A Survey on the Perception of Use of Face Masks in Preventing COVID-19 Infection Among Medical Students

Ma Jing Hung*, Manjushree Yogarajah, Ramiyahvatani Gurunatham, Kokulathrsan Vijayakumar, Gunamuni Senuri Uthara De Silva

Faculty of Medicine, Manipal University College Malaysia (MUCM), Melaka, Malaysia

Abstract

A face mask can be described as a simple, lightweight, protective covering that is used over the nose and mouth to prevent particulates from the air entering the respiratory tract or oral cavity and is widely used amongst healthcare professionals. In early 2020, with the emergence of the SARS-CoV-2 pandemic, its use among the public has increased as an initiative taken to reduce and prevent the rapid spread of the virus. This research study was designed to assess the perception of medical students on the use of face masks in controlling and preventing COVID-19 infection as well as future face mask usage. A cross-sectional study was conducted from May 2021 to June 2021 among undergraduate medical students of Manipal University College Malaysia (MUCM). An online questionnaire was distributed among medical students of varying clinical experience and 108 responses were collected. All statistical tests were done using Epi info Software (v7.2.4.0). The data was analysed using frequency tables, odds ratio, and correlation. Findings reveal that 99.1% of participants currently wear face marks as per government regulations. A significant association was observed between gender and a sense of relief felt by face mask usage (95% CI -1.154, -0.240; p-value 0.003). Another significant association between exposure to clinical settings and sense of relief was also found (95% CI -0.832, -0.031; p-value 0.035). Many participants believe that they would continue to wear a face mask even when the WHO has declared the society of being safe from the virus (69.4%); 29% gave self-protection as a reason whilst 26% mentioned they would do it with the intention of protecting others. Based on the results of the study male gender is 1.26 times more likely to continue wearing face masks in the future compared to females (95%CI 0.47, 3.37; x^2 0.213; p-value 0.644). This study also showed that medical students with no exposure to clinical setting are 2.05 times more likely to continue wearing face masks in the future compared to students with exposure to clinical setting (95%CI 0.87, 4.82; x^2 2.778; p-value 0.096). Overall, the perception of medical students on the use of face masks remains high with high compliance to government regulations on face mask usage. For the foreseeable future, we recommend medical students to continue wearing face masks.

1. Introduction

With the emergence of Severe Acute Respiratory Syndrome (SARS) Coronavirus 2 in 2019, wearing face masks has become the new norm. The SARS-CoV-2 virus can be transmitted mainly via aerosol. There are also other methods of transmission such as fomites [1, 2,]. Viable SARS-CoV-2 viruses have also been found in patient's

---

* Corresponding author

E-mail address: cas.ma.jh@gmail.com (Ma J. Hung)

urine and feces but transmission via these routes are very low or negligible [3, 4, 5]. Studies have shown that the spread of this virus relies significantly on the aerodynamic diameter of these droplets. This is because droplets with an aerodynamic size of less than 5µm tend to remain suspended in the environment for longer periods of time [6]. SARS-CoV-2 has also been found to remain viable in aerosols for more than 3 hours [7].

During the early phases of this pandemic, there was some confusion regarding the effectiveness of wearing a face mask. The DANMASK-19 study showed that masks proved ineffective against COVID-19 [8]. The study later was revealed that the results were 'inconclusive' rather than 'negative' [9]. A US surgeon general telling people to stop wearing and buying masks also led to this confusion, even though the original intent was to conserve critically low medical supplies for high-risk healthcare providers in times of supply shortage [10]. In such times, prioritizing the supply of face masks to those at high risk (doctors, nurses, caregivers, etc) may offer greater reduction in transmission rather than random distribution to the general public [11]. However, as time went on, we began to learn more about the SARS-CoV-2 virus and realized the importance of face mask usage in preventing COVID-19.

Given the highly infectious nature of this disease, the wearing of face masks and adequate social distancing has been deemed an absolute necessity by the Center for Disease Control (CDC) and the World Health Organization (WHO) in order to mitigate the spread of this virus. Many countries such as Singapore, Hong Kong and Taiwan making it mandatory by law for face masks to be worn in public places and gatherings [12, 13, 14]. This has created a significant surge in demand for face masks around the world with surgical and N95 masks being the most commonly used type along with cotton, activated carbon and non-woven masks [15]. Although the obligation to wear masks in public has been a controversial subject in many countries as it is not a perfect barrier to transmission, there is increasing clinical evidence suggesting that it significantly lessens the risk of transmitting and catching the virus and even in reducing the severity of infection in people who catch the disease, indirectly saving lives [11, 16].

Current best estimates show that about 30% of all COVID-19 infections are asymptomatic [17]. However, most people that have been infected by the SARS-CoV-2 virus may not remain asymptomatic indefinitely and may progress to the symptomatic stage [18].

At present, while some communities struggle to contain the third wave of infections and others are easing their way out of lockdown, there is still an active debate as to whether members of the public should be encouraged to wear face masks. This is a result of a conflict of interest from health officials and policy makers as there is a lack of research conducted into the effectiveness of different types of masks and materials. For example, studies have shown that cloth masks are unsuitable for health care workers as they have an inadequate filtration system due to poor fabric and improper design compared to surgical masks [19]. On the other hand, a part of the population may overestimate the effectiveness of face masks and over-rely on them, causing them to neglect other preventive measures such as social distancing and frequent hand washing [20].

A study was carried out during the early phases of this pandemic regarding the public knowledge, attitudes and practices towards COVID-19 among Malaysians. When assessed regarding practices, a slightly higher majority claimed to have worn face masks upon leaving their homes [21]. There was still a debate as to whether or not wearing masks would be necessary. In another study carried out among medical students, it was found that 91% of participants said "yes" to wearing face masks [22]. It can be said that Malaysians deemed wearing face masks as a necessity albeit it may not be beneficial to oneself but as a cumulative benefit to society.

Medical students, specifically preclinical students have a higher risk of contracting this deadly virus since they are exposed to patients on the daily basis. Hence, this study aims to determine the perceived effectiveness of using face masks among medical students to prevent infection. Our study can provide the necessary data needed to determine the appropriate precautions that should be taken to prevent COVID-19 infection. For example, face mask usage. This way, medical students would still be able to go to hospitals for their clinicals with a sense of relief and medical education of undergraduate students will not have to take a pause.

The objectives of our study are to determine the association between gender and exposure to clinical settings with the use of face masks as well as to assess the future use of face masks and reasons for doing so.

2. Methods

2.1. Study Design, Study Population, Time and Place

This analytical cross-sectional study was conducted among undergraduate students of Manipal University College Malaysia (formerly Melaka Manipal Medical College) from May 2021 to June 2021. It is a private institution in Malaysia consisting of 2 campuses, namely the Muar campus in Muar, Johor and the Melaka campus in Bukit Baru, Melaka. There

are a total of 3 courses offered by this institution, Foundation in Science (FiS), Bachelor of Dental Surgery (BDS) and Bachelor of Medicine and Bachelor of Surgery (MBBS). In this study, we have only selected undergraduate students of the Bachelor of Medicine and Bachelor of Surgery (MBBS) course. The medical faculty has a population size of approximately 1300 students.

2.2. Sampling and Sample Size

A non-probability sampling method, which is purposive sampling method was used to select students for this study. Manipal University College Malaysia (MUCM) students from the MBBS course were selected to participate in this study. The inclusion criteria comprised of undergraduate MBBS students of MUCM with given willing consent, questionnaires that were fully completed and only the first response sent by each individual. Exclusion criteria includes those whose consent form were not filled up, questionnaires with incomplete answers and duplicate responses.

In a recent survey, 87% of Malaysians responded that they usually wear masks out in public [23]. Based on the calculations provided in sample size tables for clinical studies, 2nd edition, and with our population size of 1300, expected frequency of 87%, and precision error of 7%, we conclude that our sample size to be 87 [24].

Upon calculation of our sample size (n) to be 87, we then chose to allow for 20% of null responses. The calculation to obtain our (n) final is as shown below;

$$n \text{ (final)} = n \text{ (calculated)} / 1 - \text{non response}\%$$

$$= 87 / 1 - 0.2 (20\%)$$

$$= 109$$

Hence, 109 was considered to be the final sample size.

2.3. Data Collection

An online survey was developed and distributed to undergraduate medical students of Manipal University College Malaysia. The 12-item questionnaire consisted of three parts. The first part included consent for participation and sociodemographic information such as gender, age, nationality, ethnicity, clinical/pre-clinical phase as well as how many hours of face mask usage in a day on average. The second part comprised of questions regarding the perception towards wearing face masks. It included six questions such as "Do you think that your disease condition would be serious if you had COVID-19?", "Do you think that wearing a mask will keep you from being infected?", etc. Responses were based on a likert scale of 1 (not at all) to 5 (very much). The final part was regarding face mask use in the future.

The survey was submitted via Google forms online platform which required participants to be signed-in to a Google account to complete the survey. This prevented multiple responses from individual respondents. A prerequisite for submission was responding to all multiple-choice questions in the questionnaire. The survey was distributed over social media platform – Whatsapp and study participation was voluntary. In order to maintain anonymity, names and email addresses were not recorded.

2.4. Data Processing and Data Analysis

The raw data was downloaded via Google Forms and was then entered into Microsoft Excel. The data was then analysed using Epi info ver. 7.2.4.0 from the Centers for Disease Control and Prevention (CDC). In this research, the independent variables included gender, and exposure to clinical setting. The dependent variables were perception towards face masks and continued use of face masks after the pandemic. The quantitative data was calculated using mean and standard deviation. The level of significance was set as 0.05 (5%). The statistical tests used to determine the association between independent and dependent variables are shown in the tables below [Tables 1-2].

2.5. Ethical Consideration

Respondents were asked to fill in the consent form attached to the questionnaire prior to participating in this study. They were also informed that participation in this study is completely voluntary. If they choose to withdraw participation at any point during this study, there could do so without any negative implications. Any information obtained was kept confidential and only to be used for the sole purpose of this study. Anonymity and privacy of participants were maintained.

Table 1. Variables and statistical tests used in data analysis.

Independent variables	Dependent variables	Statistical tests
Gender	Perception towards face masks	Unpaired T-test
Exposure to clinical setting		Unpaired T-test
Gender	Continued use of face masks after the pandemic	Chi-square test
Exposure to clinical setting		Chi-square test

Table 2. Statistical test used to determine perception of students towards face mask usage and association.

Association between:	Statistical test
Severity vs Protection	Correlation
Severity vs Prevention	Correlation
Severity vs Norm	Correlation
Severity vs Relief	Correlation
Severity vs Impulsion	Correlation
Severity vs Effectiveness	Correlation
Severity vs Ineffectiveness	Correlation
Protection vs Prevention	Correlation
Protection vs Norm	Correlation
Protection vs Relief	Correlation
Protection vs Impulsion	Correlation
Protection vs Effectiveness	Correlation
Protection vs Ineffectiveness	Correlation
Prevention vs Norm	Correlation
Prevention vs Relief	Correlation
Prevention vs Impulsion	Correlation
Prevention vs Effectiveness	Correlation
Prevention vs Ineffectiveness	Correlation
Norm vs Relief	Correlation
Norm vs Impulsion	Correlation
Norm vs Effectiveness	Correlation
Norm vs Ineffectiveness	Correlation
Relief vs Impulsion	Correlation
Relief vs Effectiveness	Correlation
Relief vs Ineffectiveness	Correlation
Impulsion vs Effectiveness	Correlation
Impulsion vs Ineffectiveness	Correlation
Effectiveness vs Ineffectiveness	Correlation

3. Results

Table 3. Sociodemographic characteristics of participants.

Variables		Frequency (n)	Percentage (%)
Age	≤22 y/o	88	81.5
	>22 y/o	20	18.5
	Mean (SD)	21.37 (1.56)	
	Min-Max	18-25	
Gender	Male	26	24.1
	Female	82	75.9
Ethnicity	Indian	63	58.3
	Chinese	25	23.1
	Malay	5	4.6
	Sinhalese	14	13.1
	Sikh	1	0.9
Clinical setting exposure	Yes	59	54.6
	No	49	45.4
Nationalities	Malaysian	93	86.1
	International	15	13.9

Table 3 shows the sociodemographic characteristics of our survey respondents which include age, gender, ethnicity, exposure to clinical settings and nationalities. Most of our respondents were below or are the age of 22 (81.5%) while the remaining 18.5% were above the age of 22. Most of our respondents were females (75.9%) while the remaining 24.1% were males.

The participants were of various ethnic groups out of which most were Indian (58.3%) followed by Chinese (23.1%),

Sinhalese (13.1%), Malay (4.6%), and Sikh (0.9%).

Majority of respondents have had exposure to clinical settings (54.6%) while the rest have not been exposed to clinical settings (45.4%). Most of the respondents were Malaysian (86.1) while the remaining were non-Malaysian (13.9%).

Table 4. Face mask usage, duration, future use and reasons for future use.

Variables		Frequency (n)	Percentage (%)
Face mask use	Yes	107	99.1
	No	1	0.9
Average duration of face mask use	< 1 hour	44	40.7
	1 -2 hours	15	13.9
	2-4 hours	25	23.1
	4-6 hours	11	10.2
	6-8 hours	9	8.3
	> 8 hours	4	3.7
Future use of face masks	Yes	75	69.4
	No	33	30.6
Reasons for future use of face masks	Self-protection	69	29.9
	Protect others	60	26.0
	Habit	29	12.6
	Peer pressure	3	1.3
	Feeling of anxiety without masks	31	13.4
	Air pollution	20	8.7
	Anonymity and privacy	17	7.4
	Fashion statement	2	0.7

Based on Table 4, majority of respondents responded that they wear masks at all times in public (99.1%) while only a small percentage do not (0.9%).

Based on the average daily use of face masks, larger number of respondents wear face masks for less than 1-hour (40.7%) followed by respondents who wear face masks between 2-4 hours (23.1%), respondents who wear face masks between 1-2 hours (13.9%), respondents who wear face masks between 4-6 hours (10.2%), respondents who wear face masks between 6-8 hours (8.3%) and respondents who wear face masks for more than 8 hours (3.7%). When inquired whether they will continue wearing face masks in the future, most of the respondents said yes (69.4%) while the rest said no (30.6%). When asked about the reasons to continue wearing face masks (respondents can give multiple answers), self-protection (29.9%), to protect others (26%), out of habit (12.6%), peer pressure (1.3%), feeling of anxiety without masks (13.4%), air pollution (8.7%), anonymity and privacy (7.4%) and face masks being a fashion statement (0.7%), these were the responses.

Table 5 is an interpretation of the association between male and female medical students of MUCM and their perception towards the use of face mask in preventing the spread of COVID-19 infection. Among these undergraduate medical students, there is a significant association between gender and a sense of relief felt as the p-value is 0.003. Also,

students of both genders have perceived that the usage of face mask during this pandemic is effective, and this is proven by the highest mean difference. This association however cannot be significant as the p-value is above 0.05. The least mean difference is recorded between gender and

their perception of usage of mask as being a sense of norm. This association is significant as the p-value is 0.695 which is above 0.05. The results regarding severity, protection, prevention, impulse, and ineffectiveness are not significant as p-value is recorded is above 0.05.

Table 5. Association between gender and perception.

	Male Mean (SD)	Female Mean (SD)	Mean difference (95% CI)	P-value
Severity	3.462 (0.905)	3.134 (1.225)	0.327 (-0.189, 0.849)	0.212
Protection	4.000 (0.748)	4.110 (0.956)	-0.110 (-0.516, 0.297)	0.594
Prevention	4.308 (0.788)	4.085 (1.045)	0.222 (-0.220, 0.664)	0.321
Norm	4.577 (0.494)	4.646 (0.807)	-0.069 (-0.419, 0.280)	0.695
Relief	3.462 (1.140)	4.159 (0.975)	-0.697 (-1.154, -0.240)	0.003
Impulse	4.692 (0.471)	4.309 (1.075)	0.302 (-0.129, 0.733)	0.168
Effectiveness	14.923 (4.931)	13.232 (6.441)	1.691 (-1.039, 4.422)	0.222
Ineffectiveness	5.846 (3.331)	5.573 (3.178)	0.273 (-1.162, 1.708)	0.707

Table 6. Association between exposure to clinical setting and perception.

	Preclinical year Mean (SD)	Clinical year Mean (SD)	Mean difference (95% CI)	P-value
Severity	3.429 (1.080)	3.034 (1.203)	0.395 (-0.046, 0.835)	0.078
Protection	4.082 (0.862)	0.907 (0.952)	-0.003 (-0.353, 0.347)	0.986
Prevention	4.061 (0.966)	4.203 (0.966)	-0.142 (-0.522, 0.238)	0.992
Norm	4.735 (0.605)	4.542 (0.897)	0.192 (-0.106, 0.491)	0.204
Relief	3.755 (1.146)	4.186 (0.956)	-0.431 (-0.832, -0.031)	0.035
Impulse	4.612 (0.885)	4.3390 (1.027)	0.273 (-0.097, 0.643)	0.146
Effectiveness	14.102 (6.063)	13.254 (6.216)	0.848 (-1.508, 3.203)	0.477
Ineffectiveness	6.469 (3.714)	4.949 (2.535)	1.520 (0.323, 2.718)	0.013

Table 6 portrays the association between exposure to clinical setting and perception of face mask usage in preventing Covid-19 infection. Among the undergraduate medical students, there is a significant association between clinical exposure and a sense of relief felt as the p-value is 0.035. Students who have not had exposure to clinical settings are 1.5 times on average higher than the clinical year students in perceiving the use of face masks as ineffective and shows the

highest mean difference. The association is significant as the p-value is 0.013. The least mean difference of 0.003 is observed between exposure to clinical setting and belief of protection by wearing a face mask. However, the association is not significant as p-value is 0.986. The results for severity, prevention, norm, impulse, and effectiveness shows no significant value because the p-values are greater than 0.05.

Table 7. Association between gender, exposure to clinical setting and future use of face mask.

Independent variables	Future use of face masks		Odds Ratio (95% CI)	Chi-Square	P-value
	Yes (%)	No (%)			
GENDER					
Male	19 (73)	7 (27)	1.26 (0.47-3.37)	0.213	0.644
Female	56 (68)	26 (32)			
EXPOSURE TO CLINICAL SETTING					
Pre-clinical	38 (78)	11 (22)	2.05 (0.87-4.82)	2.778	0.096
Clinical	37 (63)	22 (37)			

Table 7 shows the association between gender and exposure to clinical setting as well as future use of face masks. According to our study, male gender is 1.26 times more likely to continue wearing face masks in the future compared to females. However, the findings were not significant (95% CI 0.47, 3.37; x^2 0.213; p-value 0.644). The study also showed that medical students with no exposure to clinical settings are 2.05 times more likely to continue wearing face masks in the future compared to students with exposure to clinical setting. However, the findings were not significant (95% CI 0.87, 4.82; x^2 2.778; p-value 0.096).

Table 8 shows the association between perceptions and effectiveness of face mask usage in preventing COVID-19 infection. The association between severity and protection was positive with r value 0.141. This finding is not significant as p-value is more than 0.05. However, a positive significant association can be seen between severity and prevention with the r value of 0.30 and p-value less than 0.05. The association between severity and norm was also a low positive significant association with the r value = 0.265. Next, the association between severity and relief is not significant as the p-value is more than 0.05 and complete

absence of correlation with r value = 0.00. There is no significant association between severity and impulse but high positive correlation with r value = 0.889. The association between severity and effectiveness as well as association between severity and ineffectiveness shows positive significant association where r value is 0.889 and 0.469 respectively. The association between protection and prevention as well as association between protection and norm shows low significant positive correlation as the r values are 0.469 and 0.490 respectively. Thus, as protection increases, norm and prevention also increase. Low significant positive association can be seen with the association between protection and relief as well as association between protection and impulse with the r value of 0.424 and 0.361 respectively. However, a significant negative correlation can be seen in the association between protection and ineffectiveness with the r value of 0.200 and p-value less than 0.05 but low positive significant correlation can be seen from the association between protection and effectiveness with the r value of 0.245.

Table 8. Association between perceptions and effectiveness of face mask usage.

No.	Measure	1	2	3	4	5	6	7	8
1	Severity	-	-	-	-	-	-	-	-
2	Protection	0.141	-	-	-	-	-	-	-
3	Prevention	0.300*	0.469*	-	-	-	-	-	-
4	Norm	0.265*	0.490*	0.510*	-	-	-	-	-
5	Relief	0.000	0.424*	0.265*	0.436*	-	-	-	-
6	Impulse	0.173	0.361*	0.424*	0.458*	0.361*	-	-	-
7	Effectiveness	0.889*	0.245*	0.648*	0.361*	0.100	0.245*	-	-
8	Ineffectiveness	0.469*	-0.200*	-0.592*	-0.141	-0.100	-0.100	0.000	-

*$p < 0.05$

A moderate significant correlation can be seen from the association between prevention and norm as well as association between prevention and effectiveness with the r value of 0.510 and 0.648 respectively. The association between prevention and relief as well as the association between prevention and impulse shows low positive significant correlation as the p-value is less than 0.05 and r values of 0.265 and 0.424 respectively. A significant moderate negative association can be seen from the association between prevention and ineffectiveness with the r value of -0.592. The association between norm and relief and the association between norm and impulse shows moderate significant positive correlation as the r value is 0.436 and 0.458 respectively. A low significant positive association seen from the association between norm and effectiveness with the r value of 0.361.

The association between norm and ineffectiveness is not significant and has a negative correlation with r value of -0.141. The association between relief and impulse shows a low positive significant association with r value of 0.361 whereas the association between relief and effectiveness is not significant with little positive correlation, r value = 0.100.

A nonsignificant negative little correlation can be seen in the association between relief and ineffectiveness, r value of -0.100. The association between impulse and effectiveness shows low positive significant correlation with r value of 0.245. However, a negative non-significant correlation is seen in the association between impulse and ineffectiveness with r value of -0.100. Finally, there is no significant correlation between effectiveness and ineffectiveness of face mask usage in preventing COVID-19 infection.

4. Discussion

A cross-sectional study was conducted among undergraduate students of Manipal University College Malaysia (MUCM) to determine the association between gender and exposure to clinical settings WITH the use of face masks. Also, to assess the future use of face masks and the reasons for doing so.

In our study, most of the respondents wear a face mask at all times when they go out into public (99.1%) and among them, a majority of respondents wear face masks for less than 1 hour on average per day (40.7%), followed by respondents who wear face masks between 2 to 4 hours in average per day (23.1%). When inquired about whether they would continue face mask wearing practices in the future, once the pandemic has ended, majority of respondents said yes (69.4%). The reasons for doing so include self-protection from infectious diseases (29.9%), protecting others from diseases (26.0%), face mask use becoming a personal habit (12.6%), feeling of anxiety when not wearing a mask (13.4%), to combat air pollution (8.7%), to maintain anonymity and privacy (7.4%), peer pressure (1.3%) and face masks becoming a fashion statement (0.7%). Our results align with other surveys where people are now generally more accepting and are inclined to continue wearing face masks even after the pandemic. [25-26]. With the precedence of Japan widely adopting face mask use after the 1918 Spanish flu outbreak, it may be possible that the widespread use of face masks could become a cultural norm in the near future. [27]

We also found out that there is a significant association with gender and relief. Female undergraduate medical students felt more relief by wearing a face mask during the pandemic compared to male undergraduate medical students. There is no significant association between gender and perception of severity, protection, prevention, norm, impulse, effectiveness, and ineffectiveness among undergraduate medical students. This study also shows that there is a significant association between exposure to clinical setting and relief as well as ineffectiveness of face mask usage. Clinical year undergraduate students feel more relieved to wear a face mask to prevent COVID-19 infection compared to preclinical undergraduates. Preclinical undergraduates feel that wearing a face mask is ineffective compared to clinical undergraduates. There is no significant association between exposure to clinical settings and the perception of severity, protection, prevention, norm, impulse and effectiveness among medical undergraduates in preventing COVID-19 infection.

In our study, we have also assessed the correlation between multiple perception points towards the usage of face masks during this pandemic. These include a few measures such as severity, protection, prevention, norm, relief, impulse, effectiveness, and ineffectiveness. Effectiveness is calculated as a product of severity and prevention while ineffectiveness is the product of severity and the inverse of prevention. There are positive significant correlations between severity with prevention, norm, effectiveness, and ineffectiveness. The same has been noticed between protection with prevention, norm, relief, impulse and effectiveness. Besides that, a positive significant correlation can also be seen between prevention with norm, relief, impulse and effectiveness as well as between norm with relief, impulse and effectiveness. The correlation between relief and impulse is also a positive significant one and the same goes for impulse and effectiveness. There is also a negative significant correlation and this is seen between protection and ineffectiveness as well as between prevention and ineffectiveness. A positive but non significant correlation has been noticed between severity with protection, relief and impulse. Also, this correlation is seen between relief and effectiveness as well as between effectiveness and ineffectiveness. Last but not the least, a negative and insignificant correlation has been seen between norm and ineffectiveness, relief and ineffectiveness, as well as impulse and ineffectiveness.

This research also includes the perception of undergraduate medical students on the use of face masks in preventing COVID-19 infections. Based on our study, we found that 99.1% of undergraduate medical students which took part in this survey use a face mask when going out in public during this pandemic. The average duration of face mask usage was <1 hour in majority of the participants (40.7%) and the lowest percentage (3.7%) of students were observed to wear the mask for more than 8 hours. There was a significant positive association observed among those who were exposed to a clinical setting and sense of relief felt by wearing a face mask which indicated that being exposed to clinical setting provides a better understanding as to why wearing a face mask may help them in feeling safer. We also studied the association between future uses of face mask in relation to the reasons for wearing masks. The highest frequency of students (69) stated 'self-protection' as the reason for future face mask usage. As portrayed by the study, male gender is 1.26 times more likely to continue wearing face masks in the future compared to females. However, the association observed was not significant. According to this study, the association observed between exposure to clinical setting and future use of face masks was not significant but states that medical students with no exposure to clinical setting are more likely to continue wearing face masks in the future compared to students with exposure to clinical setting.

While conducting the study, we also faced several limitations. This survey was narrowed down to only include medical students of one private medical college in Malaysia. Hence, it is not representative of medical students in Malaysia as a whole. Even though the target population was limited to undergraduate medical students of Manipal University College Malaysia (MUCM), it was impossible to ensure that everyone would participate in this survey. We had to resort to distributing our questionnaire through social media platforms due to the pandemic and some people might have overlooked it resulting in them not being able to participate. The sample of this study was also over-representative of female students and more respondents have had exposure to clinical settings. Therefore, the effect on representativeness and generalizability of the findings is rather significant. Lastly, participants may have resorted to giving preferable responses that are socially acceptable since the data used in this study was self-reported. This could have an impact on the overall findings.

Future research should be done into the efficacy of face masks and other preventive measures in combating the spread of Covid-19 and its variants. Nationwide Standard Operating Procedures (SOPs) are to be based on research-based evidence. Education and promotion of face masks as a Covid-19 preventive measure should be enhanced. Finally, more studies regarding the perception of the Malaysian population on face masks as a method to curb and dampen the spread of Covid-19 should be done.

5. Conclusion

The Covid-19 pandemic has altered lives at a global level and led us to resort to many ways of curbing the spread of

infection. Face mask usage plays a pivotal role in preventing transmission and is a mandatory precaution taken by authorities to control the spread of the virus. As a result, it has become a new norm in the society. In fact it would feel peculiar to leave the house without wearing a face mask. This guided us to survey if there is a correlation between medical students who are the future of healthcare and the perception of face mask usage in preventing Covid-19 infection.

In brief, there is a positive association between the exposure to clinical setting among undergraduate students and a sense of relief felt by wearing a face mask. This could indicate a positive perception regarding the use of face masks in contributing towards preventing further transmission of the virus especially in a clinical background. Furthermore, female undergraduate students seemed to feel more relieved when wearing a face mask compared to male students. Finally, regarding the future use of face masks, it was observed that majority of respondents seemed to be in favour of it. This aligns with other studies that indicate the general public are now more accepting in using face masks as a routine practice.

In conclusion, face mask usage is of utmost importance as it plays a key role in the fight against COVID-19. It not only limits transmission but helps the wearer feel more relived and safer from the ongoing infection.

Acknowledgements

References

[1] Asadi S, Bouvier N, Wexler AS, Ristenpart WD. The coronavirus pandemic and aerosols: Does COVID-19 transmit via expiratory particles?

[2] Chia PY, Coleman KK, Tan YK, Ong SW, Gum M, Lau SK, Lim XF, Lim AS, Sutjipto S, Lee PH, Son TT. Detection of air and surface contamination by SARS-CoV-2 in hospital rooms of infected patients. Nature communications. 2020 May 29; 11 (1): 1-7.

[3] Sun J, Zhu A, Li H, Zheng K, Zhuang Z, Chen Z, Shi Y, Zhang Z, Chen SB, Liu X, Dai J. Isolation of infectious SARS-CoV-2 from urine of a COVID-19 patient. Emerging microbes & infections. 2020 Jan 1; 9 (1): 991-3.

[4] Xiao F, Sun J, Xu Y, Li F, Huang X, Li H, Zhao J, Huang J, Zhao J. Infectious SARS-CoV-2 in feces of patient with severe COVID-19. Emerging infectious diseases. 2020 Aug; 26 (8): 1920.

[5] Jones DL, Baluja MQ, Graham DW, Corbishley A, McDonald JE, Malham SK, Hillary LS, Connor TR, Gaze WH, Moura IB, Wilcox MH. Shedding of SARS-CoV-2 in feces and urine and its potential role in person-to-person transmission and the environment-based spread of COVID-19. Science of the Total Environment. 2020 Dec 20; 749: 141364.

[6] Pandey LK, Singh VV, Sharma PK, Meher D, Biswas U, Sathe M, Ganesan K, Thakare VB, Agarwal K. Screening of core filter layer for the development of respiratory mask to combat COVID-19. Scientific Reports. 2021 May 13; 11 (1): 1-4.

[7] Van Doremalen N, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN, Tamin A, Harcourt JL, Thornburg NJ, Gerber SI, Lloyd-Smith JO. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. New England journal of medicine. 2020 Apr 16; 382 (16): 1564-7.

[8] Bundgaard H, Bundgaard JS, Raaschou-Pedersen DE, von Buchwald C, Todsen T, Norsk JB, Pries-Heje MM, Vissing CR, Nielsen PB, Winsløw UC, Fogh K. Effectiveness of adding a mask recommendation to other public health measures to prevent SARS-CoV-2 infection in Danish mask wearers: a randomized controlled trial. Annals of Internal Medicine. 2020 Nov 18.

[9] Abbasi, K. (2020a). The curious case of the Danish mask study. BMJ, m4586. https://doi.org/10.1136/bmj.m4586

[10] Asmelash L. The Surgeon General Wants Americans to Stop Buying Face Masks. https://edition.cnn.com/2020/02/29/health/face-masks-coronavirus-surgeon-general-trnd/index.html

[11] Worby CJ, Chang HH. Face mask use in the general population and optimal resource allocation during the COVID-19 pandemic. Nature communications. 2020 Aug 13; 11 (1): 1-9.

[12] Xiaoning, T Yuwei. Research on Management of University Public Health Emergencies----Based on 2019 New Coronavirus Events 2020 Z 10.11648/j.si.20200802.15 Science Innovation. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/when-and-how-to-use-masks

[13] Everington, K. *Masks Mandatory on Taiwan Trains, Intercity Buses Starting Today*. Taiwan News; Taipei, Taiwan. https://www.taiwannews.com.tw/en/news/3908366 (2020).

[14] Feng, S. et al. Rational use of face masks in the COVID-19 pandemic. *Lancet Respir. Med.* 8, 434–436 (2020).

[15] Wai YC, Yee PJ, Thastheen VR. The Potential Side Effect of the Face Mask. 2020. http://files.aiscience.org/journal/article/pdf/70570152.pdf

[16] Leung NH, Chu DK, Shiu EY, Chan KH, McDevitt JJ, Hau BJ, Yen HL, Li Y, Ip DK, Peiris JM, Seto WH. Respiratory virus shedding in exhaled breath and efficacy of face masks. Nature medicine. 2020 May; 26 (5): 676-80.

[17] Centers for Disease Control and Prevention. 2021. Healthcare Workers. [online] Available at:<https://www.cdc.gov/coronavirus/2019-ncov/hcp/planning-scenarios.html#table-1>

[18] Buitrago-Garcia D, Egli-Gany D, Counotte MJ, Hossmann S, Imeri H, Ipekci AM, Salanti G, Low N. Occurrence and transmission potential of asymptomatic and presymptomatic SARS-CoV-2 infections: A living systematic review and meta-analysis. PLoS medicine. 2020 Sep 22; 17 (9): e1003346.

[19] Raina MacIntyre, C., & Jay Hasanain, S. (2020). Community universal face mask use during the COVID 19 pandemic—from households to travellers and public spaces. Journal Of Travel Medicine, 27 (3). doi: 10.1093/jtm/taaa056

[20] Prasad V. Here's How to Think About the Danish Mask Study: What the DANMASK-19 trial showed and didn't show about mask use and COVID-19. 2020 Nov 18 [cited 2020 Dec 11] Available from: https://www.medpagetoday.com/blogs/vinayprasad/ 89778

[21] Azlan AA, Hamzah MR, Sern TJ, Ayub SH, Mohamad E. Public knowledge, attitudes and practices towards COVID-19: A cross-sectional study in Malaysia. 2020 May 21; PLoS One 15 (5): e0233668. Available from: https://doi.org/10.1371/journal.pone.0233668

[22] Joyce Chzi Ching Chee, Sylvia Wei Wei Kong, Zhi Jing Tan, Yi Khai Lim, Mark S Pearce, Edmund L C Ong. Perceptions, Attitude, Responses, Knowledge and Emotional Well-being (PARKE) of COVID-19 among students at Newcastle University Medicine Malaysia (NUMed). 2021 February 07, Available from: https://doi.org/10.29392/001c.18960

[23] R. Hirschman. Share of people who wore masks in public COVID-19 outbreak Malaysia 2020-2021 [Internet] Statista: R. Hirschman; 2021 April 30 [Updated 2021 April 30; cited 2021 June 5] Available from: https://www.statista.com/statistics/1110960/malaysia-wearing-masks-during-covid-19-outbreak/

[24] David Machin, Michael Campbell, Peter Fayers, Alain Pinol, Sample size tables for clinical studies, 2nd edition, Blackwell Science, Oxford, 1997.

[25] Jamie Ballard. Most americans expect to keep wearing face masks after the pandemic [Internet]. YouGovAmerica; 2021 [updated 2021 March 20; cited 2021 June 15]. Available from: https://today.yougov.com/topics/health/articles-reports/2021/03/19/americans-wearing-face-masks-after-pandemic-poll

[26] Korin Miller. Nearly three-quarters of Americans still plant to wear masks in public after COVID-19 is no longer a threat: Survey [Internet] Yahoo!life; 2021 [updated 2021 February 10; cited 2021 June 15]. Available from: https://www.yahoo.com/lifestyle/americans-still-plan-wear-masks-public-covid-19-no-longer-threat-survey-194043610.html?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS88&guce_referrer_sig=AQAAABvt7giJDYWhnhM1_EuCUxpaaJ6JG9I73RErUffxNefPwJuM9i8R60fKqdClOyTQxXaLLLtGVLn2GjjxPa92452fyoimqegSFirEJCmLO-uOadqIVEvguDbayojMc-d72L0Xgr3b6SMZD9cxgyL5ee6Uke-yAFR94s3GoL4N-35J

[27] Deutsche Welle. How Japan's mask culture may have saved lives during coronavirus [Internet]. Taiwan News; 2020 [updated 2020 October; cited 2021 June 15]. Available from: https://www.taiwannews.com.tw/en/news/4033338

[28] Nakayachi K, Ozaki T, Shibata Y, Yokoi R. Why do Japanese people use masks against COVID-19, even though masks are unlikely to offer protection from infection?. Frontiers in Psychology. 2020 Aug 4; 11: 1918.