COVID-19: IMPLEMENTING A NEW HEALTHY LIFESTYLE AND TACKLING VACCINATION HESITANCY

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ABSTRACT

Coronavirus disease 2019 (COVID-19), which caused by SARS-COV-2, has spread globally. Pre-existing comorbidities such as diabetes, hypertension, cardiovascular disease, obesity, and malignancy may increase susceptibility to infection and the worsening of COVID-19. An unhealthy lifestyle in people with pre-existing comorbidities can worsen the condition and increase the risk of mortality and morbidity. During the 5M policy implementation, people tend to adopt unhealthy lifestyles, which lead to weight gain, dysregulated immune systems, increased cardiometabolic risk, and death. Therefore, implement a new healthy lifestyle to achieve health, good mental status, and prevent the worsening of pre-existing comorbidities. Given the importance of comorbidities control, we advised people with pre-existing diseases to monitor their condition using easy devices. Simple home aerobic exercise with minimal equipment is recommended to achieve adequate physical exercise. Vaccination also plays an important role in preventing severe COVID-19 progression and reducing disease transmission. Despite the importance of vaccines, we are still facing vaccination hesitancy, in which many people are still in doubt about getting the vaccination. It is important to show the data that the benefits of the COVID-19 vaccine far outweigh the potential risks. Health workers play a vital role in community education and health promotion.

Keywords: COVID-19; Healthy lifestyle; Vaccination.

INTRODUCTION

Coronavirus disease 2019 (COVID-19), which caused by SARS-COV-2, has spread rapidly.¹ Based on World Health Organization (WHO), more than 242 million people have been infected in October 2021, with almost 5 million deaths reported globally.² Pre-existing comorbidities such as diabetes, hypertension, cardiovascular disease, obesity, and malignancy may increase susceptibility to infection and worsening outcome of COVID-19.³ As an effort to overcome COVID-19, the Indonesian Ministry of Health has established 5M policy which stands for memakai masker/wearing mask, mencuci tangan/washing hands, menjaga jarak/maintaining distance, menjauhi kerumunan/avoiding crowds, and membatasi mobilitas/limiting mobility to reduce disease transmission. Aside from that, the Indonesian government has also accelerated vaccination programs to achieve herd immunity. The 5M policy indirectly but significantly impacts lifestyle and daily routine activities, particularly physical activity, nutrition, and sleep patterns.⁴ ⁵ In addition, COVID-19 also has a high burden on social, psychological, and economic aspects that contribute to mental health and quality of life.⁶

People tend to adopt unhealthy lifestyles while implementing the 5M policy, including excessive food intake, cigarette, and alcohol...
consumption, and a sedentary lifestyle. This leads to weight gain, dysregulated immune system, increased cardiometabolic risk, and death.\textsuperscript{1,7} Unhealthy lifestyles in people with pre-existing comorbidities can worsen the condition and increase the risk of mortality and morbidity.\textsuperscript{3} Therefore, implementing a new healthy lifestyle to achieve health, good mental status, and prevent the worsening of pre-existing comorbidities is essential.

Vaccination also plays an important role in preventing severe COVID-19 progression and reducing disease transmission.\textsuperscript{8} Vaccination is required for long-term control through herd immunity.\textsuperscript{8,9} Despite the importance of vaccines, we are still facing vaccination hesitancy, in which many people are still in doubt about getting the vaccination.\textsuperscript{10} Consequently, preventing disease transmission and herd immunity may not be achieved.\textsuperscript{11}

As an effort to prevent COVID-19, our discussion aims to emphasize the importance of implementing a healthy lifestyle, as it is often neglected. Furthermore, it is also important to point out that the benefit of the COVID-19 vaccine far outweighs the potential risks of increasing vaccination rates and expanding the coverage of vaccinated individuals and the community.

DISCUSSION
Impact of self-isolation in individuals with pre-existing comorbidities

Diabetes, obesity, hypertension, and cardiovascular diseases are the most frequent comorbidities associated with poor outcomes.\textsuperscript{3} Unhealthy lifestyles may exacerbate or yet, worsen the previous diseases. Therefore, people with pre-existing comorbidities may be at a higher risk during self-isolation. Patients with diabetes need special attention. Impaired glycemic control is associated with an increased risk of complications during the lockdown, including peripheral neuropathy, lower-extremity amputation, myocardial infarction, and stroke. Uncontrolled blood glucose has a higher risk of COVID-19 infection and mortality rate.\textsuperscript{12} Impaired blood glucose might be caused by reduced physical activity, unbalanced diet, poor compliance to self-monitoring of blood glucose, lack access to diabetic medication and routine control to healthcare facilitation.\textsuperscript{13,14}

A meta-analysis by Soeroto et al. showed obesity (>30 kg/m\textsuperscript{2}) was associated with the poor composite outcome with OR=1.78 (95\% CI, 1.25 to 2.54).\textsuperscript{15} Obese people need to monitor their diet strictly, which may be more challenging during the lockdown. Moreover, adequate physical activity is difficult to do at home and can increase the risk for weight gain. People with hypertension, cardiovascular diseases, malignancy, chronic obstructive pulmonary disease (COPD), liver, and renal diseases were also at a higher risk, possibly due to uncontrolled and worsened diseases.\textsuperscript{3,16}

Therefore, it is important to control pre-existing comorbidities during this pandemic by implementing a new healthy lifestyle.

Lifestyle modification
Nutrition

During this situation, people tend to consume more unhealthy, savory snacks and high-sugar foods during this situation.\textsuperscript{17} Obesity is a known risk factor for severe COVID-19, leading to acute respiratory distress syndrome (ARDS), multiple organ failure, and death. Therefore, obesity prevention should be a concern.\textsuperscript{17,18} Imbalanced nutrition intake alters immune responses, leading to metabolic syndrome and obesity.\textsuperscript{19} A well-balanced and healthy diet is necessary for maintaining the immune system.\textsuperscript{7} Apart from the increase of high sugar food intake and snacking habits, there is also a rise in healthful nutrition intake, such as fruits, vegetables, herbal, and multivitamins.\textsuperscript{20} The reasons for the improvement in healthy intake and lower junk food are fear of getting infected while going out and socializing, so people prefer home-cooked meals, which are more nutritious.\textsuperscript{4} High intake of fruits and vegetables may also increase optimism and reduce psychological burden.\textsuperscript{6}

Vitamins A, B, C, D, E, and minerals such as iron, magnesium, zinc, copper, selenium, iodine, are necessary for the
immune system to function properly. Proteins, short-chain fatty acids (SCFA), Omega-3, low-fat diet and polyphenols also support the immune system, which helps virus clearance.\textsuperscript{7,19} Interestingly, probiotics protect the alimentary tract and the upper respiratory tract. This is beneficial since SARS-CoV-2 can also affect the lower gastrointestinal tract due to high ACE2 receptors.\textsuperscript{19} Excess intake of high-sugar food, carbohydrates, saturated fats, worsened by decreased physical activity, could lead to obesity and alter the immune system. In addition to essential nutrient deficiency, these kinds of daily patterns would impair the regulation of the immune system, making our body more vulnerable to infection.\textsuperscript{19}

Patients with metabolic diseases should pay more attention to their nutritional intake. In diabetic patients, low compliance on diabetic diet consumption causes uncontrolled blood glucose.\textsuperscript{14} They should stick with their diabetic diet plan, cut out sugars, and be compliant with the medication. Patients with hypertension should also follow Dietary Approach to Stop Hypertension (DASH) to lower their blood pressure, consuming high fibers, low salt, and low-fat dairy products. Given the importance of comorbidities control, we advised people with pre-existing diseases to monitor their condition using easy devices such as body weight scales, automated blood pressure, and blood glucose devices. We also strongly advised the government to use technology-based monitoring for people who require routine monitoring. Technology-based monitoring allows patients to communicate their disease with their physician without fear of getting infected by COVID-19. It may also give a chance for physicians to educate their patients effectively without the time and place limitations.

**Physical exercise**

Regular exercise during a pandemic is important to prevent diseases associated with physical inactivity.\textsuperscript{7} Inadequate physical activity is linked to the escalation of screen time and daily sitting.\textsuperscript{4} Combined with excessive food intake, the risk of weight gain is very likely, leading to many metabolic disorders. With regular exercise, not only immunity and physical well-being are achieved, but mental health is also positively affected, reducing anxiety and psychological distress.\textsuperscript{7}

Despite its benefit to enhancing the human immune system, physical exercise can lead to positive and negative effects, depending on the duration and intensity of activity. Immunomodulation induced by low to moderate exercise might boost immune responses. However, extreme exercises may harm the immune system, lowering immune response, thus resulting in a higher risk of illness. Therefore, the most important thing to do the physical exercise is consistency, not intensity.\textsuperscript{7} During the pandemic, physical exercise is challenging due to lack of space and the closure of fitness centers so that home workouts may become the option. We recommend simple home aerobic exercise with minimal equipment such as jogging, jump rope, jumping jacks to achieve adequate physical exercise. People with more tools and experience can perform intermediate and advanced exercises.

**Smoking**

Various respiratory tract diseases have been associated with smoking, as it impairs immune function.\textsuperscript{21} Previous studies showed that smoking increases the risk of getting tuberculosis twice, influenza five times higher, and several types of pneumonia three to fivefold higher than in non-smokers. Smokers also have a higher risk of developing severe COVID-19 than non-smokers.\textsuperscript{7} Angiotensin-converting enzyme 2 (ACE2) plays an important role, as it is necessary for host cell entry and subsequent viral replication.\textsuperscript{22} It has been reported that current smokers' ACE2 gene expression in the airway is higher.\textsuperscript{7} Therefore, smoking is strongly not advised.

**Screen time and sleep patterns**

One of the COVID-19 major effects is sleep pattern adjustment. People usually do their daily activities outside before coming
back home feeling tired. This lockdown forces communities to apply work and school from home policies, which forbid people to go out, resulting in a lack of physical activity. People feel not as tired as before, so the need for evening rest is not as much.\textsuperscript{7} Aside from lack of physical activity, it may also be associated with increased screen time. Electronic devices produce short wavelength-enriched light, which may impact sleep. Excessive exposure to artificial light in the evening suppresses melatonin levels, alters circadian rhythm, and impairs sleep patterns.\textsuperscript{23} Lack of sleep can also elevate the risk of cardiovascular diseases.\textsuperscript{24}

The human immune system is associated with sleep patterns as one of the pivotal factors. Sleep pattern affects the adaptive and innate immune systems. Longer sleep duration is linked positively with lower infection risk, poor outcome, and optimized immunization responses.\textsuperscript{25} Previous studies have shown that insufficient sleep decreases antibody titers after influenza vaccination.\textsuperscript{7} Hence, regular sleep patterns may strengthen our immune system, making it less susceptible to COVID-19 infection.

### Change of lifestyle and its psychological effect

Abrupt changes and new policies forced humans to adjust to a new lifestyle. Lockdown was applied everywhere, work and school were done from home, mass events were forbidden, limiting social interactions. Some people could handle it well, but plenty of them are struggling, which leads to mental stress, such as depression and anxiety.\textsuperscript{26} Physical inactivity, smoking, and alcohol consumption affect the physical condition and worsen psychological state.\textsuperscript{6} Previous studies also showed that increased screen time is negatively associated with mental health outcome.\textsuperscript{27}

Environmental exposures also affect mental health well-being. Outdoor spaces and green sceneries have a positive psychological effect, relaxing one's mind.\textsuperscript{28} This could barely be afforded these days and may worsen mental health during COVID-19. Patients who live in smaller rooms and have poor quality surroundings tend to have more severe depressive symptoms.\textsuperscript{26} Recent studies also stated that the psychological defense mechanism during a pandemic might result in further mental instability, such as depression, anxiety, insomnia, anger management, and post-traumatic stress disorder (PTSD).\textsuperscript{6}

### Role of healthcare worker

Patients trust the advice given by doctors, especially their personal doctors. This can be the basis that health promotion plays an important role. Doctors must educate on a healthy diet, exercise, and sleep patterns to help patients achieve maximum quality of life. This also applies especially to people with pre-existing comorbidities. People with comorbidities need to pay more attention to their health issues. Many diseases are neglected because of delayed routine control to healthcare facilities, fear of going to the hospital in emergencies, inability to self-monitor such as blood glucose level or blood pressure, or running out of daily medication. At the same time, the worsening of comorbidities may increase the risk of COVID-19 infection and poor outcomes. As healthcare workers, we may educate our patients on maintaining and controlling their comorbidities without damaging themselves. If it is not possible to do it directly, telemedicine consultation may become the alternative. In addition, the health worker may provide education to the community through writings and videos published on social media and send positive vibes by sorting out information related to COVID-19.

### Vaccination situation

Many efforts have been made to overcome the COVID-19 pandemic, one of which is the development of vaccines.\textsuperscript{29} Although the prevention of COVID-19 by using masks and physical distancing has proven to be effective in suppressing the spread of the virus, and long-term control still requires vaccines.\textsuperscript{8} The development of different types of vaccines may be the key to minimizing new infections.\textsuperscript{30} Reduced disease transmission in vaccinated individuals,
suggestion that vaccination can achieve immunity. Therefore, it is essential to vaccinate healthcare workers and other people at risk of infection to limit disease transmission. Vaccines are one of the greatest medical innovations of all time, significantly reducing disease incidence. Herd immunity to COVID-19 can be achieved with 60 – 80% minimum vaccination coverage. On the other hand, there is also skepticism about vaccines. Many people reject vaccines, even against their use. This phenomenon is a significant problem because high levels of doubt about vaccines reduce vaccination coverage and cause outbreaks of infectious diseases.

**Vaccine Hesitancy**

World Health Organization (WHO) defines vaccine hesitancy as a behavior influenced by various factors: confidence, complacency, and convenience. Confidence is the belief that believes that the vaccine given is effective and safe, including individual trust in government policies in making vaccination guidelines. Complacency is the notion that the vaccine has value, i.e., whether the vaccine is needed. Convenience is defined as the quality of service and the extent to which vaccination is considered affordable. Individuals with vaccine hesitancy may receive all vaccines but remain cautious, reject certain vaccines, or reject all types of vaccines. Vaccine hesitancy may be based on political, cultural, and emotional interests that are difficult to deal with. Individuals in this group, known as the anti-vaccine group, provide misinformation regarding vaccines. For example, the vaccine's side effects are worse than the disease it prevents. The vaccine causes disease in healthy people, vaccine obligations violate religious freedom or belief, and doctors have a conflict of interest.

Previous studies examining the acceptance of COVID-19 vaccination in several countries showed variations. China is the country with the highest acceptance (88.6%), followed by Brazil (85.3%), South Africa (81.5%). The countries with the lowest acceptance were Russia (54.8%), followed by Poland (56.3%), and France (58.8%). Unemployed and low socioeconomic individuals have lower vaccination coverage. In addition, parents with low education were predictors of vaccine refusal. On the other hand, parents with high education can think critically based on available information. Lower age is associated with unwillingness to receive vaccinations. This can be partly explained because most young people are healthy, and most manifestations of COVID-19 are usually asymptomatic or have mild symptoms. This also has a significant impact on the spread of COVID-19. Perception of risk is an important factor influencing behavior. Individuals with low-risk perceptions tend to engage in risky behavior and ignore prevention protocols.

The Indonesian Ministry of Health, in collaboration with WHO, NITAG, and UNICEF, held a COVID-19 Acceptance Survey in Indonesia in late 2020. More than 115,000 respondents from all 34 provinces completed the survey. According to the survey, 65% of the respondents would accept the COVID-19 vaccination provided by the government, and about 8% would strongly refuse. The remaining 27% of the respondents were crucial, as they were hesitant to get the vaccine. The level of hesitancy decrease as economic status increases. Levels of knowledge towards vaccination were linked to poor economic status. This may be due to limited access to COVID-19 and vaccination information in low-income level sections. Higher educational level linked positively to vaccination acceptance. Respondents who had previous COVID-19 infection or their circle contracted COVID-19 were more willing to accept the vaccine.

Various reasons lie behind the hesitancy. The most common reasons are unsure of the vaccine's safety (30%) and effectiveness (22%). In addition, people were worried about the side effects after being vaccinated, such as fever and pain. Religious beliefs are strongly associated with vaccination. In Indonesia, the majority are Muslim, in which they are wondering whether the vaccine is halal or not. This could lead to
hesitancy.\textsuperscript{37,38,40} Few people also believe conspiracy theories, such as COVID-19, are biological weapons, unreal, manufactured by man, government's plan, and false rumors about vaccination such as microchip insertion.\textsuperscript{38} The type of vaccines also plays a big role. A study with 1.359 respondents in Indonesia found that 93.3\% respondents would accept vaccination for a 95\% effective vaccine but decrease significantly to 67\% when being asked for a 50\% effective vaccine.\textsuperscript{41}

In a survey in the United States of people with doubts about the COVID-19 vaccine, 48\% of respondents said they were willing to be vaccinated if the vaccine was proven safe. The vaccine's efficacy will be proven as more people get vaccinated, with decreased number of cases globally.\textsuperscript{10} Perceptions of vaccine effectiveness are often based on misunderstandings about how, for whom, and how long vaccines work. To clarify the myths and conspiracies of COVID-19 with vaccination, educational intervention should be done. According to previous studies, social media is the best instrument to educate. People tend to engage more in that platform, followed by electronic or mass media and government official websites.\textsuperscript{37,39,40} Interventions aimed at increasing knowledge, awareness, and confidence should be balanced with efforts to increase the ease of and access to vaccines, especially in high-risk and rural populations.\textsuperscript{10}

\textbf{Healthcare intervention on vaccination}

A previous survey conducted during the COVID-19 pandemic showed that people commonly made their doctor the most trusted source of vaccine information.\textsuperscript{10} An Indonesian survey also stated that more than 50\% of respondents also trust the health professionals and health workers as the guidance on whether to accept a COVID-19 vaccination.\textsuperscript{37} This shows that health workers, especially doctors, must educate the public about the importance of vaccination. In addition, it is important to provide transparent information about what is and is not known about COVID-19 and its vaccination, including the possible fatal side effects, and also bust the false rumors. It is equally important to show the data that the benefits of the COVID-19 vaccine far outweigh the potential risks. Given the importance of vaccines in tackling the pandemic, effective and sustainable intervention methods are needed to educate the public to understand the benefits of COVID-19 vaccination.

\textbf{CONCLUSION}

During this COVID-19 pandemic, implementing a new healthy lifestyle is essential. Aside from a healthy lifestyle, maintaining comorbidities such as self-monitoring check-ups, consuming daily medication regularly, and knowing what to do when an emergency occurs is also needed. Another effort to prevent rapid escalation of infection is vaccination. Unfortunately, there are still hesitant to get the vaccination, even some refuse. Community-based education should be conducted transparently, especially regarding the risks and benefits of vaccines. Herd immunity may be achieved with increasing coverage of COVID-19 vaccinations, and the pandemic will be over soon.

\textbf{CONFLICT OF INTEREST}

The authors declare that there is no conflict of interest regarding the publication of this article.

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