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ALTERATIONS IN KNOWLEDGE, ATTITUDE, AND BEHAVIOURAL PATTERNS OF DENTISTS IN CIMAHI, INDONESIA REGARDING DENTAL MEDICAL WASTE MANAGEMENT POST COVID-19 PANDEMIC

(PERUBAHAN PENGETAHUAN, SIKAP DAN PERILAKU DOKTER GIGI DI CIMAHI INDONESIA MENGENAI PENGOLAHAN LIMBAH MEDIS KEDOKTERAN GIGI SETELAH PANDEMIK COVID-19)

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ABSTRACT

Management of dental medical waste is essential in preventing the spread of diseases, especially during the COVID-19 pandemic. The COVID-19 pandemic has increased the amount of medical waste in healthcare facilities, including dental practices. This study aims to determine the changes in dentists' knowledge, attitudes, and behaviours regarding the management of dental and medical waste after the COVID-19 pandemic. The research used a survey with an observational analytical approach, quantitative methods, and a cross-sectional research design. The research sample or respondents were 50 dentists

practising independently in Cimahi. Data collection used questionnaire about dentists' knowledge, attitudes, and behaviours regarding managing dental and medical waste before and after the COVID-19 pandemic. The results of the Wilcoxon non-parametric test showed that the knowledge and attitudes of dentists regarding the management of dental medical waste after the COVID-19 pandemic experienced significant changes statistically ($p < 0.05$). However, dentists' behaviour in managing dental and medical waste did not show substantial statistical changes ($p > 0.05$). The study results concluded that the COVID-19 pandemic has positively impacted increasing dentists' awareness of the importance of managing medical waste. However, reinforcement is needed to maintain the good behaviour of dentists in managing dental medical waste.

Keywords: attitude; behaviour; COVID-19; dentist; knowledge; medical waste

ABSTRAK

Pengelolaan limbah medis kedokteran gigi merupakan hal yang penting untuk mencegah penularan penyakit terutama saat pandemik COVID 19. Pandemik COVID-19 telah meningkatkan jumlah limbah medis di fasilitas kesehatan, termasuk praktik kedokteran gigi.Penelitian ini bertujuan untuk mengetahui perubahan pengetahuan, sikap, dan perilaku dokter gigi terhadap pengelolaan limbah medis kedokteran gigi setelah pandemik COVID-19. Penelitian ini menggunakan metode survei dengan metode analitik observasional dengan pendekatan kuantitatif serta rancangan penelitian cross-sectional. Sampel penelitian atau responden yang diambil adalah dokter gigi yang berpraktik mandiri di Kota Cimahi yang berjumlah 50 orang. Pengumpulan data dilakukan dengan kuesioner yang terdiri dari pertanyaan tentang pengetahuan, sikap, dan perilaku dokter gigi terhadap pengelolaan limbah medis kedokteran gigi sebelum dan setelah pandemik COVID-19. Hasil uji beda non parametrik wilcoxon

menunjukkan bahwa pengetahuan dan sikap dokter gigi terhadap pengelolaan limbah medis kedokteran gigi setelah pandemik COVID-19 mengalami perubahan yang signifikan dan bermakna secara statistik (p < 0,05). Namun, perilaku dokter gigi dalam pengelolaan limbah medis kedokteran gigi tidak menunjukkan perubahan yang signifikan secara statistik (p > 0,05). Hasil penelitian memberikan kesimpulan bahwa pandemik COVID-19 memiliki dampak positif dalam meningkatkan kesadaran dokter gigi terhadap pentingnya pengelolaan limbah medis. Namun diperlukan penguatan untuk mempertahankan perilaku dokter gigi dalam pengelolaan limbah medis kedokteran gigi yang sudah baik.

***Kata kunci**: COVID-19; dokter gigi; limbah medis; pengetahuan, perilaku; sikap*

INTRODUCTION

Medical waste in dental practice encompasses various types of materials generated during the dental care process. Dental, medical waste generally consists of used syringes, sharp medical instruments such as scalpels and dental burs, biological waste such as dental tissues, blood, or patient mouth rinse, and chemicals such as disinfectant solutions, dental preservatives, or teeth whitening materials.[1–4] Proper handling of medical waste is crucial, especially when it comes to components such as used syringes, sharp medical instruments, and biological waste in dentistry. Awareness of the potential transmission of diseases if this waste is not processed correctly becomes highly important. Tools such as scalpels and dental burs were used carefully. After use, these tools are stored and managed safely to protect medical staff and waste-handling personnel from injuries or disease transmission. Biological waste such as dental tissues, blood, and patient mouth rinses are also essential components of medical waste in dental practices. Proper biological waste management is necessary to prevent the spread of diseases and environmental contamination. [1,2,4,5]

Improper management of dental medical waste can lead to the spread of diseases and significant environmental damage. Therefore, proper and safe

handling of medical waste is necessary to prevent its adverse impacts on human health and the environment. [1,2,4,5]

Before the Pandemic, there was a 2018 journal discussing the management of dental medical waste, which included the knowledge and attitudes of dentists towards medical waste management in Tabanan Regency. Waste generated by dental practices in Tabanan Regency, whether they are providers of BPJS services or not, both in urban and rural areas, can be classified into medical and non-medical waste. Medical waste generated includes various types such as syringes, ampoules, bottles containing materials, masks, gloves, extracted teeth, blood-contaminated gauze, medicine boxes, alginate waste, cotton pellets, waste from the dental impression, hand wash waste, patient mouth rinse waste, blood waste, and saliva. On the other hand, non-medical waste generated includes newspapers, magazines, food remnants, and their packaging. The research found that some dental students did not receive knowledge of waste management from colleague lectures but gained it from training, brochures from relevant agencies, and participation in the health community centre accreditation process. Although many know the requirements for proper waste containers, their implementation is still not entirely carried out, as seen in field observations where the waste containers used do not meet these requirements. However, the research shows the importance of medical waste management awareness as it can endanger the environment, transmit diseases, and be reused irresponsibly.[1,2,6] Since the World Health Organization declared COVID-19 a pandemic on March 12, 2020, several countries have faced a significant increase in medical or hazardous and toxic waste (B3). In China, particularly in Hubei Province, there has been an increase in medical waste volume reaching 180 tons per day. Meanwhile, Indonesia has also become one of the countries with the highest medical waste after the Philippines. Within 60 days since the first COVID-19 case was found in Indonesia, the medical waste volume drastically increased to 12,740 tons per day. The contributors to this increase are from healthcare facilities and households, averaging 87 kg per day per household.[7,8]

Infectious medical waste is prioritised in medical waste processing during the Pandemic. If medical waste is not handled properly, besides polluting the environment, it also has the potential to adversely affect human health. Single-use medical mask waste is one type of waste that has the potential to become infectious waste and can spread viruses through soil

and water. In addition to the risk of virus transmission, medical mask waste also has the potential to pollute the environment due to its containing microfiber plastic fibres. Research conducted by Francesco Saliu in Italy shows that medical mask waste in water bodies decomposes into harmful microfiber plastics if consumed by marine organisms. Coastal residents are at high risk of exposure to microfiber plastics through contaminated fish. Microfiber plastics containing heavy metals can also cause health problems such as blood flow blockage, lung damage, and brain damage in animals and humans. Therefore, handling medical mask waste should be a severe concern to reduce its negative impact on the environment and human health. [5,8,9]

Managing COVID-19 medical waste is a matter that must be taken seriously. Research shows that the SARS-CoV-2 virus, the cause of COVID-19, can survive under certain conditions, and it takes several days for the virus to no longer be actively infectious to humans, depending on the type of surface material where it resides. [5,9] During the COVID-19 pandemic, where transmission is rapid and easy, using Personal Protective Equipment (PPE) is necessary. PPE is generally made of plastic and is used for single use. Therefore, there has been a significant increase in medical waste from used PPE. Additionally, COVID-19 medical waste can come from specimens, used pharmaceuticals, used medical devices, and packaging of COVID-19 patients' food/drink. The increased use of masks and gloves at the household level also needs special attention. Household medical waste has the potential to mix with other household waste, which can endanger waste collection workers who often do not use PPE or use inadequate PPE.[8,10]

The Indonesian government has issued circulars to ensure medical waste management across all regions. These circulars include Circular Letter MENLHK Number 167 of 2020 concerning the Management of Medical B3 Waste in COVID-19 Emergency Health Facilities; Circular Letter MENLHK Number 02 of 2020 concerning the Management of Infectious Waste (B3 Waste) and Household Waste from COVID-19 handling; and Circular Letter of the Director-General of Waste Management, Waste, and B3 Number 156 of 2020 regarding the Management of B3 Waste during the Emergency Handling of COVID-19. These circulars aim to improve the capacity of medical waste management in Indonesia, both by healthcare facilities and licensed B3 waste management services. Circular Letter MENLHK Number 02 of 2020 also allows healthcare facilities to

treat B3 waste without a permit using an incinerator with a minimum temperature of 800°C or an autoclave equipped with a shredder.[10–14]

The Cimahi City Health Office collaborates with the private sector to manage medical waste in the city. In 2020, the volume of medical waste from 13 Community Health Centers reached 5,371.40 kg, most of which came from COVID-19 handling. However, a study shows that health protocols at Community Health Centers could have been more optimal during the Pandemic. It is recommended that the heads of Community Health Centers improve the implementation of health protocols, including the proper use of PPE by all medical staff. Training and routine supervision are also essential to ensure consistency in implementing health protocols. All parties in Community Health Centers were expected to be active in maintaining a safe and sterile service environment by enhancing cleaning and sanitation procedures. These steps are expected to make Community Health Centers in Cimahi City more prepared to face the challenges of COVID-19 transmission in the context of healthcare services.[7,10,12–14] This study aims to determine the changes in dentists' knowledge, attitudes, and behaviours regarding the management of dental and medical waste after the COVID-19 pandemic.

METHOD

This study employs an observational analytic method with a cross-sectional design. The research is conducted online, targeting 50 independent practising dentists in Cimahi. The sample size encompasses the number of independent dental practices in Cimahi, which is 57 (Cimahi City Health Office Report, 2022) for individual clinics (independent dental practitioners). Sample calculation is done using the Slovin formula based on the population size as follows:

$$n = \frac{N}{1 + N(e)^2}$$

The questionnaire is in the form of a Google Form and is distributed by providing a form fill-in link to the relevant respondents. The questionnaire consists of 15 questions to assess dentists' knowledge, attitudes, and behaviours in managing medical waste before the Pandemic, and 15 questions after the Pandemic.

The questionnaire will first undergo validity testing with 20 independent dentists outside of Cimahi using content validity, followed by statistical descriptive analysis and reliability testing using Cronbach's Alpha.

The subsequent steps involve conducting univariate or statistical descriptive analysis to determine the mean,

median, standard deviation, minimum, and maximum values of the observed variables. Normality tests are also conducted to determine whether the test used for the difference test (bivariant) later on is parametric or non-parametric. If the data is not normally distributed, non-parametric tests like the Wilcoxon test for the difference test were used.[15–17]

RESULT

Based on Table 1, the average knowledge score of respondents before the COVID-19 pandemic was 8.48, with a minimum score of 6 and a maximum score of 10. Meanwhile, after the COVID-19 pandemic, the average knowledge score of respondents was 9.64, with a minimum score of 8 and a maximum score of 10.

Table 1. Distribution of respondents' knowledge scores (before and after COVID-19)

Variable	N	*Mean*	Med	SD	Min	Max
Knowledge before CVD-19	50	8.48	8.00	1.37	6	10
Knowledge after CVD-19	50	9.64	10.00	0.78	8	10

The increase in the average knowledge score of respondents before and after the COVID-19 pandemic can be seen in Figure 1.

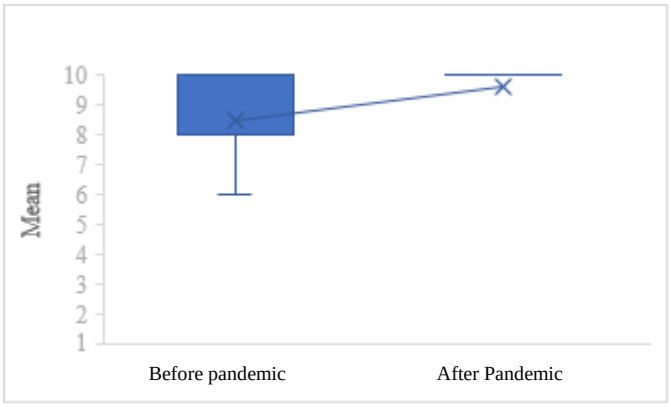

Figure 1. Distribution of respondents' knowledge scores (before and after COVID-19).

Based on Table 2, there was an increase in the average attitude scores of respondents regarding medical waste management after the emergence of the COVID-19 pandemic compared to before. Before the Pandemic, the average attitude score of respondents was 21.42, with a minimum score of 14 and a maximum score of 25. It indicates that before the Pandemic, respondents generally had a positive

attitude towards medical waste management, although there was variation in confidence and readiness.

Table 2. Distribution of respondents' attitude scores (before and after COVID-19)

Variable	N	*Mean*	Med	SD	Min	Max
Behaviour Before CVD-19	50	12.52	12.50	1.25	10	15
Behaviour After CVD-19	50	12.72	13.00	2.13	7	15

The increase in the average attitude score of respondents before and after the COVID-19 pandemic can be seen in Figure 2.

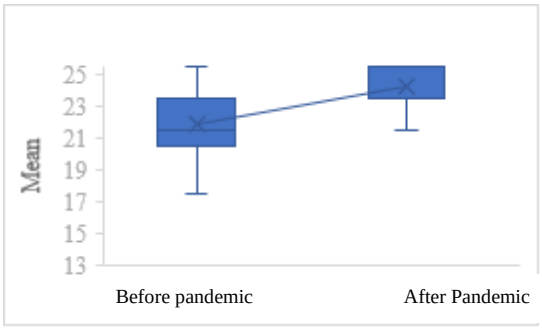

Figure 2. Distribution of respondents' attitude scores (before and after COVID-19).

Based on Table 3, it can be concluded that there was no significant change in the average behaviour scores of respondents related to medical waste management before and after the emergence of the COVID-19 pandemic. Before the Pandemic, the average behaviour score of respondents was 12.52, with a minimum score of 10 and a maximum score of 15. It indicates that, generally, respondents had been practising positive behaviours related to medical waste management before the Pandemic.

Table 3. Distribution of respondents' behaviour scores (before and after COVID-19)

Variable	N	*Mean*	Med	SD	Min	Max
Attitude before CVD-19	50	21.42	21.00	2.19	14	25
Attitude After CVD-19	50	23.78	25.00	2.18	12	25

The increase in the average behaviour score f respondents before and after the COVID-19 pandemic show in Figure 3.

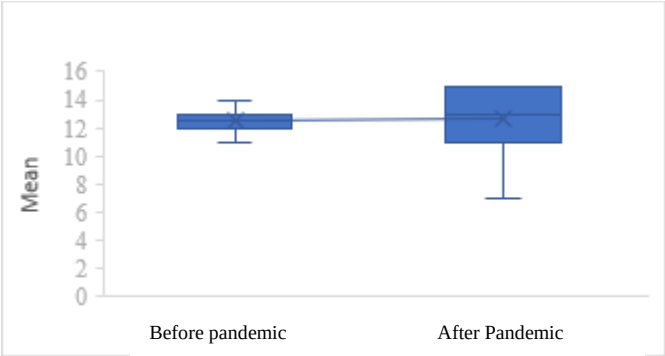

Figure 3. Distribution of respondents' behaviour scores (before and after COVID-19).

The distribution of data affects the type of statistical test used, so it is necessary to test the normality of the data. The results of the normality test are shown in Table 4. Based on the Shapiro-Wilk test results, the significance values for all variables (knowledge, attitude, behaviour) both before and after the COVID-19 pandemic were found to be <0.05. Therefore, it is concluded that the data is not normally distributed, and the non-parametric Wilcoxon test is used to determine differences in variable scores (knowledge, attitude, behaviour) between before and after the COVID-19 pandemic.

Table 4. Knowledge, attitude, and behaviour data normality test
Saphiro Wilk test, *P value >0.05 significant

Variable	**Saphiro Wilk (p value)**	
	After Pandemic	Before Pandemic
Knowledge	0.000	0.000
Attitude	0.011	0.000
Behaviour	0.002	0.000

examine differences in knowledge, attitude, and behaviour scores before and after the COVID-19 pandemic. The research results of the Wilcoxon test shows in Table 5.

Bivariate analysis or difference tests

Table 5. The differences in knowledge, attitude, and behaviour scores before and after the COVID-19 pandemic

Variable	N	Mean ± SD	P-value
Knowledge			
Before COVID-19	50	8.48 ± 1.37	0.001*
After COVID-19	50	9.64 ± 0.78	
Attitude			
Before COVID-19	50	21.42 ± 2.19	0.001*
After COVID-19	50	23.78 ± 2.18	
Behaviour			
Before COVID-19	50	12.52 ± 1.25	0.531
After COVID-19	50	12.72 ± 2.13	

Wilcoxon Test, *P value <0.05 significant

DISCUSSION

Based on Table 5, the average knowledge score of respondents before the COVID-19 pandemic was 8.48, with a score variation of 1.37. After the COVID-19 pandemic, the average knowledge score of respondents increased to 9.64 with a variation of 0.78. The Wilcoxon test results obtained a p-value of <0.001, indicating a statistically significant difference in the average knowledge scores of respondents before and after the COVID-19 pandemic in Cimahi City.[16,18]

The analysis results also show that the average attitude score of respondents before the COVID-19 pandemic was 21.42, with a score variation of 2.19. After the COVID-19 pandemic, the average attitude score of respondents increased to 23.78 with a variation of 2.18. The Wilcoxon test results obtained a p-value of <0.001, indicating a statistically significant difference in the average attitude scores of respondents before and after the COVID-19 pandemic in Cimahi City. [16,18]

Furthermore, the analysis results indicate that the average behaviour score of respondents before the COVID-19 pandemic was 12.52, with a score variation of 1.25. After the COVID-19 pandemic, the average behaviour score of respondents increased to 12.72 with a variation of 2.13. However, the Wilcoxon test results obtained a p-value of 0.531, indicating no statistically significant difference in the average behaviour scores of respondents between before and after the COVID-19 pandemic in Cimahi City. [16,18]

CONCLUSION

Based on the research results, there is a significant difference in knowledge and attitude. Still, there has been no change in behaviour among dentists in Cimahi City before and after the COVID-19 pandemic.

CONFLICT OF INTEREST

The author declared no conflicts of interest or potential commercial background in this research.

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