

The Relationship Between The Use of Personal Protective Equipment (PPE) With the Levels of Stress in Dentists During the Covid-19 Pandemic

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Abstract

The Covid-19 virus transmission can be transmitted through bioaerosols produced during dental treatment. Dentists are most susceptible to exposure to this virus because they come into direct contact with droplets in the patient's mouth. Dentists must wear PPE but on the other hand, it turns out that the use of PPE can limit the space for dentists to move. The purpose of this study was to determine the relationship between the use of PPE and the stress level of dentists during the Covid-19 pandemic. The research method used a questionnaire containing questions about the use of PPE and Perceived Stress Scale to dentists in Indonesia. The research subjects were 270 dentists consisting of 81 men and 189 women. There were significant differences between the number of practice days per week ($p:0,000$); the number of practice hours per day ($p:0,000$); and the number of patients ($p:0,000$). The results of the Spearman test showed that there was a very weak relationship between the use of PPE and stress levels ($rs: -0,014$). In conclusion, not all dentists experience stress because dentists have reduced practice days, length of work, and a number of patients per day. This indirectly has reduced the burden of the dentist.

Keywords

Personal Protective Equipment, Dentist, Stress level.

1. Introduction

The importance of dentists wearing PPE during the Covid-19 pandemic is to protect against disease transmission and prevent cross-infection (Cook 2020). The global Covid-19 pandemic worldwide threatens everyone (Watt 2020). The pathogen for this pandemic is Novel Coronavirus 2019 (2019 nCoV). This virus causes pneumonia and on February 11 (Minggu et al. 2021); WHO described it as Coronavirus Disease 2019 (Covid-19) and declared it as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). Aerosols have the potential to be a mode of transmission of SARS-CoV-2, these aerosols are produced during providing medical care indoors (Fini 2020). Through the bioaerosol produced during dental procedures, the Covid-19 virus can be transmitted easily.

The source of droplets can come from the nasopharynx or oropharynx which are directly related to saliva from the oral cavity. Larger droplets can cause transmission of the virus to nearby subjects, while small droplets contaminated with virus particles that are suspended air can provide distance transmission (Xie et al. 2009). Dentists are the most vulnerable professions exposed to this virus because they have direct contact with respiratory droplets or liquids in the patient's mouth when carrying out medical treatment. The use of PPE has become an Infection Prevention and Control strategy in the Decree of the Minister of Health of the Republic of Indonesia concerning Guidelines for the Prevention and Control of Covid-19 (Ministry of Health 2020), and in the guidebook published by the Indonesian Dentists Association (PB PDGI 2020).

From several conversations between dentist colleagues, there are many complaints about the effect of using PPE on stress levels during their dental practice. Research is needed to highlight the use of medical PPE on the physical endurance of dentists, which in turn causes dentists to feel easily tired and stressed.

1.1 Objectives

This research will examine the relationship between the use of PPE and the level of stress on dentists during the Covid-19 pandemic.

2. Literature Review

Transmission (SARS-CoV-2), primarily via respiratory droplets and via contaminated surfaces. Droplets are water-filled particles $> 5\text{-}10\mu\text{m}$ in diameter. Transmission of SARS-CoV-2 can be through aerosols (Bake et al. 2019). Aerosols are exhaled air containing endogenously produced droplets. It is estimated that 48% to 62% of transmission can occur through asymptomatic individuals (Wiersinga et al. 2020). In dental procedures, some dental tools such as high-speed handpieces, ultrasonic scaler, and air-water syringe can produce aerosols. This happens because of the effect of the water coolant. Aerosols mixed with oral fluids, such as blood and saliva will form bioaerosols. Bioaerosols contaminated by bacteria, fungi, and viruses will remain in the air for a long time and can be inhaled by dentists and other people in the dentist's practice room. Oral microorganisms will spread mainly to the face such as the eyes and nose. This distribution area is an important area in the transmission of the Covid-19 virus. Therefore it is very important for dentists to use full PPE (Ge et al. 2020).

The best type of PPE for dentists and assistants while working on patients is Level 3 PPE. Due to the impermeable design and coating material of PPE, it causes heat and dehydration for dentists as well as limits their movement. In addition, the use of google and face shield causes limited access to vision as well as makes breathing less free so that dentists are increasingly vulnerable to the risk of stress (Ardyananta et al. 2020). If the amount of stress exceeds the ability to adapt to stress, it will have a negative impact. Conversely, if the amount of stress is proportional to the ability to adapt, then stress will have a positive impact on health. The emergence of stress that has a positive or negative impact is determined by the number of job demands and the physical and psychological ability to deal with sources of stress (Gaol 2016).

The source of stress on dentists can start from their education. A survey of 2053 dentists reported that more than half of dentist respondents (54.9%) experienced high work stress. It is reported that general practice dentists experience the highest levels of stress (Collin et al. 2019). During the work of treating patients, a dentist often performs repetitive procedures, which require intensive and technical skills. The workload will be heavier when associated with fear, anxiety, and patient satisfaction; length of work per day, and emotional stress during work (Al-zubair et al. 2014).

3. Methods

The type of research is correlation research, with cross sectional design. The research population is dentists in Indonesia. Inclusion criteria were the Indonesian Dentists Association member dentists who were actively practicing until the time of this study. Exclusion criteria were dentists who were no longer actively practicing and who refused to be research subjects. The sampling technique used the cluster sampling method for all general practice dentists and specialist dentists in Indonesia. The determination of the sample size is based on the Slovin sample size formula. This formula provides the opportunity for researchers to set a minimum sample size based on the error rate (Ryan 2013).

4. Data Collection

This study used an online questionnaire which is divided into 3 parts: 1) Demographic data; 2) Practical data including the use of PPE; 3) Perceived Stress Scale (PSS), this questionnaire has been widely used to determine a person's perception of stress and has been shown to be associated with worsening health risks (Barauskas, Barauskienė, and Janužis, 2019). The PSS consists of 10 questions (Purnami and Sawitri, 2019), each with a possible answer rated on a 5-point Likert scale ranging from: 0 (never); 1 (almost never / 1-2 times); 2 (sometimes / 3-4 times); 3 (almost often/5-6 times) and 4 (very often/more than 6 times)

(Saraswati, 2017). Overall scores for PSS range from 0 to 40, with higher scores determining higher perceived stress. To assess the level of stress with the PSS is based on the score range 0-13 (low stress); 14-26 (moderate stress) and 27-40 (high perceived stress) (Baik et al. 2019).

The assessment of the types of PPE is based on a guidebook published by the Indonesian Dentists Association. The definition of Level 1 PPE includes the use of: head cap (optional), google or face shield, surgical masks, surgical scrubs, disposable gowns (up to the knee), outer gloves. PPE Level 2 includes the use of: head cap, google or face shield, surgical masks, surgical scrubs, disposable gowns (up to the knee), outer gloves, closed shoes and shoe covers, boots (as an addition). PPE Level 3 includes the use of: head cap, google or face shield, surgical masks, N95 masks/equivalent, surgical scrubs, disposable gowns (up to the knee), gown all covers (hazmat suits), inner gloves, outer gloves, shoes closed and shoe covers, boots (as additional) (PB PDGI 2020).

Statistical difference test using the Wilcoxon test on paired data (before and during the pandemic), the Mann-Whitney test on unpaired data. Correlation test uses the Spearman test, with the correlation coefficient (rs) as follows: 0.00 (no correlation); 0.01-0.19 (very weak); 0.20-0.39 (weak); 0.40-0.59 (moderate); 0.60-0.79 (strong); 0.80-1.0 (very strong) (Akoglu 2018).

5. Results and Discussion

There were 270 respondents consisting of 81 (30%) men and 189 (70%) women. The age range was 24-75 years with a mean of 42.62 ± 11.280 . The respondents consisted of 66.3% general dentists and 33.7% specialist dentists (orthodontics, oral medicine, pedodontics, dental conservation, periodontia, prosthodontia, and oral surgery). The practice types of all respondents studied included before and during the Covid 19 pandemic. The types of practice referred to were: 1) dentists worked alone without an assistant, 2) assisted by one assistant, and 3) assisted by two assistants. There was no difference in the type of practice between male and female dentists (p: 0.063).

5.1 Analysis of the number of days of dental practice per week

The results of the Wilcoxon test showed that there was a significant difference in the number of dental practice days per week before and during the pandemic (p: 0.000). Male and female dentists showed the difference in the number of practice days before the pandemic (p: 0,000) and during the pandemic (p: 0,000). During the Covid-19 pandemic, there was a decrease in the number of working days per week for both male and female dentists (Figure 1). Based on the number of male and female dentists, as much as 40.74% of male dentists still practice 6 days per week, while only 16.4% of female dentists practice 6 days per week.

5.2 Analysis of the number of hours of dental practice per day

The results of the Wilcoxon test showed that there was a significant difference (p: 0.000) in the number of hours of dental practice per day before and during the pandemic (Figure 2). The same thing happened to the number of hours of dental practice per day, there was a difference in the number of hours of dental practice between male dentists and female dentists before the pandemic (p: 0.001) and during the pandemic (p: 0.007). There are 45.5% female dentists who reduce their working time, which is working less than 3 hours; 47.62% of female dentists work 3-6 hours and only 6.88% still work more than 6 hours per day. Meanwhile, 56.80% of male dentists work for 3-6 hours; 29.63% of male dentists work less than 3 hours and only 13.58% of male dentists work more than 6 hours per day.

5.3 Analysis of the number of patients

The results of the Wilcoxon test showed that there was a significant difference on the number of patients (p: 0.000) before and during the pandemic (Figure 3). Before the pandemic, there was no difference in the ability to work on patients per day between men and women (p: 0.070), but during the pandemic, there was a difference in the number of patients per day between male and female dentists (p: 0.022).

5.4 Correlation analysis of PPE and stress levels in dentists

The results of the Wilcoxon test showed that there were differences in the types of PPE used before and during the pandemic ($p: 0.000$) (Figure 4). Between male and female dentists showed differences in the types of PPE used during the pandemic ($p: 0.033$); but there was no difference in the type of PPE used before the pandemic ($p: 0.179$). The results of the Mann-Whitney test showed that there was no significant difference between the use of PPE levels 2 and 3 with stress levels ($p: 0.824$) (Figure 5) and there was no significant difference in stress levels ($p: 0.049$) between male dentists and women dentists during a pandemic. The results of the Spearman correlation test between the use of PPE and stress levels show $r_s: -0.014$ (very weak correlation).

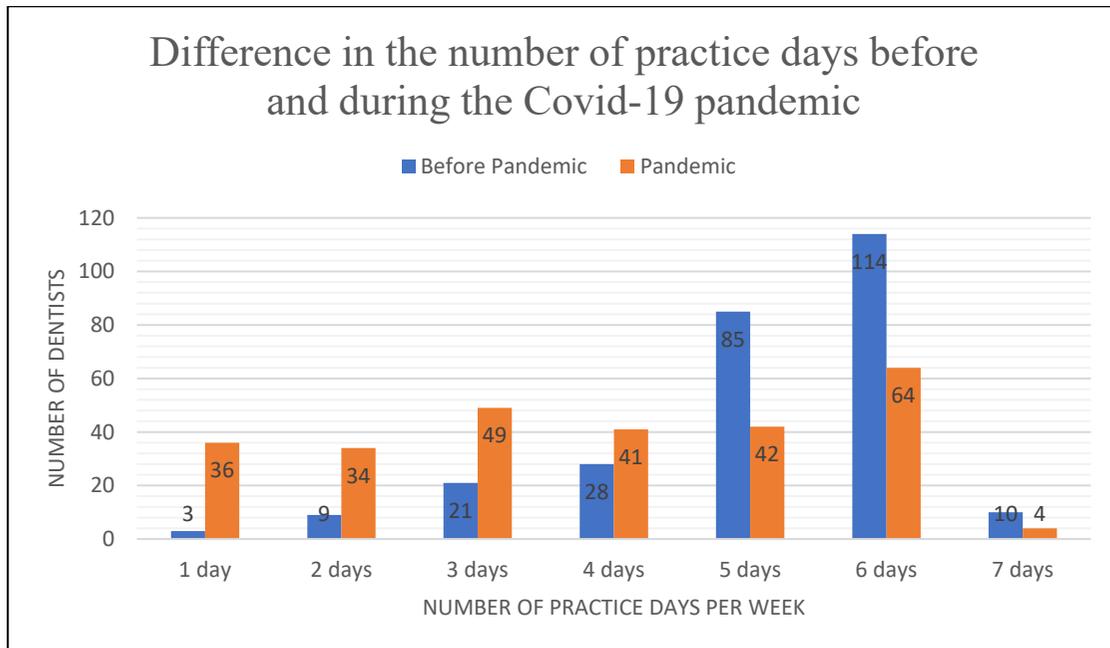


Figure 1. Difference in the number of practice days per week before and during the Covid-19 pandemic

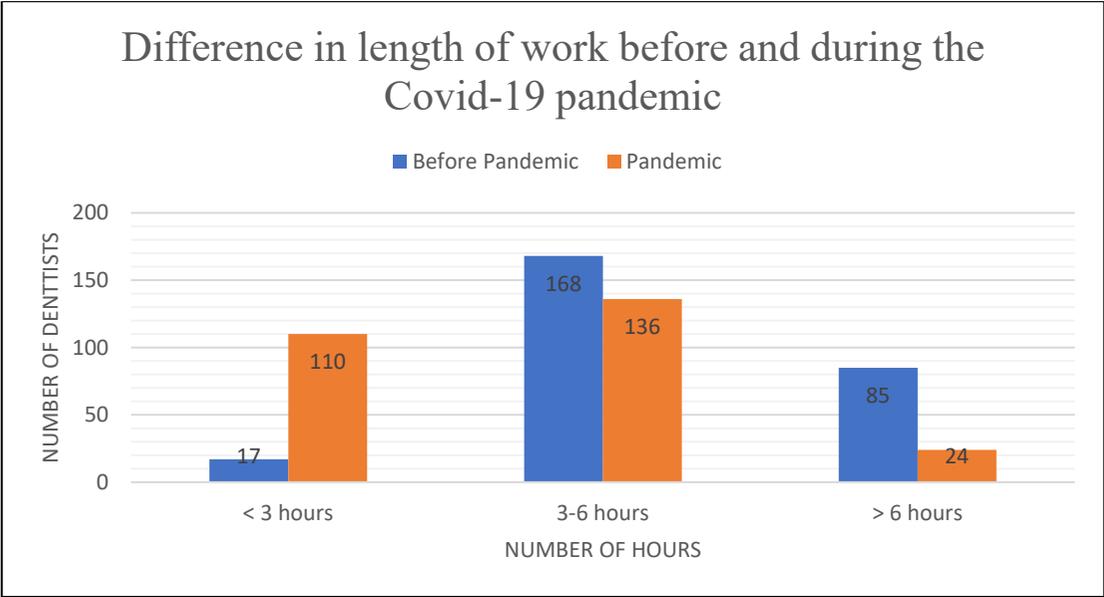


Figure 2. Difference in length of work before and during the Covid-19 pandemic

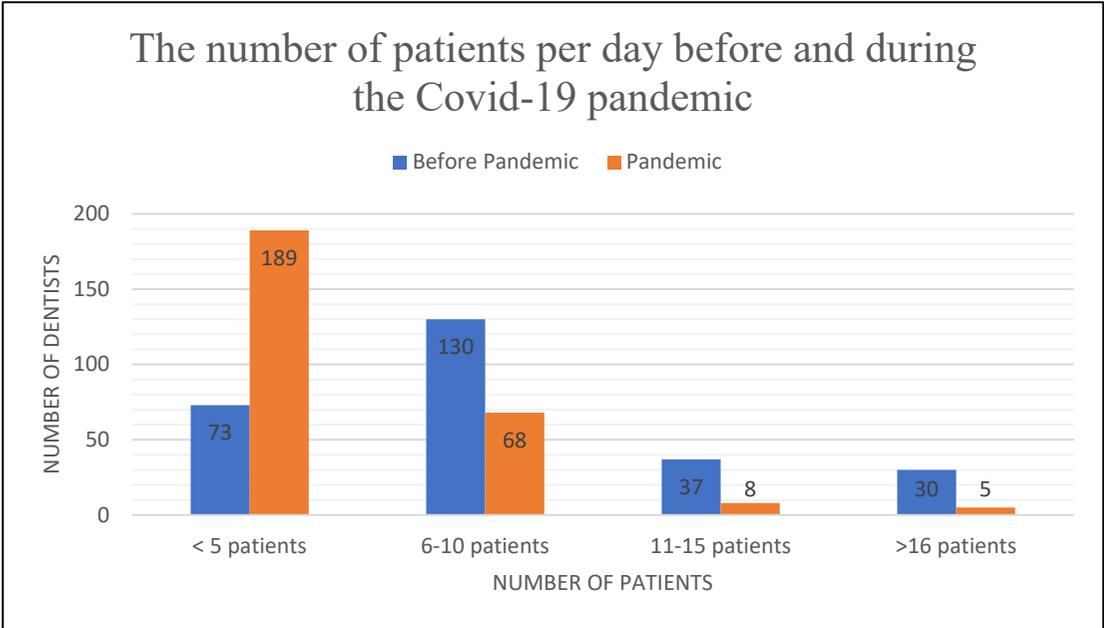


Figure 3. The number of patients per day before and during the Covid-19 pandemic

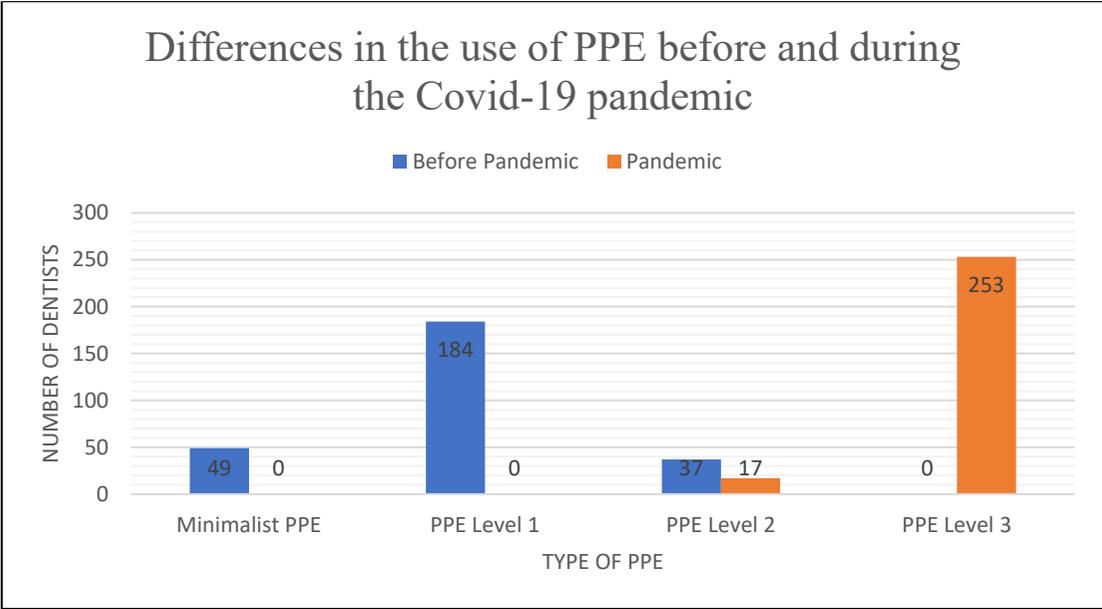


Figure 4. Difference in the use of PPE before and during the Covid-19 pandemic

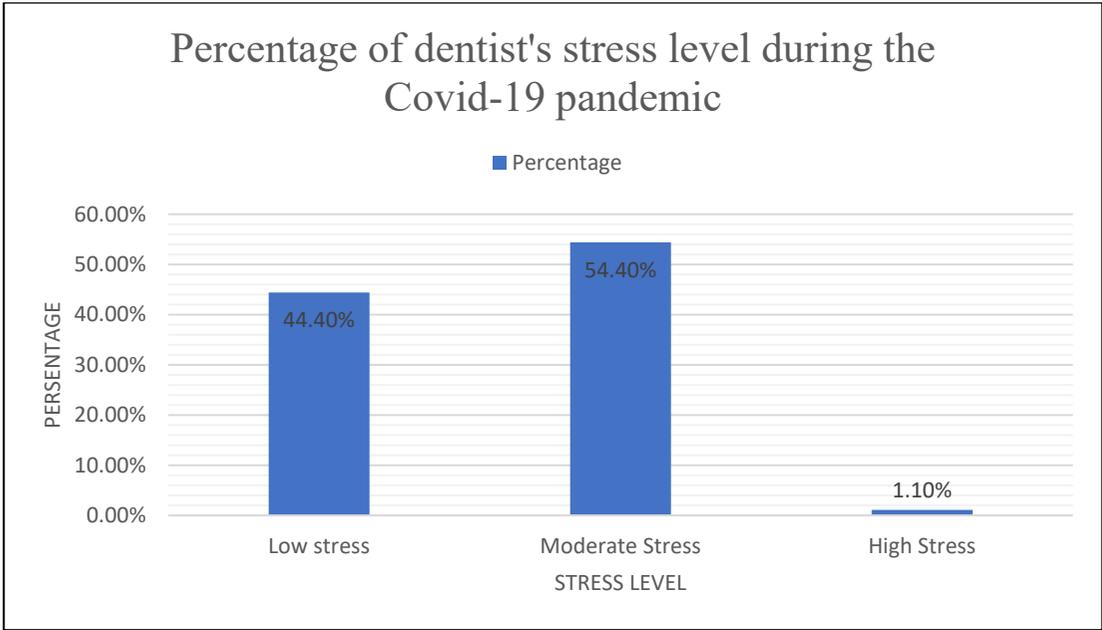


Figure 5. Percentage of dentist's stress level during the Covid-19 pandemic

5.5 Proposed Improvements for dentists related to stress levels during work

Before the pandemic, 68.1% of dentist respondents only used PPE level 1, and even 18.1% of respondents used minimalist PPE. The use of minimalist PPE is a condition where dentists only use gloves and masks, but during the pandemic, there has been a change in the awareness of respondents to use ideal PPE. The ideal PPE during the Covid-19 pandemic is PPE level 3. In this study, 93.7% of dentist respondents wear PPE level

3 and only 6.3% of respondents wear PPE level 2. No dentist uses PPE level 1 and minimalist PPE. The level of awareness of wearing PPE level 3 differs between men and women. A total of 67.04% of female dentists and 26.67% of male dentists were wearing PPE level 3. This was a statistically significant difference ($p: 0.033$). It seems that female dentists are more obedient and more careful when wearing PPE level 3. This also reflects the high level of knowledge and awareness that wearing PPE level 3 is very important to prevent the dangers of aerosols (Ge et al. 2020).

Dentists should be more aware of the daily stress in their work. If not noticed, the effects of stress on the dentist can lead to "professional fatigue syndrome" which can negatively affect the patient and can even lead to medical errors and adverse outcomes for the patient. Causes of stress such as perfectionism, inefficient patient management, and even poor ergonomics (Frey 2000). Occupational risks for dentists are closely related to non-ergonomic posture, work intensity, vibration (Upadhyay et al. 2011), eye strain, cross infection, contact with allergens and toxic substances, atmosphere a noisy work environment due to dental equipment (Danilina et al. 2019). In ergonomics dentistry, it has been explained that dentists need to apply their ergonomic knowledge which aims to build a safe and healthy work environment. The work system in accordance with the ergonomics of dentistry will certainly improve the performance of the dentist (Anggraini 2017). Fatigue may be the result of relentless stress, but in essence, work fatigue is not the same as stress (Sachdeva et al. 2020). Stress, in general, involves too much pressure that is both physically and psychologically demanding. However, stressed people can still imagine that if they can control everything, they will feel better (Rakovec-Felser 2011).

5.6 Validation of the results of this study

The results of this study showed that there was no significant difference in stress levels in the use of PPE levels 2 and 3 ($p: 0.824$). Another result obtained was a very weak correlation between the use of PPE and the stress level of dentists ($rs: -0.014$). The stress level of dentist respondents showed 44.4% low stress; 54.4% moderate stress and 1.1% high stress. During the Covid-19 pandemic, significantly the respondent dentists in this study had reduced the number of practice days per week, the number of practice hours, and the number of patients worked per day. The dentist's decision to reduce this has an impact on reducing stress levels. Regarding of PPE, dentists need to consider materials that provide comfort, breathability, ease of movement, flexibility when treating patients, materials that do not cause stress, heat, and dehydration.

6. Conclusion

The use of PPE will limit performance in practice which can increase stress for dentists. Basically, stress cannot be completely avoided in the practice of dentistry. Dentists should keep stress to a minimum to avoid the physical and emotional stress associated with it. During the Covid-19 pandemic, dentists have reduced practice days per week, length of work, and a number of patients per day. This has indirectly controlled stress levels. Therefore, not all dentists who use PPE experience excessive stress while working during the Covid-19 pandemic.

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