Thai Dentists' Concern on COVID-19 Infection from Dental Treatment and Daily Activities and Related Factors

Athikhun Praditpapha[1], Nikos Mattheos[1, 2], Pagaporn Pantuwadee Pisarnturakit[3], Atiphan Pimkhaokham[1], and Keskanya Subbalekha[*, 1]

[1]Department of Oral and Maxillofacial Surgery, Faculty of Dentistry Chulalongkorn University, Bangkok, Thailand
[2]Affiliated Research Fellow, Department of Dental Medicine, Karolinska Institute, Sweden
[3]Department of Community Dentistry, Faculty of Dentistry Chulalongkorn University, Bangkok, Thailand
[*]Corresponding author, E-mail: skeskanya@gmail.com

Abstract

The COVID-19 pandemic is a public health emergency of international concern. Due to the nature of the clinical treatment, dentists are among those at high-risk to contract the disease. However, there is scant data on dentists' concern about getting COVID-19 infection from their practice and the associated factors. This study aimed to investigate the concern about getting COVID-19 disease in Thai dentists, along with the associated factors. A questionnaire was developed and distributed via social media from April 24 to May 5, 2020. The dentists' working and sociodemographic status were collected as independent variables. Two numerical scale-rated questions were asked to assess the level of concern about getting infected from daily and clinical activities. Two open-end questions about the source of unpleasantness and opinion of the pandemic were also included in the questionnaire. Of 622 responses, 580 were included in the final analysis. Thai dentists had more concern about contracting the disease from performing dental treatment (score 6.80±2.58) than doing daily activities (score 5.15±2.65), P<0.001. Female dentists had a significantly higher concern about contracting the disease than males, P<0.001. A significant negative correlation with age was found, P<0.001. Thai dentists are concerned about COVID-19 infection from performing the dental treatment to a higher degree than from daily activities. Age and sex were related factors.

Keywords: *dental public health, coronavirus, SARS-CoV-2, infectious disease, infection control*

1. Introduction

At the end of the year 2019, there were cases of pneumonia with unknown pathological causes in Wuhan, China. The cause of the pneumonia was later identified as a new strain of coronavirus in the beta genus and was named the 2019 novel coronavirus (2019-nCoV). Just one month after the first report (January 20, 2020), the number of 2019 coronavirus disease (COVID-19) cases has reached over 200 (Tan et al. 2013). Although the World Health Organization (WHO) finally declared the global COVID-19 epidemic a public health emergency of international concern on January 30, 2020, the number has continued to exponentially grow (Mahase 2020a). And as of March 2, 2020, the number has dramatically increased to reach over 80,000 cases, about 400 times in just 6 weeks. While these numbers indicated only the cases in China only, the virus has also spread throughout the globe, causing over 3 million infected people around the world at the end of April 2020. In Thailand, the first confirmed case was reported on January 13, 2020. While the average number of the new case per day remain under 1 person for the first 50 days, the number has then increased rapidly since March 10, 2020, to hit over 100 cases per day just about 10 days later.

The 2019-nCoV may be considered one of the 21st century highly pathogenic human coronavirus (HCoV) following severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome virus (MERS-CoV) which caused pandemics in 2002 and 2012 respectively (Paules et al. 2020). It was also designated as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) by the International Committee on Taxonomy of Viruses because of its similar genomic features to SARS-CoV (Paudel et al. 2020). It was estimated that the effective reproduction number (R) of COVID-19 is about 4.08, which means an individual with COVID-19 can cause up to 4 new cases on average, exceeding that of SARS (R = 2.76-3.01) (Cao et al. 2020). Although the fatality rate of the disease seems to be low (0.3-

7.2%)(Li et al. 2020; Nishiura et al. 2020; Onder et al. 2020) compare to those of SARS and MERS (about 10% and 30% respectively), the total number of death worldwide in a period of just less than six months (over 200,000 confirmed dead as of March 28, 2020) exceeded 100 times higher than all-time cumulative dead cases of SARS and MERS added together (less than 2,000) (Mahase 2020b), highlighting the enormous impact of the pandemic on the human history of the 21st century.

To limit the spread of the virus, social distancing is an important measure. Most of the public areas including department stores, fitness centers, movie theatres, and nightclubs are closed. Transportations are limited both in and between countries. People need to stay safely in their accommodations, normal daily activities are interrupted. These protection modalities were applied by the Thai government to help stop the spread of COVID-19 infection.

Dentists are one among many careers which were inevitably affected by COVID-19. As dental procedures always involve contacting either directly or indirectly with patients' intra-oral and respiratory secretions, it is unarguable that, without proper management, their works are very risky of getting the new infectious disease. Whether it is a high-speed cutting instrument or an ultrasonic scaler, they both are capable of creating a huge amount of aerosols and droplets through the treatment processes; thus elevating the potential of the virus to spread through the air until they can enter a new host or settle down on a surface, waiting for other patients or health care workers (HCW) to touch them (Peng et al. 2020). There is a report that describes the infectious potency of aerosols and droplets from oral and nasal routes of a patient with an infected respiratory tract. These aerosols and droplets can suspend long and travel far in the air (Gerberding 1995). As of the first outbreak in Thailand (April 2020), the epidemic spreads throughout the country and hundreds of new infectious cases were reported every day. Due to the course of the disease, it is hard to identify the person carrying the virus (Peng et al. 2020). Many dental treatment guidelines recommend that dental procedures during the outbreak should be postponed, only emergency and urgency conditions that expect neither to produce aerosols nor droplets could be performed under the proper personal protective equipment (PPE). However, the availability of PPE, safety environment, the prevalence of disease in each area, and the policy of each working place were varied. Therefore, many workplaces were closed while some were still partial or fully open.

From all risks mentioned above, it is suspicious whether Thai dentists were afraid of contracting the disease from their work more than daily activities.

2. Objectives

1) To identify the concerning source of COVID-19 infection of Thai dentists
2) To identify associated factors of Thai dentists' concerns on the source of COVID-19 infection

3. Materials and Methods

3.1 Study design

This study was a cross-sectional descriptive study, questionnaire-based.

3.2 Study population

3.1.1 Study population

Thai dentists who are actively practicing in Thailand at the time before the COVID-19 pandemic (before April 2020).

3.1.2 Sample selection

The sample size is calculated based on the formula $n=Z^2pq/d^2$ (Daniel 2018). By using the prevalence of stress in dentists from the study of Collin V. et al., the calculated sample size was 381. This study used a convenient sampling method to collect the sample.

Inclusion criteria

- Thai dentists who are actively doing dental practice in Thailand before the pandemic time point (before April 2020).
- Thai dentists who can read, write, and communicate in the Thai language fluently.

Exclusion criteria

- Response from non-dentist respondent
- Incompletely filled questionnaire
- Duplicated response

3.3 Data collection

A custom questionnaire was designed for this study. The questionnaire was distributed online. The participants were invited to enroll in the study through an announcement and short explanation about the study, posted in private social media groups, including Facebook (Facebook Inc., USA) and Line (Line Corp., Japan).

To confirm that the respondent was a dentist, two screening questions were placed at the beginning of the questionnaire. Forms that had wrong responses to the screening questions were excluded from the analysis. The participants who wanted to participate in the lucky draw were requested to fill in their mobile phone numbers at the end of the questionnaire, and they would be brought to another link they could fill in their full name and dentist registration number. These private data were not linked to the questionnaire's response; thus, the identification of corresponding responses and respondents was unable. The participants emphasized that everyone could send only one response which was checked by their submitted phone number. Also, the dentist registration number given by participants was used to verify whether they were registered Thai dentists using the Thai dental council's website.

3.4 The questionnaire

The questionnaire comprised three sections: 1) Questions about working and sociodemographic data, 2) Concerns about COVID-19 infection source, and 3) Open-end questions about the things that made Thai dentists unhappy the most and opinions about the pandemic

Section 1: Demographics, work-related, and financial and socio-economic characteristics of the respondent

The question in this section includes age, gender, primary workplace, secondary workplace, primary working province, hometown, and primary source of income. These items were considered independent variables for concerns.

Section 2: Concerns about COVID-19 infection source

This section investigated the self-perceived concerns of getting infected with COVID-19 from work and daily activities, using 2 numerical scale rating questions with a score ranging from 0 to 10. These two questions were;

1) You are worried that you will get infected with COVID-19 from daily activities such as buying food/goods or traveling to work

2) You are worried that you will get infected with COVID-19 from performing dental treatment

Section 3: Open-end questions

This section has two open-end questions:

1) What is the thing that made you unhappy the most during the pandemic

2) What is your opinion about the pandemic

3.5 Statistical analysis

All descriptive data will be analyzed using descriptive statistics (frequency, percentage, mean and standard deviation), Mann-Whitney U test, Wilcoxon Signed Ranks test, and Spearman's correlation will be used to analyze the association between demographic data and concern scores. Data analysis will be performed by IBM SPSS (SPSS, Inc., USA) version 22. All data is considered significant when the p-value is less than 0.05.

3.6 Ethical approval

This study was approved by the ethics committee in human research of the Faculty of Dentistry, Chulalongkorn University (project number HREC-DCU 2020-027, approval number 029/2020).

4. Results

Data was collected from April 24 to May 5, 2020, which was in the middle of the lockdown period of the first outbreak in Thailand. 622 respondents answered the questionnaire. Of these responses, 5 did not pass inclusion criteria as they failed to deliver correct answers to screening questions and could not be identified as dentists. Of 617 responses left, 5 were duplicated answers, which might occur due to errors on the internet or limitation of the Google Form system, and 32 were not completely filled; thus, 37 responses were excluded from the result. There were 580 responses left for data analysis.

4.1 Working and sociodemographic data

Details of demographic data are presented in table 1. Of all respondents, 442 (76.2%) were female with the mean±SD = 38.39±10.22 years. The oldest and youngest respondents were 71 and 23 years old, respectively.

Most frequently reported primary and secondary working places were government hospitals (n=235, 40.5%) and freelance in private dental clinics (n=232, 40%) respectively. It is noted that nearly half of the dentists working primarily in a state hospital were also working as a freelance in private dental clinics (104 out of 235, 44.3%). Most dentists were primarily working outside of Bangkok (n=313, 54%).

Table 1 Working and sociodemographic data

Demographics	N (total=580)	%
Gender		
Male	138	23.8
Female	442	76.2
Age		
≤30	180	24.8
31-40	182	33.1
41-50	144	25.5
51-60	64	14.3
>60	10	2.2
Primary workplace		
Private dental clinic owner	64	11.0
Private hospital	53	9.1
Government's hospital	235	40.5
Dental school	115	19.8
Freelance	113	19.5
Secondary workplace		
Private dental clinic owner	44	7.6
Private hospital	52	9.0
Government's hospital	20	3.5
Dental school	36	6.2
Freelance	232	40.0
No secondary working place	196	33.8
Primary working location		
Bangkok	267	46.0
Outside Bangkok	313	54.0

4.2 Concerns of COVID-19 infection and related factors

Table 2 shows that Thai dentists were worried that they might get infected with the disease from work rather than from daily activities (Mean±SD = 6.80±2.58 and 5.15±2.65, respectively P<0.001). In addition, female dentists had higher concerns about infection from both clinical practice and daily life (Mean±SD = 7.01±2.54 and 5.31±2.57, respectively) than males (Mean±SD = 6.13±2.62 and 4.64±2.84, respectively) at P<0.001 and 0.015, respectively.

Univariate analysis between other predictors (age, workplace, and working location) and concern level of infection revealed that only the age had a negative correlation with the level of concern of getting infected from work and daily activities (spearman's rho -0.217 and -0.182, respectively, P<0.001). The data were shown in Table 3.

Table 2 Concern scores of each source of COVID-19 infection and subgroup analysis

Questions and subgroup	Mean±SD	P-value
1) You are worried that you will get infected with COVID-19 from daily activities such as buying food/goods or traveling to work	5.15±2.65	<0.001 [1, 2]
- Male	4.64±2.84	0.015 [1, 3]
- Female	5.31±2.57	
2) You are worried that you will get infected with COVID-19 from performing dental treatment	6.80±2.58	<0.001 [1, 2]
- Male	6.13±2.62	<0.001 [1, 3]
- Female	7.01±2.54	

[1] *Significant variable at P<0.05*
[2] *Compared between questions 1) and 2) with Wilcoxon Signed Ranks test*
[3] *Compared between males and females with the Mann-Whitney U test*

Table 3 Correlation between concerns of COVID-19 infection source and age

Questions	Spearman's rho	P-value
1) You are worried that you will get infected with COVID-19 from daily activities such as buying food/goods or traveling to work	-0.217	<0.001 [1]
2) You are worried that you will get infected with COVID-19 from performing dental treatment	-0.182	<0.001 [1]

[1] *Significant variable at P<0.05*

4.3 The thing that made Thai dentists unhappy the most

For the question "what is the thing that makes you unhappy the most?," the most frequent answer were income, finance, and economy (issued 114 times). Many dentists had reduced income, and some receive no income at all. Some dentists mentioned insufficient income compared to expense or loan, and some even informed that their expense was increased. One dentist also thought that his colleagues were worried too much about their income. Some dentists are worried about the income of dental assistants or people with a low socio-economic profile. One told that he doesn't know how to pay his employee.

The next issue that was also frequently mentioned were working and further studying (mentioned 68 times). Most answers were that they are stressed because they can't go to work. Some dentists were stressed due to the working system, e.g., "don't know how to change the working system to match with the situation" and "worried because the working system has been changed too much." Some dentists explained that being idle caused them to feel useless. Some dentists said that they were stressed because they can't do what they should normally do. One dentist clearly stated that stopping working for a long time makes him bored. There were also issues like conflicting opinions in the workplace about how to cope with the COVID-19 situation, lack of support from the chief, lack of protective equipment, and lack of clear working protocol. Some dentists had to give their treatment unwillingly. Furthermore, many dentists had problems due to the closing of education institutes such as interrupting in research and learning process.

The third issue was about infection and the spread of the disease. Sixty dentists quoted about this point. Most were afraid of getting infected whether by their patients or their colleagues. Some dentists are worried about spreading the infection to others, especially their family members. Some dentists are worried about spreading the infection to their patients or cross-infection between them. Some dentists got stressed because they felt that their colleagues were worried too much about infection.

Travel restrictions and shutting down of places were also mentioned a lot, 41 times to be exact. This issue was also associated with other issues such as; can't go study, can't visit family that was living in a different province, can't go out for exercise, and can't go to restaurants.

The family was also another frequently mentioned issue. This topic included a lack of meeting between family member and worry about family member. One dentist mentioned about conflict between family members' opinions. One dentist said that staying home too much can cause quarrels between family members to be more frequent.

Other issues that were quoted were lack of vacation, lack of pleasure from eating, worry about problem-solving of the government or the government itself, worry about information accuracy of the news, fake news, or information concealment, lack of exercise, can't predict the end of the situation, worry about future, uncertainty, life-style changing. Many dentists mentioned the inability to live a normal life, and feeling pity for others who were in trouble.

4.4 Opinion about COVID-19

One-hundred and ninety-nine dentists reported "no opinion" about the COVID-19. Of all 381 remainings, most reported neutral opinions or feelings, such as understanding the nature of the situation or suggesting rationale management, rather than totally positive or negative aspects. Many dentists had a positive attitude, showed encouragement, and anticipated the situation to get better soon, while the same number had a totally negative attitude toward the situation, feeling frustrated, expressed negative feelings such as anger, fear, anxiety, or anticipated the situation to get worse. Thirty-three dentists reported that they wish the situation to go back to normal as soon as possible, while 35 thought the pandemic will continue for a long time. Twenty-one practitioners hope there will be a vaccine or treatment very soon. Thirty-two criticized the failure of or doubted the government's or related organization's management of the pandemic.

5. Discussions

We found that Thai dentists were more concerned about getting infected with COVID-19 from dental practice rather than doing daily activities. This finding emphasized that dental practitioners need improvement in their working environment to ensure their safety upon duty. At present, having insufficient PPE and scientific knowledge of the virus might be the main course of the concern. But these two factors would improve upon the course of the pandemic and could possibly lower the concern of the infection, both from daily activities and clinical practice in the future.

We also found that female dentists were having higher concern of contracting the disease from both daily and clinical activities than male dentists. This finding was in line with a study on risk perception of COVID-19 across many countries which showed higher risk perception in females (Dryhurst et al. 2020). A systematic review of epidemics and pandemics on the mental health of HCWs also found that female HCWs usually have higher mental health symptoms during this kind of event (Chigwedere et al. 2021). The higher concern among females was also reflected in other studies where women reported better hygienic behavior and knowledge than men (Mariwah et al. 2012; Suen et al. 2019). Furthermore, younger dentists were reporting higher concern from both sources. This time, risk perception might not be able to explain such a result, as age appeared not to be related to risk perception in the COVID-19 (Dryhurst et al. 2020). younger dentists were possibly having less experience in dealing with new infectious diseases. Older dentists might be more familiar with this situation if they were in the beginning era of HIV infection. However, further study is required to provide solid evidence to confirm this suspicion.

The results of this study should be seen under certain limitations of the methodology. This study used convenient sampling. As the means of distribution were social media groups of professionals, the

sample population was not random. The number of returned questionnaires was high, while the Thai population has among the highest daily use of social media globally. Nevertheless, using social media to distribute the questionnaire might have skewed the sample which might be not fully representative of the whole population of Thai dentists.

Finally, this study used a self-reported questionnaire which means there is a possibility that some respondents were not answering the truth, or there might misunderstand the questions. So, it is very important that we are aware of the inaccuracy that comes along with the instrument we used.

6. Conclusion

Thai dentists were having concerns about getting infected with COVID-19 disease from performing the dental treatment to a higher degree than from daily activities, with younger female dentists having higher concerns. Government and related organizations such as the Ministry of Public health should immediately provide PPE along with clear guidelines on how to stay safe from the disease in such a situation, not only in this pandemic but also in the future familiar outbreaks.

7. Acknowledgements

We thank Ms. Tatchaya Taenguthai for providing valuable data in drafting the research proposal, and Ms.Supphalak Kaewsri for help arranging the lucky draw live on Facebook.

8. References

Cao, Z., Zhang, Q., Lu, X., Pfeiffer, D., Jia, Z., Song, H., Zeng, D. D. (2020). Estimating the effective reproduction number of the 2019-nCoV in China. Retrieved from https://www.medrxiv.org/content/10.1101/2020.01.27.20018952v1

Chigwedere, O. C., Sadath, A., Kabir, Z., Arensman, E. (2021). The Impact of Epidemics and Pandemics on the Mental Health of Healthcare Workers: A Systematic Review. *Int J Environ Res Public Health. 18*(13), 6695.

Daniel, W. W. C., Chad, L. (2018). *Biostatistic: A foundation of analysis in the health sciences.* New Jersey: Wiley&Sons.

Dryhurst, S., Schneider, C. R., Kerr, J., Freeman, A. L. J., Recchia, G., Van Der Bles, A. M., Spiegelhalter, D., Van Der Linden, S. (2020). Risk perceptions of COVID-19 around the world. *J Risk Res. 23*(7-8), 994-1006.

Gerberding, J. L. (1995). Management of occupational exposures to blood-borne viruses. *New England Journal of Medicine*, *332*(7), 444-451.

Li, L. Q., Huang, T., Wang, Y. Q., Wang, Z. P., Liang, Y., Huang, T.B., Zhang, H. Y., Sun, W., Wang, Y. (2020). COVID-19 patients' clinical characteristics, discharge rate, and fatality rate of meta-analysis. *J Med Virol*, *92*, 577-583.

Mahase, E. (2020a). China coronavirus: WHO declares international emergency as death toll exceeds 200. *The BMJ*, *368*, m408.

Mahase, E. (2020b). Coronavirus covid-19 has killed more people than SARS and MERS combined, despite lower case fatality rate. *The BMJ*, *368*, m641.

Mariwah, S., Hampshire, K., Kasim, A. (2012). The impact of gender and physical environment on the handwashing behaviour of university students in Ghana. Trop Med Int Health, 17(4), 447-454.

Nishiura, H., Kobayashi, T., Yang, Y., Hayashi, K., Miyama, T., Kinoshita, R., Linton, N. M., Jung, S.-M, Yuan, B., Suzuki, A. et al. (2020). The rate of underascertainment of novel coronavirus (2019-nCoV) infection: Estimation using japanese passengers data on evacuation flights. J Clin Med, 9(2), Article No 419. doi: 10.3390/jcm9020419.

Onder, G., Rezza, G., Brusaferro, S. (2020). Case-fatality rate and characteristics of patients dying in relation to COVID-19 in Italy. *JAMA.*, *323*(18), 1775-1776. doi:10.1001/jama.2020.4683

Paudel, S., Dangal, G., Chalise, A., Bhandari, T. R., Dangal, O. (2020). The coronavirus pandemic: what does the evidence show? *J Nepal Health Res Counc*, *18*(1), 1-9.

Paules, C. I., Marston, H. D., Fauci, A. S. (2020). Coronavirus infections-more than just the common cold. *JAMA*, *323*(8), 707-708.

Peng, X., Xu, X., Li, Y., Cheng, L., Zhou, X., Ren, B. (2020). Transmission routes of 2019-nCoV and controls in dental practice. *Int J Oral Sci*, *12*(1), Article No 9, 1-5.

Suen, L. K. P., So, Z. Y. Y., Yeung, S. K. W., L,o K. Y. K., Lam, S. C. (2019). Epidemiological investigation on hand hygiene knowledge and behaviour: A cross-sectional study on gender disparity. *BMC Public Health*, *19*(1), Article No 401. https://doi.org/10.1186/s12889-019-6705-5.

Tan, W., Zhao, X, Ma1, X, Wang, W, Niu, P, Xu, W, Gao, GF, Wu, G. (2013). A novel coronavirus genome identified in a cluster of pneumonia cases - Wuhan, China 2019-2020. *Mol Biol Evol*, *30*(4), 772-780.