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Abstract

BACKGROUND: Since early 2020, the global community has been battling a pandemic caused by coronavirus disease, known as COVID-19. In response to the pandemic, preventive behaviors have been widely applied regardless of the sociocultural, economic and educational status of individuals. However, studies related to its implementation have not been completely reviewed to identify the implementation as well as the determining factors for COVID-19 preventive behaviors.

AIM: This review aimed to synthesize evidence from existing studies about the implementation of COVID-19 preventive behaviors, its determinants, and its measurement tools

METHODS: This study employed a scoping approach using five electronic databases (Scopus, ScienceDirect, SAGE Journals, ProQuest, and EBSCOhost). The screening is guided by a PRISMA flowchart.

RESULTS: Around 27 articles were included in this review with 26 of 27 selected articles incorporating cross-sectional research design and only a study using a three-wave prospective correlational design. Four sub-themes were identified to describe the preventive behaviors implementation, namely: (1) Personal preventive measures, (2) community preventive measures, (3) health status factors, and (4) enabling factors.

CONCLUSION: The aspects of COVID-19 preventive behavior implementation include personal and community preventive measures, immune boosting, and self-screening/medication. These measures are affected by multifactorial. Further research needs to be focused on intervention development to improve the adherence of the preventive measures by considering reported determinants factors.

Introduction

Since early 2020, the global community has been battling a pandemic caused by coronavirus disease, known as COVID-19. This disease, which affects both the adult population and the respiratory system of children, has become widespread in countries [1]. With respect to this situation, the World Health Organization (WHO) has declared the SARS-CoV-2 epidemic a global public health emergency since March 2020. The WHO reported that there were 260,493,573 confirmed cases, with more than 5 million deaths by November 28, 2021 [2].

The COVID-19 pandemic is resulting in enormous drawbacks as the number of morbidity and mortality has surged since the pandemic hit the global community hard. Saladino et al. [3] strongly revealed that psychological and social issues have significantly occurred amidst the pandemic. What is more, people experience the feeling of being separated from relatives and helplessness, loss of freedom, and uncertainties related to disease development [4], [5].

Preventive behaviors which can reduce the transmission of COVID-19 play an important role amidst the pandemic. Disease prevention behavior is a reaction to prevent the onset of the disease [6]. The COVID-19 preventive behavior is defined as measures to suppress the transmission of COVID-19. Several measures recommended by the government, such as social/physical distancing, self-isolation and quarantine, lockdown, and other measures have been performed as mass prevention strategies. These strategies are conducted in order to stop the infection-related pandemic [7]. According to CDC [8] and WHO [9], the COVID-19 preventive behavior comprises avoiding to touch eyes, nose, and mouth, washing hand with soap and water or alcohol-based liquid regularly, performing cough etiquette or respiratory hygiene, social or physical distancing, self-isolating if feeling ill, avoiding crowds, and maintaining distance from people who are sick. Other related behaviors to prevent COVID-19 transmission include consuming nutritious food, exercising regularly, and receiving COVID-19 immunizations [10].

Preventing the transmission of COVID-19 requires compliance with preventive behavior by local
governments and the local community as the virus is easily transmitted in humans. This virus is transmitted by droplets from the nose and mouth of patients, through contact, fomite and fecal-oral contact [11], [12]. Therefore, the COVID-19 preventive behavior cannot be conducted without active participation of society [13]. Each community member has to regularly perform the COVID-19 preventive behavior to control the virus spreading amidst the pandemic.

The implementation of behavior is influenced by several factors, according to LaMorte [14] is effectively performed if obstacles, benefits, threats, the willingness to act as well as self-efficacy is acknowledged by people. This is explained that individuals will take preventive action when one is aware of the susceptibility of a certain situation (perceived susceptibility), perception of the worst condition might happen (perceived severity), the understandings of loss reduction (perceived benefit), and perception of negative effect related to health (perceived barriers) [15]. Therefore, an evaluation to assess the COVID-19 preventive behavior is essentially needed as a component in monitoring and developing an intervention based on community needs.

Since the start of the global COVID-19 pandemic in 2019, preventive behaviors have been widely applied regardless of the sociocultural, economic, and educational status of individuals. However, studies related to its implementation have not been completely reviewed to identify the behavior that is obedient as well as the determining factors for its implementation. According to this emerging situation, authors are intrigued to explore the implementation behavior of COVID-19 prevention among people across countries.

Methods

As the topic of COVID-19 preventive behaviors has not been comprehensively reviewed, this study employed a scoping approach to synthesize evidence from existing studies about the implementation of COVID-19 preventive behaviors, its determinants, and its measurement tools following the guidelines by a: (1) Formulation of the research question(s), (2) identification of relevant studies, (3) study selection, (4) charting the data, and (5) collating, summarizing, and reporting the results. To assess the methodological quality of selected studies and to determine the extent to which selected studies have addressed the possibility of bias, critical appraisal was performed individually by four authors using Joanna Briggs Institute Critical appraisal tools [16].

Research questions

This scoping review determined three research questions. These research questions were: (1) “How was COVID-19 preventive behaviors described?” (2) “What are the determinants of COVID-19 preventive behaviors?” and (3) “What are the measurement tools of COVID-19 preventive behaviors?”

Search methods

Five electronic databases (Scopus, ScienceDirect, SAGE Journals, ProQuest, and EBSCoHost) had been searched to retrieve relevant studies. Keywords of (adult OR family OR “informal caregiver”) AND (“preventive behavior” OR “preventive behavior” OR prevention OR “preventive practice” AND (pandemic OR covid-19) were applied to identify studies published between January 2019 and August 2021 with free full-text availability in English.

Eligibility criteria

Studies were included if those were original studies employing quantitative, qualitative, or theoretical design; involving adults or family members older than 18 years of age only who performed COVID-19 preventive behaviors; and published in peer-reviewed journals. Studies were excluded if preventive behaviors were described in a general context (not related to COVID-19 pandemic) and no description of socio-demographic characteristics of participants.

Screening

There were 875 studies identified, of which 120 studies were duplicates. Two authors (LL and ADMP) then independently screened 755 studies by title and abstract. After screening by title and abstract, the full texts of 39 studies were assessed for eligibility. After screening the full text, 27 studies were found to meet the objectives of this scoping review.

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**Data extraction**

Data extraction was conducted by four authors in an Excel spreadsheet to identify the following information from selected studies such as author, publication date (year), country, participants, design, determinants factors to COVID-19 preventive measures, implementation of COVID-19 preventive measures, and instrument used. A data charting table was created to identify themes from study findings which correspond to research objectives and questions [17].

**Data analysis**

Data analysis was performed by four authors who summarized the major findings from selected studies to draw themes and subthemes independently [17]. The authors then merged the data analysis and performed joint analysis to determine the sub-themes of research questions.

**Results**

After following the article screening guideline, 27 articles were included in this review article. Almost half of the selected studies were conducted in Asian countries: Iran (3 studies), Saudi Arabia (3 studies), one study in Taiwan, Vietnam, Malaysia, Korea, and Hong Kong, followed by African countries with Egypt (3 studies), Ethiopia (2 studies), one study from Cameroon, Malawi, and Kenya. The remaining studies were from European countries with one study each: Germany, Slovenia, and Hungary. Furthermore, two studies from the USA, one study from Brazil and Mexico can be seen in Table 1. In addition, 26 of 27 selected articles used cross-sectional research design and only a study using a three-wave prospective correlational design. Furthermore, Table 1 also presents the summary of every selected study including determinant factors and the implementation of COVID-19 preventive measures.

Turning to the analytical and synthesis findings of the selected articles, this review deduced two main themes, namely implementation and determinant factors of COVID-19 preventive behaviors. Moreover, four sub-themes were identified to describe the preventive behaviors implementation as seen in Table 2, namely: (1) Personal preventive measures, (2) community preventive measures, (3) immune boosting, and (4) self-screening and medication. In addition, (1) socio-demographic factors, (2) social psychological factors, (3) health status factors, and (4) enabling factors were obtained as the sub-themes of determinant factors of COVID-19 preventive measures as seen in Table 3.

**Implementation of preventive measures**

Most of the authors of the selected studies used self-developed questionnaires to identify the implementation of COVID-19 preventive behaviors. All instruments were developed from literature or previous study and/or combining with the WHO guidelines [18, 19, 20, 21, 22, 23, 25, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42] except Yehualashet et al. [26], wearing face masks [13, 19, 21, 22, 23, 24, 29, 30, 31, 34, 35, 36, 38, 39, 40, 41] except 4 studies [26, 33, 37, 42], cough/sneeze etiquette [13, 20, 22, 23, 24, 26, 29, 30, 32, 34, 36, 40, 41] except Faria de Moura Villela et al. [37], physical/social distancing [13, 21, 22, 23, 24, 29, 30, 31, 33, 34, 35, 37, 38, 40] except three studies [20, 26, 42], wearing hand sanitizer [13, 21, 23, 24, 31, 34, 36, 37, 38] except Gutu et al. [20] and Yehualashet et al. [26], avoid touch face [13, 23, 24, 29, 32, 34, 37, 38, 40, 41] except four studies [20, 26, 30, 42], avoid handshake [19, 20, 21, 29, 32, 38, 42] except Ali et al. [30], disinfect personal belongings [13, 29, 37] except 26, [34, 40], maintain ventilation [13, 29, 40], avoid contact with animals [29], and dispose used PPS in a hygienic manner [29]. On the other hand, regular body temperature [34, 37], wearing gloves when leaving home [19, 40, 42], separate use of clothing inside and outside home [40], and regular replacement of masks and gloves [40] were poorly adopted by respondents.

**Personal preventive measures**

Personal preventive measures which were well-practiced by most respondents in the selected studies are: regular handwashing [13, 19, 20, 21, 22, 23, 25, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42] except Yehualashet et al. [26], wearing face masks [13, 19, 21, 22, 23, 24, 29, 30, 31, 34, 35, 36, 38, 39, 40, 41] except 4 studies [26, 33, 37, 42], cough/sneeze etiquette [13, 20, 22, 23, 24, 26, 29, 30, 32, 34, 36, 40, 41] except Faria de Moura Villela et al. [37], physical/social distancing [13, 21, 22, 23, 24, 29, 30, 31, 33, 34, 35, 37, 38, 40] except three studies [20, 26, 42], using hand sanitizer [13, 21, 23, 24, 31, 34, 36, 37, 38] except Gutu et al. [20] and Yehualashet et al. [26], avoid touch face [13, 23, 24, 29, 32, 34, 37, 38, 40, 41] except four studies [20, 26, 30, 42], avoid handshake [19, 20, 21, 29, 32, 38, 42] except Ali et al. [30], disinfect personal belongings [13, 29, 37] except 26, [34, 40], maintain ventilation [13, 29, 40], avoid contact with animals [29], and dispose used PPS in a hygienic manner [29]. On the other hand, regular body temperature [34, 37], wearing gloves when leaving home [19, 40, 42], separate use of clothing inside and outside home [40], and regular replacement of masks and gloves [40] were poorly adopted by respondents.

**Community preventive measures**

Community preventive measures which were well-performed by respondents are reported as follows: avoid crowded place/public spaces [13, 21, 22, 24, 25, 29, 30, 33, 34, 35, 36, 38, 39, 40, 41] except two studies [36, 40], avoid meetings [13, 21, 33, 34, 38, 40, 42] except one study [31], staying at home [13, 21, 22, 23, 24, 29, 30, 32, 36, 38, 41, 42] except three studies [26, 33, 35], avoid public transportation [21, 34, 36, 38, 42], avoid contact with infected/vulnerable person [21, 30, 36, 41, 42] except one study [40], avoid travelling [13, 20, 21, 22, 23, 24, 26, 29, 30, 32, 34, 36, 40, 41] except Yehualashet et al. [26], wearing face masks [13, 19, 21, 22, 23, 24, 29, 30, 31, 34, 35, 37, 38, 39, 40, 41] except 4 studies [26, 33, 37, 42], cough/sneeze etiquette [13, 20, 22, 23, 24, 26, 29, 30, 32, 34, 36, 40, 41] except Faria de Moura Villela et al. [37], physical/social distancing [13, 21, 22, 23, 24, 29, 30, 31, 33, 34, 35, 37, 38, 40] except three studies [20, 26, 42], using hand sanitizer [13, 21, 23, 24, 31, 34, 36, 37, 38] except Gutu et al. [20] and Yehualashet et al. [26], avoid touch face [13, 23, 24, 29, 32, 34, 37, 38, 40, 41] except four studies [20, 26, 30, 42], avoid handshake [19, 20, 21, 29, 32, 38, 42] except Ali et al. [30], disinfect personal belongings [13, 29, 37] except 26, [34, 40], maintain ventilation [13, 29, 40], avoid contact with animals [29], and dispose used PPS in a hygienic manner [29]. On the other hand, regular body temperature [34, 37], wearing gloves when leaving home [19, 40, 42], separate use of clothing inside and outside home [40], and regular replacement of masks and gloves [40] were poorly adopted by respondents.

Turning to the analytical and synthesis findings of the selected articles, this review deduced two main themes, namely implementation and determinant factors of COVID-19 preventive behaviors. Moreover, four sub-themes were identified to describe the preventive behaviors implementation as seen in Table 2, namely: (1) Personal preventive measures, (2) community preventive measures, (3) immune boosting, and (4) self-screening and medication. In addition, (1) socio-demographic factors, (2) social psychological factors, (3) health status factors, and (4) enabling factors were obtained as the sub-themes of determinant factors of COVID-19 preventive measures as seen in Table 3.
Table 1: Summary of selected studies

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<tr>
<td>Lin et al., 2020</td>
<td>1563 Iranian adults aged 18 years and older</td>
<td>Three-wave prospective correlational</td>
<td>Intention, coping planning, action planning, maintenance, self-efficacy, perceived behavioral control</td>
<td>N/I</td>
<td>A self-developed questionnaire, based on four preventive behaviors recommended by the WHO. This questionnaire has a Cronbach alpha of 0.80. Self-developed instruments adopted from previous literature. This specific questionnaire measuring the preventive behavior has Cronbach alpha of 0.721. Self-developed instrument. There is no clear information on the validity or reliability of the questionnaire.</td>
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<tr>
<td>Lin and Chen, 2021</td>
<td>1012 LINE users in Taiwan</td>
<td>Cross-sectional</td>
<td>Fear arousal, age, gender</td>
<td>N/I</td>
<td>Self-developed questionnaire to measure precautionary and cautious behaviors of COVID-19. There is no information about the CVI score, but it is mentioned in the questionnaire reviewed by experts. The Cronbach alpha of the questionnaire is 0.91. Self-developed questionnaire. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
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<tr>
<td>Lüdecke and von Kneasebach, 2020</td>
<td>3186 Germans aged 18 years and older</td>
<td>Cross-sectional</td>
<td>Education level and gender</td>
<td>Majority of respondents obeyed to perform handwashing, avoid crowded places, reduce meetings, do physical distancing, and use disinfectant. While they did not regularly practice to adapt school or work situation, stay at home, and wear face masks</td>
<td>Self-developed questionnaire measuring the preventive behavior has Cronbach alpha of 0.721. Self-developed instrument. There is no clear information on the validity or reliability of the questionnaire.</td>
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<tr>
<td>Mirzaei et al., 2021</td>
<td>558 Iranian adults (18 years or older) from 24 provinces across the country</td>
<td>Cross-sectional</td>
<td>Perceived benefit, perceived barriers, self-efficacy</td>
<td>N/I</td>
<td>Self-developed questionnaire to measure precautionary and cautious behaviors of COVID-19. There is no information about the CVI score, but it is mentioned in the questionnaire reviewed by experts. The Cronbach alpha of the questionnaire is 0.91. Self-developed questionnaire. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
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<td>Nguyen et al., 2020</td>
<td>2175 Vietnamese citizens (18 years or older)</td>
<td>Cross-sectional</td>
<td>Perceived adaptation of the community to lockdown, fear, residing in large cities, access to official COVID-19 information, working in healthcare/medical student</td>
<td>Physical distancing, wearing face masks, covering mouth and nose while coughing/sneezing, washing hands immediately, and using hand sanitizer regularly were the personal preventive measures often practiced by respondents. Turning to community measures, avoid meetings, avoid public crowded spaces, avoid social events, avoid public transportation, avoid using utensils with strangers, and not travelling were the obeyed measures.</td>
<td>Social distancing, washing hands and using sanitizers, wearing masks, and taking vitamin C and fruits were the most common preventive behaviors by respondents. Whereas total confinement, using traditional medicine, taking self-medication were the low frequency behavior by respondents. 14 of 18 preventive measures showed a good adherence. While only 4 behaviors were poorly performed</td>
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<tr>
<td>Ngewondo et al., 2020</td>
<td>1006 Cameroonian residents (18 years or older)</td>
<td>Cross-sectional</td>
<td>Age and women</td>
<td>Social distancing, washing hands and using sanitizers, wearing masks, and taking vitamin C and fruits were the most common preventive behaviors by respondents. Whereas total confinement, using traditional medicine, taking self-medication were the low frequency behavior by respondents. 14 of 18 preventive measures showed a good adherence. While only 4 behaviors were poorly performed</td>
<td>Self-developed 32-item instrument consisting of demographics, knowledge, attitudes, practices, and symptomatology was developed. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
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<tr>
<td>Nourmoradi et al., 2020</td>
<td>558 Iranian people (18 years or older)</td>
<td>Cross-sectional</td>
<td>Access to personal protective equipment and psychological effects of COVID-19</td>
<td>14 of 18 preventive measures showed a good adherence. While only 4 behaviors were poorly performed</td>
<td>Self-developed 50-item instruments consisting of demographics, knowledge, attitudes, practices, and fear was developed. The Cronbach alpha of the questionnaire is 0.92. A self-developed online survey questionnaire consists of four sections of the questionnaire. The reliability test was using a test retest resulting in Cronbach alpha of 0.72. Self-administered web-based questionnaire (web hosted on SURVS with full General Data Protection Regulation coverage. The survey was originally designed for the COVID-19 outbreak in Hong Kong (Koek et al., 2020). An online questionnaire available on Microsoft Forms was distributed via social media and Whatsapp group. It was developed by researchers based on a review of the literature, CDC and the Saudi MoH guidelines. Self-developed online questionnaire including preventive behavior, perceived behavioral control, attitudes towards behavior, perceived subjective norm based on recommendations on sickness prevention published by the CDC. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
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<td>Ali et al., 2021</td>
<td>731 adult Egyptian community (18 year old)</td>
<td>Cross-sectional</td>
<td>Younger age, higher education, female, discomfort when wearing masks, forget and not accustomed to wear mask, lack of governmental push, financial barriers, and unavailability of mask and sanitizer</td>
<td>Staying at home, covering the mouth and nose while sneezing, wearing masks, social distancing, handwashing self-isolation when contacting an infected person, avoiding parties, and disinfecting surroundings were regularly practiced measures.</td>
<td>Self-administered web-based questionnaire (web hosted on SURVS with full General Data Protection Regulation coverage. The survey was originally designed for the COVID-19 outbreak in Hong Kong (Koek et al., 2020). An online questionnaire available on Microsoft Forms was distributed via social media and Whatsapp group. It was developed by researchers based on a review of the literature, CDC and the Saudi MoH guidelines. Self-developed online questionnaire including preventive behavior, perceived behavioral control, attitudes towards behavior, perceived subjective norm based on recommendations on sickness prevention published by the CDC. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
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<td>Alkhaldi et al., 2021</td>
<td>2303 Saudi Arabian respondents (18 year old and above)</td>
<td>Cross-sectional</td>
<td>Lowest income</td>
<td>There were 18 preventive measures abided by respondents with more than 80% of them practicing these measures.</td>
<td>Self-administered web-based questionnaire (web hosted on SURVS with full General Data Protection Regulation coverage. The survey was originally designed for the COVID-19 outbreak in Hong Kong (Koek et al., 2020). An online questionnaire available on Microsoft Forms was distributed via social media and Whatsapp group. It was developed by researchers based on a review of the literature, CDC and the Saudi MoH guidelines. Self-developed online questionnaire including preventive behavior, perceived behavioral control, attitudes towards behavior, perceived subjective norm based on recommendations on sickness prevention published by the CDC. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
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<td>Almoayad et al., 2021</td>
<td>847 residents of Riyadh city who were over 18 years of age</td>
<td>Cross-sectional</td>
<td>Elderly, female, healthcare practitioners</td>
<td>Avoid crowded places, wear masks, keeping distance, regular handwashing, cough etiquette, sanitize surfaces and equipment, and home quarantine were all obeyed by respondents.</td>
<td>An online questionnaire available on Microsoft Forms was distributed via social media and Whatsapp group. It was developed by researchers based on a review of the literature, CDC and the Saudi MoH guidelines. Self-developed online questionnaire including preventive behavior, perceived behavioral control, attitudes towards behavior, perceived subjective norm based on recommendations on sickness prevention published by the CDC. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
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<td>Aschwanden et al., 2021</td>
<td>2256 participants from every US state and Washington as well as Puerto Rico, age range 18-88 year old</td>
<td>Cross-sectional</td>
<td>Older adult</td>
<td>Eight of nine preventive behaviors toward COVID-19 were regularly performed by respondents in this study with more than 70% of them.</td>
<td>Self-developed online questionnaire including preventive behavior, perceived behavioral control, attitudes towards behavior, perceived subjective norm based on recommendations on sickness prevention published by the CDC. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
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<tr>
<td>Bachok et al., 2021</td>
<td>1290 participants from 14 Malaysian states</td>
<td>Cross-sectional</td>
<td>Ethnicity and marital status</td>
<td>All ten preventive measures were complied by respondents in this study with more than 60% in each measure.</td>
<td>A self-developed questionnaire was designed to record all of the information, based on the literature and previous research of the H1N1 influenza epidemic in 2010, which had been validated. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
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Table 1: (Continued)

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<td>Banda et al., 2021 Malawi</td>
<td>619 respondents of Malawi resident</td>
<td>Cross-sectional</td>
<td>Nil</td>
<td>Only handwashing and avoiding crowds were well-adopted by both respondents in rural and urban areas.</td>
<td>A self developed questionnaire administered by phone interviews. Questionnaires were adapted from instruments used in previous study and HIV-related surveys. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
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<td>Barakat and Kaserny, 2020 Egypt</td>
<td>182 Egyptians</td>
<td>Cross-sectional</td>
<td>age, high education, healthcare worker, perceived susceptibility, perceived benefit, perceived barriers, and ability to follow the preventive measures against the disease</td>
<td>All 8 preventive behaviors were well-performed by respondents over the three periods of time.</td>
<td>A self developed online self-reported questionnaire that was created according to the Saudi MOH and WHO guidelines to measure the knowledge and commitment of the Saudi public. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
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<tr>
<td>Bazaid et al., 2020 Saudi Arabia</td>
<td>5105 Saudi residents aged 18 years and older</td>
<td>Cross-sectional</td>
<td>Female, high socioeconomic status, high level of education, youth, resident of the northern part of the KSA</td>
<td>Avoid handshaking, practicing handwashing, and wearing face masks were the most common practices by respondents.</td>
<td>A self developed online self-reported questionnaire that was created according to the Saudi MOH and WHO guidelines to measure the knowledge and commitment of the Saudi public. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
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<td>Glutu et al., 2021 Ethiopia</td>
<td>634 adults from urban in Ethiopia (aged 18 and older)</td>
<td>A community based Cross sectional</td>
<td>Knowledge about COVID-19, urban and rural areas, and social media use</td>
<td>Avoid contact greetings, cook meat and eggs before eating, and regular hand washing were the most often preventive behavior adoptions conducted by respondents. However, other measures were poorly performed.</td>
<td>A self developed online questionnaire survey. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
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<td>Faria de Moura Villela et al., 2021 Brazil</td>
<td>23,896 adults (18 and older) living in Brazil</td>
<td>Survey Study</td>
<td>Younger people, male, living in rural area, student, and workers</td>
<td>This study only assessed 3 preventive practices, they were wearing face masks, practicing hand hygiene, and avoiding crowded places, all of which were well-performed by the respondents.</td>
<td>An online questionnaire including a set of 40 questions were adopted from previous COVID-19 related studies in Kenya. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
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<tr>
<td>Karpi, 2021 Kenya</td>
<td>2156 youth (aged 18-35) in Kenya</td>
<td>Cross-sectional</td>
<td>Nil</td>
<td>Respondents adopted almost all preventive measures regularly, however, only 45.7% of them were keen to voluntarily test themselves to know their COVID-19 status.</td>
<td>A self developed questionnaire that was designed based on previous studies on SARS and COVID-19. The most important questions were those measuring the preventive behaviors recommended by the government, the WHO, and other scientific organizations. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
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<tr>
<td>Kim and Kim, 2020 Korea</td>
<td>1525 Korean’s general population aged 18 years and older</td>
<td>Cross-sectional</td>
<td>Women, age, number of elderly in family, perceived severity, perceived benefit, self-efficacy, good family health, media exposure, knowledge, personal health status, and social support</td>
<td>Respondents of the study well-complied with all 19 preventive measures assessed in this study.</td>
<td>A self developed questionnaire measuring precautionary behavior practices that covered the following two categories: preventive measures and social distancing. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
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<tr>
<td>Lee et al., 2021 Korea</td>
<td>970 Korean aged 18 years or older</td>
<td>Cross-sectional</td>
<td>knowledge, efficacy belief, lack of access to healthcare, and pre-existing health condition</td>
<td>This study only assessed 3 preventive practices, they were wearing face masks, practicing hand hygiene, and avoiding crowded places, all of which were well-performed by the respondents.</td>
<td>A self developed questionnaire that was designed based on previous studies on SARS and COVID-19. The most important questions were those measuring the preventive behaviors recommended by the government, the WHO, and other scientific organizations. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
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<td>Quandt et al., 2020 The United States of America</td>
<td>67 families with at least one farmworker (FWF) and 38 comparable families with no farmworkers (nonFWF) in North Carolina</td>
<td>Cross-sectional</td>
<td>Nil</td>
<td>Avoiding travelling, handwashing, avoid eating outside of the house, staying at home when sick, avoiding close contact, avoiding crowds, and wearing face masks were the preventive measures which were well-practiced by both farmworkers and non-farmworkers.</td>
<td>A self developed questionnaire measuring precautionary behavior practices that covered the following two categories: preventive measures and social distancing. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
</tr>
<tr>
<td>Sánchez-Arenas et al., 2021 Mexico</td>
<td>1030 participants</td>
<td>Cross-sectional</td>
<td>female, older age, professional worker, homemaker, retiree, regular physical exercise, high health literacy, and access to COVID-19 information, perceived severity and perceived effectiveness</td>
<td>15 of 18 preventive behaviors were well-performed by the respondents.</td>
<td>A self developed questionnaire based on the World Health Organization (WHO) and the Mexican government’s recommendations on preventive measures of COVID-19. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
</tr>
<tr>
<td>Small et al., 2021 The United States of America</td>
<td>4445 respondents</td>
<td>Cross-sectional</td>
<td>age, gender, race, educational attainment, perceived risk of infection, perceived risk of death, and perceived effectiveness of vaccines</td>
<td>Nil</td>
<td>A self developed questionnaire that was designed based on previous studies on SARS and COVID-19. The most important questions were those measuring the preventive behaviors recommended by the government, the WHO, and other scientific organizations. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
</tr>
<tr>
<td>Turk et al., 2021 Slovenia</td>
<td>2467 participants</td>
<td>Cross-sectional</td>
<td>Gender, age, education level, settlement size, retired participant, and living with a vulnerable person</td>
<td>11 of 25 suggested behavior to prevent COVID-19 transmission were performed by more than 50% of respondents.</td>
<td>A self developed Questionnaire based on health guidelines related to COVID-19. There is no clear information regarding the expert review, validity, or reliability of the questionnaire.</td>
</tr>
</tbody>
</table>

(Contd...)
COVID-19 information sharing with

Determinant factors of COVID-19

Health status factors

Table 1: (Continued)

Social psychological factors

Self-developed questionnaire to measure preventive behaviors. There is no clear information regarding the expert review, validity, or reliability of the questionnaire. Self-developed questionnaire adopted from a WHO survey tool for COVID-19 (from HIV/AIDS). The questionnaire has a Cronbach alpha of 0.68.

The COVID-19 pandemic which has lasted for almost two years is an impactful health crisis for millions of people worldwide. Every country has put many efforts to improve the COVID-19 preventive behavior compliance to reduce the transmission of the virus. Health prevention behavior is a response to prevent diseases including activity undertaken by a person

Socio-demographic factors

There were 17 studies which found 15 factors to COVID-19 preventive measures according to socio-demographic characteristics. The most frequent reported factor by 13 authors was age [13], [19], [21], [22], [23], [27], [30], [32], [35], [37], [40], [42], [43], followed by gender which were presented in 12 studies [13], [19], [21], [22], [27], [30], [33], [35], [37], [40], [42], [43], education level [19], [30], [32], [33], [40], [43], occupation [20], [21], [31], [33], [36], marital status [24], ethnicity [24], [43], socioeconomic status [19], [30], [36], residential area [19], [20], [34], [37] and settlement size [40].

Self-screening and medications

Self-screening and medication behavior to prevent COVID-19 transmission were poorly practiced by respondents in all studies assessing these measures. Ngwevondo et al. reported a very few respondents took traditional medicine, chloroquine, and paracetamol/ibuprofen as preventive measures [35]. In addition, getting tested for COVID-19 [38] and assessing COVID-19 risk using government web applications [21] were still not popular among residents.

Determinant factors

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Immune boosting

With respect to immune boosting importance, there were five articles exploring this preventive behavior. Immune boosting measures are related to consuming diet and lifestyle modification to improve the immune system during the pandemic. Participants showed good preventive practices such as taking vitamins [13], [35], maintaining a healthy diet [13], and cooking meat and eggs [20]. One study enlists that smoking was still performed by the participants [29].

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Determinant factors

Social psychological factors

Six-related studies revealed that perceived severity was related to COVID-19 preventive behaviors [13], [21], [27], [29], [34], [43]. In addition, perceived barriers [26], [28], [30], [32], perceived benefits [13], [28], [32], [34], perceived susceptibility [26], [32], [43], self-efficacy and maintenance [13], [18], [21], [28], [39], [43] and knowledge about COVID-19 [13], [20], [31], [39] were also the determinant factors associated with preventive measures. What is more, Lin et al. presented that intention, coping planning, and action planning were the additional factors related to the preventive measures [18].

Health status factors

This review article found that health status is associated with the adherence of COVID-19 preventive behaviors. Three authors displayed family health status [13], [31], [40] and three authors presented personal health status [13], [21], [39] as the part of the determinant factors.

Enabling factors

Enabling factors is external stimulus influencing one’s preventive behavior. There are six factors associated with COVID-19 preventive measures as the element of enabling factors. These factors include lack of governmental push [30], media exposure [13], [20], access to information [31], [34], access to PPE [29], access to healthcare [39], and social support [13].

Discussion

The COVID-19 pandemic which has lasted for almost two years is an impactful health crisis for millions of people worldwide. Every country has put many efforts to improve the COVID-19 preventive behavior compliance to reduce the transmission of the virus. Health prevention behavior is a response to prevent diseases including activity undertaken by a person
who believes himself to be healthy for the purpose of preventing disease [44]. In terms of COVID-19 preventive behavior, the community is expected to abide by the international recommendations from WHO [45] such as washing your hands, wearing a face mask, and social distancing. The purpose of this review is to describe the implementation and the factors associated with COVID-19 preventive measures.

The results of the 27 selected studies show that there are four themes of COVID-19 preventive behavior implementation, namely personal preventive, community preventive, immune boosting, as well as self-screening and medication. The description of these behaviors was measured using various instruments. These instruments were developed by each author of the studies using previous literature/studies. Some authors referred to the WHO guidelines [18], [19], [20], [21], [22] and CDC guidelines [22], [23], H1N1 epidemic [24], HIV-related surveys [25], [26], SAR-related study [13], and each MOH guideline in each country [19], [20], [21], [22].

Table 2: The findings of COVID-19 preventive measures implementation

<table>
<thead>
<tr>
<th>Preventive Measures</th>
<th>Good Practice Findings</th>
<th>Poor Practice Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Preventive Measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular handwashing</td>
<td>Lüdecke and von dem Kneesebeck, 2020; Nguyen et al., 2020; Ngwewondo et al., 2020; Nourmoradi et al., 2020; Alkhaldi et al., 2021; Almoayad et al., 2021; Aschwanden et al., 2021; Banda et al., 2021; Barakat and Kasemny 2020; Bazzaid et al., 2020; Gutu et al., 2021; Faria de Moura Villela et al., 2021; Karjo 2021; Kim and Kim 2020; Lee et al., 2021; Quandt et al., 2020; Quandt et al., 2020; Sánchez-Arenas et al., 2021; Türk et al., 2021; Urbán et al., 2021; Wong et al., 2020</td>
<td>Lüdecke and von dem Kneesebeck, 2020; Faria de Moura Villela et al., 2021; Urban et al., 2021; Yehualashet et al., 2021</td>
</tr>
<tr>
<td>Wear face masks</td>
<td>Nguyen et al., 2020; Ngwewondo et al., 2020; Nourmoradi et al., 2020; Ali et al., 2021; Alkhaldi et al., 2021; Almoayad et al., 2021; Aschwanden et al., 2021; Bachok et al., 2021; Barakat and Kasemny 2020; Gutu et al., 2021; Kim and Kim 2020; Quandt et al., 2020; Sánchez-Arenas et al., 2021; Türk et al., 2021; Wong et al., 2020</td>
<td>Faria de Moura Villela et al., 2021</td>
</tr>
<tr>
<td>Cough/sneeze etiquette</td>
<td>Nguyen et al., 2020; Nourmoradi et al., 2020; Ali et al., 2021; Alkhaldi et al., 2021; Almoayad et al., 2021; Aschwanden et al., 2021; Bachok et al., 2021; Barakat and Kasemny 2020; Gutu et al., 2021; Lee et al., 2021; Quandt et al., 2020</td>
<td>Yehualashet et al., 2021</td>
</tr>
<tr>
<td>Physical/social distancing</td>
<td>Lüdecke and von dem Kneesebeck, 2020; Nguyen et al., 2020; Ngwewondo et al., 2020; Nourmoradi et al., 2020; Ali et al., 2021; Alkhaldi et al., 2021; Almoayad et al., 2021; Aschwanden et al., 2021; Bachok et al., 2021; Faria de Moura Villela et al., 2021; Karjo 2021; Kim and Kim 2020; Quandt et al., 2020; Türk et al., 2021; Yehualashet et al., 2021</td>
<td>Urban et al., 2021; Yehualashet et al., 2021</td>
</tr>
<tr>
<td>Use hand sanitizer</td>
<td>Nguyen et al., 2020; Alkhaldi et al., 2021; Aschwanden et al., 2021; Bachok et al., 2021; Faria de Moura Villela et al., 2021; Karjo 2021; Kim and Kim 2020; Sánchez-Arenas et al., 2021; Türk et al., 2021; Wong et al., 2020; Karjo 2021</td>
<td>Gutu et al., 2021; Yehualashet et al., 2021</td>
</tr>
<tr>
<td>Avoid touch face</td>
<td>Nguyen et al., 2020; Nourmoradi et al., 2020; Aschwanden et al., 2021; Bachok et al., 2021; Barakat and Kasemny 2020; Faria de Moura Villela et al., 2021; Karjo 2021; Kim and Kim 2020; Quandt et al., 2020; Türk et al., 2021</td>
<td>All et al., 2021; Gutu et al., 2021; Urban et al., 2021; Yehualashet et al., 2021</td>
</tr>
<tr>
<td>Avoid handshake</td>
<td>Nourmoradi et al., 2020; Barakat and Kasemny 2020; Bazzaid et al., 2020; Gutu et al., 2021;</td>
<td>All et al., 2021</td>
</tr>
<tr>
<td>Disinfect personal belongings</td>
<td>Nourmoradi et al., 2020; Faria de Moura Villela et al., 2021; Kim and Kim 2020</td>
<td>Nguyen et al., 2020; Türk et al., 2021; Yehualashet et al., 2021</td>
</tr>
<tr>
<td>Maintain ventilation</td>
<td>Nourmoradi et al., 2020; Kim and Kim 2020; Türk et al., 2021</td>
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<tr>
<td>Avoid contact with animals</td>
<td>Nourmoradi et al., 2020;</td>
<td></td>
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<tr>
<td>Dispose used PPE in a hygienic manner</td>
<td>Nourmoradi et al., 2020;</td>
<td></td>
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<tr>
<td>Avoid eating outside home</td>
<td>Lüdecke and von dem Kneesebeck, 2020; Nguyen et al., 2020; Gutu et al., 2020; Ngwewondo et al., 2020; Nourmoradi et al., 2020; Alkhaldi et al., 2021; Bachok et al., 2021; Banda et al., 2021; Karjo 2021; Kim and Kim 2020; Lee et al., 2021; Quandt et al., 2020; Sánchez-Arenas et al., 2021; Türk et al., 2021; Urban et al., 2021; Wong et al., 2020</td>
<td>Türk et al., 2021; Alkaldi et al., 2021</td>
</tr>
<tr>
<td>Avoid meeting</td>
<td>Lüdecke and von dem Kneesebeck, 2020; Nguyen et al., 2020; Karjo 2021; Kim and Kim 2020; Lee et al., 2021; Quandt et al., 2020; Sánchez-Arenas et al., 2021; Türk et al., 2021; Urban et al., 2021; Wong et al., 2020; Yehualashet et al., 2021</td>
<td>Türk et al., 2021; Alkhaldi et al., 2021</td>
</tr>
<tr>
<td>Stay at home</td>
<td>Nourmoradi et al., 2020; Alkhaldi et al., 2021; Almoayad et al., 2021; Aschwanden et al., 2021; Bachok et al., 2021; Barakat and Kasemny 2020; Karjo 2021; Kim and Kim 2020; Quandt et al., 2020; Sánchez-Arenas et al., 2021; Türk et al., 2021; Urban et al., 2021</td>
<td>Yehualashet et al., 2021</td>
</tr>
<tr>
<td>Avoid public transportation</td>
<td>Nguyen et al., 2020; Alkhaldi et al., 2021; Karjo 2021; Sánchez-Arenas et al., 2021; Türk et al., 2021; Urban et al., 2021</td>
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<tr>
<td>Avoid contact with infected/vulnerable person</td>
<td>Ali et al., 2021; Alkhaldi et al., 2021; Quandt et al., 2020; Sánchez-Arenas et al., 2021; Türk et al., 2021</td>
<td>Türk et al., 2021</td>
</tr>
<tr>
<td>Avoid travelling</td>
<td>Nguyen et al., 2020; Nourmoradi et al., 2020; Alkhaldi et al., 2021; Faria de Moura Villela et al., 2021; Karjo 2021; Kim and Kim 2020; Quandt et al., 2020</td>
<td>Gutu et al., 2021</td>
</tr>
<tr>
<td>Adapted school/work situation</td>
<td>Alkhaldi et al., 2021; Sánchez-Arenas et al., 2021</td>
<td>Lüdecke and von dem Kneesebeck, 2020</td>
</tr>
<tr>
<td>Avoid using common plates with strangers</td>
<td>Nguyen et al., 2020</td>
<td>Türk et al., 2021; Wong et al., 2020; Yehualashet et al., 2021</td>
</tr>
<tr>
<td>Disinfect surrounding</td>
<td>Lüdecke and von dem Kneesebeck, 2020; Nourmoradi et al., 2020; Alkhaldi et al., 2021; Almoayad et al., 2021; Aschwanden et al., 2021; Karjo 2021; Kim and Kim 2020; Quandt et al., 2020; Sánchez-Arenas et al., 2021;</td>
<td></td>
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<tr>
<td>Immunity boosting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taking vitamin</td>
<td>Ngwewondo et al., 2020; Kim and Kim 2020</td>
<td></td>
</tr>
<tr>
<td>Maintain healthy diet (Storing food</td>
<td>Gutu et al., 2021</td>
<td></td>
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<tr>
<td>Cook meat and eggs well before eating</td>
<td>Gutu et al., 2021</td>
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<tr>
<td>Avoid smoking</td>
<td></td>
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<tr>
<td>Self-screening and medications</td>
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<tr>
<td>Use of traditional concoctions</td>
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<tr>
<td>Taking chloroquine</td>
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<tr>
<td>Taking paracetamol/ibuprofen</td>
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<tr>
<td>Get tested for COVID-19</td>
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<tr>
<td>Assessing COVID-19 risk using government web application</td>
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</tbody>
</table>
immunity of individuals and promote a healthy lifestyle. The WHO [47] acknowledges the importance of preventive measures for COVID-19, stating that they are crucial for reducing the transmission of the virus and protecting individuals.

Conclusion

The aspects of COVID-19 preventive behavior implementation include personal and community preventive measures, immune boosting, and self-screening/medication. These measures are reported to be successful and effective. In addition, factors such as self-efficacy, personal health status, and social support are important in promoting preventive behaviors. Overall, the evidence supports the importance of preventive measures in managing the COVID-19 pandemic.
Further research needs to be focused on intervention development to improve the adherence of the preventive measures by considering reported determinants factors.

Authors’ Contribution

All authors contributed equally to conceptualization, methodology, article search, data analysis, and writing as well as editing of the manuscript.

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Preventive behavior of Vietnamese people in response to COVID-19 outbreak


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PMid:34084816


PMid:33261157


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