and greater dental treatment needed. There was statistically significant association between periodontitis patients with comorbidities (i.e., presence of NCDs) with poorer OHIP-14 scores and mean plaque score changes at pre- and post-MMCO, suggesting that special care is required by this group, even during the national lockdown. Of the 45 (32.4%) patients who reported having problems, most (30, 36.1%) decided to "visit the dentist for treatment'. Meanwhile, the most frequent barriers were "could not get an appointment" (14, 34%), "problem is not serious" (13, 39.4%) and "fear of COVID" (9, 27.3%). The MMCO-2020 restrictions on the population had a minimal negative impact on the OHRQoL of patients with periodontal disease, but provisions can be arranged to address the basic and urgent needs of selected periodontitis patients, especially those presented with medical comorbidities.

Keywords: COVID-19, Dental Health Services, pandemic, Oral Health, barriers

ABSTRAK

Penyakit koronavirus 2019 (COVID-19) telah menimbulkan keresahan di kalangan pesakit pergigian disebabkan oleh kadar kejangkitannya yang tinggi. Pelaksanaan Perintah Kawalan Pergerakan pada tahun 2020 oleh kerajaan Malaysia (MMCO-2020) telah menimbulkan banyak kekangan kepada pencapaian perkhidmatan di klinik pergigian dan boleh mempengaruhi status kesihatan pergigian pesakit. Matlamat kajian ini adalah untuk menyelidik impak MMCO-2020 ke atas kesihatan periodontium dan kualiti hidup berasaskan kesihatan pergigian (OHRQoL) pesakit periodontitis dengan/tanpa penyakit tidak berjangkit (NCD). Satu kajian keratan rentas melibatkan 139 pesakit periodontitis untuk menilai OHRQOL pesakit, sebarang masalah kesihatan pergigian dan tanggapan mereka terhadap halangan untuk mencapai perkhidmatan pergigian semasa MMCO-2020 menggunakan Profil Impak Kesihatan Pergigian (OHIP-14) dan soal selidik berkaitan masalah pergigian. Secara keseluruhannya, purata skor OHIP-14 adalah rendah (10.08 ± 8.861), dan membayangkan OHRQoL yang baik di kalangan pesakit semasa MMCO-2020. Walau bagaimanapun, 44 (31.7%) pesakit periodontitis memperoleh skor ADD ≥14 yang menunjukkan status kesihatan mulut yang kurang baik dan keperluan untuk rawatan pergigian lebih tinggi. Terdapat hubungan statistik yang signifikan di antara pesakit periodontitis dengan kehadiran penyakit komorbiditi (iaitu dengan NCD) dengan skor OHIP-14 yang lebih teruk, dan perubahan purata skor plak semasa pra- dan pasca-MMCO, dan sekali gus menyarankan keperluan penjagaan khas untuk kumpulan ini, apatah lagi di masa perintah berkurung. Daripada 45 (32.4%) pesakit yang melaporkan menghadapi masalah, beberapa orang pesakit (30, 36.1%) mengambil keputusan untuk 'berjumpa doktor gigi untuk rawatan'.

Manakala halangan yang paling kerap dilaporkan adalah 'tidak mendapat temu janji' (14, 34%), 'masalah tidak parah' (13, 39.4%) dan 'takut kepada COVID' (9, 27.3%). Hasil dapatan kajian ini menunjukkan kesan negatif MMCO-2020 terhadap OHRQoL pesakit periodontitis adalah rendah, namun keperluan rawatan pergigian yang asas serta kecemasan perlu disediakan untuk pesakit periodontitis tertentu terutamanya yang mempunyai penyakit komorbiditi.

Kata kekunci: COVID-19, Perkhidmatan Kesihatan Pergigian, pandemik, kesihatan pergigian, halangan

INTRODUCTION

The notorious COVID -19 (Coronavirus Disease -2019), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was first discovered in Wuhan, China, in 2019 and has since spread around the world. The pandemic has enormously affected all aspects of lives and sectors worldwide, dental health services included (Benzian et al. 2021). The virus was thought to be transmitted primarily through direct or indirect personal contact via respiratory droplets from an infected person. This has substantially restricted dental health services due to the fear of virus transmission and the high potential of infection during aerosol-generating procedures (Brian & Weintraub 2020). Following that, most health and dental authorities recommended that all providers of dental services should be kept to 'emergency-only' until a proper standard operative procedure (SOP) could be formulated (Oral Health Program 2020). The implementation of the Movement Control Order by the Malaysian government (MMCO-2020) in the effort to contain the spread of infection has further added constraints to the already limited access to dental services. The Movement Control Order (MCO) was introduced on 18th March 2020, followed by the Conditional Movement Control Order (CMCO) on 4th May 2020 and the Recovery Movement Control Order (RMCO) on 10th June 2020 until the end of 2020 (Mani et al. 2021). Closure and reduced opening hours of dental practices, except for emergency services, had significantly hindered patients' access to dental treatments and caused interruptions to active and scheduled dental care (Aziz et al.2020; Mani et al. 2021).

Periodontitis is highly prevalent in Malaysia. As one of the most common oral diseases, periodontitis is a microbial-associated inflammatory disease, with a destructive host-mediated response that results in a progressive loss of periodontal support (Tonetti et al. 2018). A high prevalence of periodontal diseases was observed among Malaysian adults affecting almost 94.0% of the population (Ministry of Health 2011) and imposing a high economic burden on the national health expenditure (Mohd Dom et al. 2016). It has been established that periodontitis patients require regular supportive periodontal therapy (SPT) to ensure their periodontal health stability and prevent the recurrence of infection (Manresa et al. 2018). Considering that patients with this condition require regular dental monitoring, long-term interruptions to dental care will affect their oral health stability and put them at a higher risk for worsening of current oral status.

The quality of life of an individual and population is a significant outcome of health and healthcare. In the oral health sector, the assessment of the impact of oral health on quality of life has led to the development of what is termed the oral health-related quality of life (OHRQoL) (Locker & Allen 2002). Evaluation of OHRQoL brings together the dimension of social impact and clinical indicators, measures the extent to which health status disrupts normal functionality and social roles, and produces major changes in behaviour. Periodontal disease may exert an impact on the quality of life of individuals, with greater severity of the disease related to greater impact (Ferreira et al. 2017). However, the impact of periodontitis on quality of life has received relatively little attention. This may be due to the few symptoms experienced by periodontal patients in the early stages of the disease, in contrast to other oral diseases and conditions (Yadav T et al. 2019).

Currently, information on the quality of life and oral health problems experienced by these patients during MMCO-2020 is crucial for formulating actions for continued dental treatment during a pandemic but its availability is very limited. To our understanding, this is the first report of oral health-related problems during the MMCO-2020 among patients with periodontitis in Malaysia. This study aimed to investigate the impact of the MMCO-2020 on periodontal health and oral health-related quality of life of periodontitis patients with and without systemic co-morbidities. We hypothesised that periodontitis patients experience significant oral health problems and their OHRQoL is significantly affected by the implementation of MMCO-2020.

METHODS

STUDY DESIGN AND STUDY POPULATION

The data for this cross-sectional study were collected from October 2020 to March 2021. Periodontitis patients treated at a dental school in the Kuala Lumpur city centre were invited to join the study. Convenience sampling was

performed based on the patients' attendance registry. The inclusion criteria for this study were Malaysians, adults aged 18 years old and above, diagnosed with periodontitis, Malay and/or English literate, and patients who were willing to participate in our study. Patients who are mentally challenged and pregnant mothers were excluded from this study. Permission to conduct the study was obtained from the University's Research Ethics Committee (PPI/111/8/JEP-2020-617).

DATA COLLECTION

Before data collection, each patient was provided with a full explanation of the research and written informed consent was obtained for participation in this research. Two interviewers were trained and calibrated to conduct the interviews using a set of questionnaires prepared in both Malay and English languages. The interviews were conducted via phone calls. During the survey, the interviewers would read out the questions clearly and slowly to ensure that the respondents could fully comprehend the questions. It took approximately 10 minutes for each interview session to be completed.

The questionnaires in this study comprised of three parts:

1. Patient information

Socio-demographic details include the date of birth, age, ethnicity, medical condition (if any), and smoking status. The medical condition of the patients was self-declared by the patients. Non-communicable diseases (NCDs) were referred to as chronic diseases that have a prolonged course and do not resolve spontaneously and result from an acute (infectious) process (CDC 2013). In this study, the main NCDs noted were hypertension, dyslipidemia, cardiovascular diseases (CVD) and diabetes mellitus (DM).

2. Oral Health Impact Profile-14 (OHIP-14)

The validated Oral Health Impact Profile-14 (OHIP-14) Malaysia version was used to assess the OHRQoL among these patients (Saub et al. 2005). The OHIP-14 is a self-completed questionnaire with a multi-item scale consisting of 14 items, subdivided into seven domains: namely functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. The frequency of experiencing each impact during the period of MMCO-2020 was reported by subjects on a five-point scale: Never (Score 0), Seldom (Score 1), Sometimes (Score 2), Quite Often (Score 3), Very Often (Score 4). The additive scores (ADD) were calculated by summing up the response codes for the 14 items. The ADD scores ranged from 0 to 56 and a higher score would reflect a higher impact which is poorer OHRQoL and an average ADD score of 13.06 was described as being perceived as 'dental treatment needed' and ADD score of 13.56 as being perceived as 'fair oral health status' (Saub et al. 2005). Therefore, the current study applied a cut-off value of 14 or greater to imply poorer oral health status and dental treatment needed.

3. COVID-19 related section

The last section of the questionnaire includes questions on oral health problems such as pain or discomfort experienced by the patients during MMCO-2020, a description of the problem, if any, including when it occurred, site of the problem, duration of the pain, and intensity of the pain, and the action(s) taken by the patient to overcome the problem. The action(s) taken by patients could include "Did not do anything", "Take home remedies", "Gargle with mouthwash", "Take over-the-counter medicines", and "Visit the dentist". If "visit the dentist" was not one of the actions taken, patients were asked for the reason for this. The reasons could be "Fear of contracting COVID-19", "Could not get a dental appointment", "Problem is not serious", "Costly", "Problem resolved on its own", or "Others".

4. Assessment of Periodontal Health

Information on patients' periodontal chartings was compiled from the existing clinical records (for pre-MMCO). The classification of periodontitis was evaluated using probing pocket depth (PPD) and bleeding on probing (BOP) according to the criteria recommended by the British Society of Periodontology (Chapple et al. 2018):

a. Periodontitis currently stable is defined as bleeding on probing (BOP) less than 10%, probing pocket depth (PPD) less than 4mm, and no BOP at 4mm sites.
b. Periodontitis currently in remission is defined as bleeding on probing (BOP) more than 10%, probing pocket depth (PPD) less than 4mm, and no BOP at 4mm sites.
c. Periodontitis currently unstable is defined as probing pocket depth (PPD) more than or equal to 5mm and PPD more than or equal to 4mm with BOP.

DATA ANALYSIS

All analyses were conducted using the statistical software package IBM SPSS software version 26.0 (IBM Corp., Armonk, New York). Descriptive statistics were used to describe the percentage and means ± SD for demographic distribution, periodontal disease status, and presence of NCDs. An analysis of variance (ANOVA) was used to

compare the data between the two groups: OHIP-14 score and periodontal status between NCD and non-NCD groups. Statistical significance was set at the 95% confidence level (α=0.05), in which a p-value of <0.05 was considered statistically significant.

RESULTS

From the list of a total of 408 periodontitis patients obtained from the registry of the Periodontics Clinic, 182 (44.6%) patients were able to be contacted. Eventually, 139 (72.0%) patients gave consent to participate in the study.

CHARACTERISTICS OF PATIENTS

Majority of the patients were male (75, 54.0%), Malay (87, 62.6%), aged between 22-86 years old (mean=50.7 + SD 13.4) (Table 1). About one-third (54, 39.6%) of the patients reported having NCDs including diabetes (21, 15.1%), hypertension (25, 18.0%), hypercholesterolemia (27, 19.4%), and cardiovascular disease (6, 4.3%), and either having one comorbidity (34, 62.9%), two (16, 11.5%) or more than two comorbidities (4, 7.4%). Some of these patients were also active smokers (19, 13.7%).

TABLE 1. Characteristics of the periodontitis patients (n, 139)

Description	n (%)
Age (years old):	
Range	22 - 86
Mean (SD)	50.71 (±13.39)
Gender:	
Male	75 (54.0)
Female	64 (46.0)
Ethnicity:	
Malay	87 (62.6)
Chinese	37 (26.6)
Indians	11 (7.9)
Others	4 (2.9)
Comorbidity:	54 (39.6)
Diabetes mellitus	21 (15.1)
Hypertension	25 (18.0)
Hypocholesterolaemia	27 (19.4)
Congestive heart diseases	6 (4.3)
1 NCD	34 (62.9)
2 NCDs	16 (11.5)
>2 NCDs	4 (7.4)
Smoking status:	
Yes	19 (13.7)
No	97 (69.8)
Unknown	23 (16.5)

OHRQOL STATUS DURING THE MMCO-2020

The three most common affected items during MMCO-2020 for periodontitis patients were food dislodged (100, 71.9%), followed by patients avoiding eating (76, 54.7%) and eating discomfort (70, 50.4%) (Table 2). Among all the domains, psychological discomfort, physical pain, physical disability, and functional limitations were mostly reported (higher means and SD) by the patients.

The mean ADD score for periodontitis patients was 10.08 (+8.861), which was relatively low and indicated good OHRQoL among the patients during the implementation of MMCO-2020. However, 44 periodontitis patients scored ADD >14, which indicates about one-third

of these patients (31.7%) had poorer OHRQoL. Based on the mean score, the three most common affected domains during MMCO-2020 for periodontitis patients were psychological discomfort (mean 2.7 ±2.17), physical pain (1.6 ±1.528), and functional limitations (1.56 ±1.687).

According to the mean score per impact item, 'discomfort due to food stuck' in between the teeth under the domain of psychological discomfort was reported with the highest mean score (1.78 ± 1.45). This was followed by the items 'avoid eating a certain food' (1.13 ± 1.215), and 'eating discomfort' (1.01 ±1.195). On the other hand, 'avoid socialising' and 'daily activities disrupted' showed the lowest mean scores (0.22 ± 0.634 and 0.27 ± 0.668 respectively).

TABLE 2. Patients perceived oral health-related quality of life during MMCO-2020 (n,139)

OHIP-14 domains and items	NCD (54)	No-NCD (85)	Total (139)	Mean	SD
Functional limitations:					
● Chewing difficulty	28 (20.1)	25 (18.0)	53 (38.1)	0.78	1.178
● Bad breath	28 (20.1)	34 (24.5)	62 (44.6)	0.88	1.126
Physical pain					
● Eating discomfort	32 (23.0)	38 (27.3)	70 (50.4)	1.01	1.195 0.850
● Oral ulcer	16 (11.5)	39 (28.1)	55 (39.6)	0.58	
Psychological discomfort					
● Food lodged	40 (28.8)	60 (43.2)	100 (71.9)	1.78	1.450
● Shy	29 (20.9)	31 (22.3)	60 (43.2)	0.91	1.256
Physical disability					
● Avoid eating	33 (23.7)	43 (30.9)	76 (54.7)	1.13	1.215
● Avoid smiling	17 (12.2)	20 (14.4)	37 (26.6)	0.54	1.037
Psychological disability					
● Sleep disturbance	16 (11.5)	15 (10.1)	31 (22.3)	0.35	0.741
● Concentration disturbance	22 (15.8)	24 (17.3)	46 (33.1)	0.57	0.963
Social disability					
● Avoid socialising	10 (7.2)	9 (6.5)	19 (13.7)	0.22	0.634
● Daily activities disrupted	15 (10.8)	11 (7.9)	26 (18.7)	0.27	0.668
Handicap					
● Spending money	18 (12.9)	23 (16.5)	41 (29.5)	0.45	0.791
● Low confidence	23 (16.5)	23 (16.5)	46 (33.1)	0.62	1.045
Total (ADD score)	699	756	1455	10.08	8.861

ORAL HEALTH PROBLEMS AND THE PERCEIVED BARRIERS DURING MMCO-2020

Most of the periodontitis patients (94, 67.6%) do not experience any oral health problems during MMCO-2020. Among those, 45 patients (32.4%) experienced oral health problems such as pain and discomfort inside the mouth. Five patients could not recall the period of the pain episode, while others reported the most complaints during the CMCO-2.0 (September to December 2020) and RMCO (June to August 2020) with 18 complaints each, then 13 complaints during the EMCO (Mac to May 2020) and six complaints during the CMCO -1.0 (May to June 2020).

Most of the patients who experienced pain went to "visit the dentists" (30, 36.1%), "gargle with mouthwash" (23, 27.7%), and "took OTC medications" (13, 15.7%). Those who did not seek dental care reasoned that they "could not get an appointment" (14, 34%), "problem was not serious" (13, 39.4%) and "fear of getting COVID-19 infection" (9, 27.3%).

COMPARISON BETWEEN PERIODONTITIS PATIENTS WITH/WITHOUT NCD

In general, there was a slightly higher percentage of patients without NCDs who reported having oral health problems during the MMCO-2020 (NCDs 61.1% and no-NCDs 71.8% respectively) (Table 3). Periodontitis patients with NCDs were reported to have a higher mean ADD score (11.7 ±8.82) than patients without NCDs (9.1 +8.79), indicating worse OHRQoL and also a statistically significant difference in the total OHIP-14 mean score of periodontitis patients with and without NCDs (p =.048). In addition, 40.7 % of periodontitis patients with ADD ≥ 14 represent poorer OHRQoL in comparison to only 25.9% of periodontitis patients without NCDs.

TABLE 3 Oral health problem and OHRQoL of periodontitis patients with and without non-communicable diseases (NCDs) (n, 139)

	NCD (54)	No-NCD (85)	Total (139)	p-value
Oral Health Problem n (%)				
Yes	21 (38.9%)	24 (28.2%)	45 (32.4%)	0.218
No	33 (61.1%)	61 (71.8%)	94 (67.6%)	
OHIP-14				
ADD (mean ±SD)	11.7 (±8.82)	9.1 (±8.79)	10.08 (±8.861)	*0.048
ADD≥14 (n, %)	22 (40.7%)	22 (25.9%)	44 (31.65)	**0.033

ADD: Additive Score, SD: Standard deviation
*Significant at p < 0.05 (ANOVA)
**Significant at p <0.05 (Chi-Square Test)

CHANGES IN THE PERIODONTAL HEALTH OF PERIODONTITIS PATIENTS

When clinical records were retrieved to access pre- and post- MMCO periodontal health assessments, we were able to retrieve 108 (77.7%) patients' complete records at pre-MMCO for analysis in this section. Of this number, 31 (22.3%) patients came for the post-MMCO clinical evaluation but only 18 (12.9%) patients had complete post-MMCO assessment records.

From the patients' periodontal health analysis, patients with NCDs had lesser teeth present in both pre-MMCO and post-MMCO respectively (22.82, 21.5), compared to the non-NCDs group (24.27, 25.92) (Table 4). However, these differences were not statistically significant. Other than the mean plaque scores which were found to be significantly higher in the patients with NCDs (p=.017) in the pre-MMCO, other clinical parameters were not statistically significant although there were higher gingival bleeding scores, a greater number of sites with PPD ≥ 4mm, a greater number of teeth with furcation involvement, and more numbers of teeth with mobility. No statistically significant difference was also found in the periodontal health between the NCDs and non-NCDs groups during the post-MMCO observation.

TABLE 4 Clinical status of patients with and without non-communicable diseases (NCDs) before and after MMCO-2020

	Pre-MMCO-2020				Post-MMCO-2020			
	NCD (45)	No-NCD (63)	Total (108)	p-value	NCD (7)	No-NCD (11)	Total (18)	p-value
Periodontitis classification, n (%):								
Periodontitis Currently Stable (PS)	1 (0.9)	3 (2.8)	**4 (2.9)**	-	0	1 (5.6)	**1 (5.6)**	-
Periodontitis Currently in Remission (PR)	0	0	**0**	-	0	0	**0**	-
Periodontitis Currently Unstable (PU)	43 (39.8)	61 (54.5)	**104 (96.3)**	-	7 (38.9)	10 (55.6)	**17 (94.4)**	-
Clinical changes, mean (SD)								
Total teeth present	22.82	24.27	**23.68**	0.266	21.5	25.92	**23.91**	0.108
Plaque score	65.25	53.14	**58.16**	*0.017	30.65	30.13	**30.34**	0.962
Gingival score	31.06	25.55	**27.85**	0.222	43.52	49.13	**46.89**	0.586
No. Sites with PPD >4mm	26.55	22.91	**24.39**	0.443	19.90	13.92	**16.64**	0.380
No. of teeth with furcation involvement	0.98	0.81	**0.88**	0.611	1.70	1.42	**1.55**	0.771
No. of teeth with mobility	4.52	3.61	**3.98**	0.380	4.7	2.17	**3.32**	0.118

DISCUSSION

To our current knowledge, there has yet been any study published to evaluate the impact of national lockdown on OHRQoL among periodontitis patients in Malaysia. The conduct of this study is therefore timely and befitting to evaluate the impact of MMCO-2020 on the oral health of periodontitis patients and aid to formulate a strategic plan for accessing dental clinics. Today, there is growing support for the existence of a correlation between the degree of periodontal disease and OHRQoL (Jansson et al. 2014). Oral health status was commonly perceived as impacting life quality because of the symptoms such as mobile teeth, sore gums, receding gums and physical effects it produced. This draws attention to the influence of periodontal diseases on day-to-day living and the overall importance of life quality. Those who had undergone a course of periodontal care and were in the maintenance phase had a better oral health-related quality of life compared with new patients (Needleman et al. 2014).

The findings in this study demonstrated a relatively higher impact on patients' OHRQoL in the psychological discomfort, physical pain, and functional limitation domains with a focus on functions, pain, and halitosis. This concurs with findings from previous studies (El Sayed et al. 2019; Palma et al. 2013). In general, the mean OHIP-14 score observed in both groups was relatively low, which indicates good OHRQoL. Nevertheless, a wide range of scores for each domain was observed implying that oral health problems affect OHRQoL at different levels and severity. Furthermore, 44 (31.7%) periodontitis patients scored ADD ≥14, indicating poorer oral health status and greater dental treatment needed.

Additionally, there were statistically significant differences in the mean OHIP-14 scores and the percentages of patients who scored ADD ≥14, between the periodontitis patients with and without NCD. The finding suggests that periodontitis patients with medical comorbidities experience poorer OHRQoL. Consequently, periodontitis patients with medical comorbidities require special attention to ensure continuous provision of active therapy. The notion also agrees with the recommendation that the SPT scheduled at intervals of three to a maximum of 12 months tailored according to the patient's needs, as any patient may need re-treatment if disease recurrence is detected (Trombelli et al. 2020).

Generally, the mean OHIP-14 observed in all periodontitis patients was in a good range, although the score is poorer in periodontitis patients with NCDs, which may reflect a poorer oral health status and perceived dental treatment needed in this group of patients. The observation could be attributed to the signs and symptoms afflicted by the periodontal disease itself (Buset et al. 2016), besides the medical problems that they were experiencing at the same time. Similar findings have been observed in previous studies where periodontitis patients presented with poorer OHRQoL than non-periodontitis patients (Sulaiman et al. 2019). The wide range of clinical signs and symptoms that are readily perceived by individuals such as swollen gums and loose teeth may have a considerable impact on daily life quantity.

In this pandemic era, the fear of SARS-CoV2 infection or 'coronaphobia' among patients would have negatively influenced their treatment-seeking behaviour, affecting their OHRQoL (Samuel et al. 2021). The fear of COVID-19 infection may lead to a refusal to come for dental treatment. Interestingly, the results of this study indicated that "*Could not get an appointment*" was the main barrier to not getting dental treatment. This may be mainly attributed to the practice of providing emergency-only dental services, especially in the early phase of MMCO-2020. Furthermore, most Malaysian dentists were reported to have limiting their clinical services during the MCO phases and resumed work once restrictions were lifted during the CMCO and RMCO (Mani et al. 2021).

It is clearly shown in multiple studies that periodontitis affects systemic health and has been independently associated with an increased risk of most chronic NCDs, particularly cardiovascular diseases, diabetes, hypertension, chronic renal disease, pneumonia, and cancer (Marouf et al. 2021). A cohort study showed that patients with periodontal disease and patients with fewer than 10 teeth were at a greater risk of coronary disease (Oppermann et al. 2012). The association between diabetes mellitus and periodontitis can be explained as a manifestation of systemic inflammation and the corresponding mechanisms of insulin sensitivity and glucose dynamics. The increased severity or chronicity of PPD increases insulin resistance and aggravates glycaemic control. Many studies have produced evidence for a link between diabetes mellitus and essential hypertension via hyperinsulinemia. Hence, the interrelatedness of diabetes mellitus, hypertension, and periodontitis may affect the manifestation of the disease (Lee et al. 2017). Periodontitis patients may benefit from diabetes control interventions to improve periodontal treatment outcomes and the maintenance of periodontal stability. These interventions consist of patient education as well as brief dietary counselling and, in situations of hyperglycaemia, the patient's referral for glycaemic control (Sanz et al. 2020). In this study, periodontitis patients with NCD exhibit poorer periodontal health parameters, especially in terms of the number of missing teeth, plaque score, gingival score, and the number of sites with more than 4mm. Therefore, periodontitis patients with NCD may require more stringent recalls and treatment during MMCO-2020 to maintain periodontal health.

Compared to the other NCDs, Type 2 Diabetes Mellitus (T2DM) had been established as a risk factor for periodontitis. However, it was reported that only a small percentage of periodontitis patients and patients with diabetes are oblivious of the close link of their condition to diabetes/periodontitis (Badiah B, 2012). Consequently, poor oral health literacy has also been associated with a lack of awareness and understanding of oral health care needs among patients. There is therefore a dire need for the development of an appropriate educational package to raise public awareness of periodontal disease and diabetes (Mohd-Said et al. 2015). Considering the established bidirectional relationships between the two diseases, the practice of integrated care for periodontitis and diabetes must be encouraged (Jamil et al. 2021). This is in line with recommendations in the latest guideline for more holistic management of patients with T2DM from all aspects of health (Ministry of Health Malaysia 2020).

Some patients experienced delays in getting access to dental treatment during the implementation of MMCO-2020, which mainly contributed to the difficulty in getting dental appointments. The findings of this study support the needs of basic and urgent treatment for selected periodontitis patients during the national lockdown. Apart from urgent dental services, there should be some consideration for continued oral health surveillance, provided with strict SOP to protect the patients and healthcare professionals. Non-invasive assessment methods such as teledentistry can be deployed since periodontitis is so prevalent in Malaysia. Self-help advise for patients with oral health problems can be guided by study findings, for instance, safe pain relief measures may be applicable for a certain duration but ultimately a dental consultation is extremely necessary.

CONCLUSION

The MMCO-2020 restrictions on the population to control COVID-19 spread had a minimal negative impact on the OHRQoL of patients with periodontal disease. However, provisions can be arranged by health providers to try to address the basic and urgent needs of selected periodontitis patients, especially those presented with medical comorbidities, while also addressing the bigger need to control the spread of COVID-19.

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CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be constructed as a potential conflict of interest.

STATEMENT OF HUMAN AND ANIMAL RIGHTS

All procedures in this study were conducted in accordance with the ethical guidelines laid down by the Declaration of Helsinki (2008).

STATEMENT OF INFORMED CONSENT

Written informed consent was obtained from the patients for their anonymized information to be published in this article. Patients were given the freedom to withdraw from the study at any point. Regular care was ensured to the participant in the case of withdrawal.

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