Hasyim, *et al. Kesmas: Jurnal Kesehatan Masyarakat Nasional (National Public Health Journal)*. 2022; 17 (Special Issue 1): 49-53
DOI: 10.21109/kesmas.v17i2.6052

Kesmas: Jurnal Kesehatan Masyarakat Nasional (National Public Health Journal)

Analysis of COVID-19 Preventive Behavior in Diabetes Mellitus Patients: A Literature Review

Hamzah Hasyim[1*], Giszka Putri[2], Patricia Dale[3]

[1]Department of Environmental Health, Faculty of Public Health, Universitas Sriwijaya, Palembang, Indonesia, [2]Department of Health of Palembang City, Palembang, Indonesia, [3]Center for Planetary Health and Food Security (CPHFS), School of Environment and Science, Griffith University, Queensland, Australia

Abstract

The Coronavirus Disease 2019 (COVID-19) is a new human-infected coronavirus causing respiratory problems. The COVID-19 can affect people of all ages, but those with a record of chronic disease (comorbidity) are at higher risk of poor outcomes with the COVID-19. This study aimed to review COVID-19 preventative behavior in diabetes patients. Diabetes Mellitus (DM) is one of the comorbidities that aggravates COVID-19 in patients. Such patients are at risk of deteriorating critical conditions in the intensive care units (ICUs) and even death. Prevention is the best measure to avoid COVID-19, although it is currently considered adequate. This article reviewed 22 papers focusing on COVID-19, DM, COVID-19 in DM patients, COVID-19 preventive behavior, and COVID-19 knowledge, attitude, and practice in patients with chronic disease, while primary focusing on DM. It is revealed that diabetes patients at high risk of COVID-19 need to practice good preventive behaviors. Furthermore, it emphasizes that improving knowledge, encouraging positive attitudes, and implementing good COVID-19 preventive behaviors in DM patients requires education and access to the COVID-19 related health information.

Keywords: attitude, COVID-19, diabetes mellitus, knowledge, preventive behavior

Introduction

The ongoing COVID-19 pandemic impacts the health sector and the world's socioeconomic system.[1] Based on World Health Organization (WHO) data, on June 9, 2022, there were 531,550,610 confirmed cases of COVID-19 and 6,302,982 deaths globally.[2] The Ministry of Health of the Republic of Indonesia verified that, on June 8, 2022, there were 6,058,180 confirmed cases of COVID-19, with 5,897,630 recovered and 156,628 deaths.[3]

Based on data from the Indonesian COVID-19 Handling Task Force data as of June 20, 2021, around 4,332 patients had comorbidities. Diabetes Mellitus (DM) is the second-highest comorbid disease by 36.5 %. Of the 4,322 COVID-19 patients with comorbidities who died, 9.7% were related to DM.[4] Thus, this study addresses the challenge of identifying issues related to COVID-19 and DM. To attain this end, data were obtained from reported research on COVID-19 pertaining to various countries.

Existing evidence suggested that elderly people with a record of chronic disease (comorbid) are at increased risk and experience worse complications.[5] Nearly 30% of COVID-19 deaths can be attributed to diabetes, hypertension, obesity, and smoking.[6] In Indonesia, three of most prevalent comorbidities in COVID-19 patients are hypertension, DM, and cardiovascular disease,[7] wherein diabetes is the second most common non-communicable disease (NCD) in COVID-19 patients which worsens disease severity and mortality.[8] Other prevalent comorbidities include hypertension, diabetes, and thyroid diseases.[9] Although the prevalence of DM in COVID-19 patients is generally lower compared to the general population, it has a more severe impact than on those without the disease.[10] However, the results obtained from the preliminary analysis showed that elderly male patients with diabetes exhibited a higher likelihood of having severe COVID-19 symptoms than those without such characteristics.[11] Hyperglycemia, imbalances in pathways involved in viral entry into cells, and impaired immune and inflammatory responses cause this COVID-19-induced mechanism in DM patients.[10] Uncontrolled blood sugar levels and complications related to DM critically affects this group of COVID-19 patients, whose prognosis was observed to be poor.[12]

As for the situation in Indonesia, the country's gov-

Correspondence: Hamzah Hasyim, Department of Environmental Health, Faculty of Public Health, Universitas Sriwijaya, Ogan Ilir, South Sumatra 30862, Indonesia, E-mail: hamzah@fkm.unsri.ac.id, Phone: +62 (711) 580068*

Received : June 10, 2022
Accepted : July 21, 2022
Published : July 31, 2022

ernment announced measures to be implemented to help DM patients during the COVID-19 pandemic on March 28, 2020.[13] To reduce the likelihood of contracting the disease, the most effective step is to follow COVID-19 preventive behavior. It should be noted that knowledge, attitudes, and behavior regarding COVID-19 largely affect community compliance with guidelines and regulations.[14] If people in Indonesia possess good knowledge and exhibit positive attitudes, they can be expected to take effective preventive action.[15] It is imperative that those at a higher risk of contracting COVID-19 must maintain adequate COVID-19 preventive behavior. However, the key problem is that insufficient knowledge among patients with DM and hypertension affects their preventive behavior, thus increasing their risk of contracting COVID-19.[16] Notably, COVID-19 prevention behavior is closely related to age, sex, and employment.[17] As explained above, it is evident that one must also focus on DM prevention to avoid DM complications arising from COVID-19 infection and reduce its incidence.[18] However, there is a gap in the literature regarding discussions on COVID-19 preventive behavior in DM patients in Indonesia, suggesting that further research and investigations are required to control and prevent COVID-19 in such patients. This study aimed to fill this gap by conducting a literature review of COVID-19 preventive behavior in diabetic patients.

Method

The literature searched for this review focused on study relevant to COVID-19 preventive behavior in patients with chronic illness, specifically DM. Relevant articles were searched for and identified on PubMed and ProQuest. About 22 of the 73 shortlisted articles met the exclusion and inclusion criteria. The inclusion criteria were articles published in the last three years based on the keywords COVID-19 and DM as well as COVID-19 preventive behavior in DM patients. The exclusion criterion was articles whose summary of contents did not correspond to the relevant keywords. An article was considered for this study if it was either a review or a research article that was available for open access. Articles that were unavailable for open access were excluded. The search terms used in Medical Subjects Headings (MeSH) were (COVID-19 AND Diabetes Mellitus), (COVID-19 in Diabetes Mellitus patients), AND (Preventive Behavior of COVID-19).

The eligibility of the papers based on their title and abstract was assessed independently by the first two authors. Additionally, if needed, the full paper was acquired to determine its eligibility status. In case of any disagreement, a consensus was reached by consulting the third author. Papers in languages other than English were excluded if their translations were unavailable. The full text of the papers that met the eligibility criteria for the review was then assessed. The authors then pooled the results of the studies focusing on COVID-19 preventive behavior in diabetic patients. Finally, the articles were reviewed and discussed thoroughly, critically, and objectively using the same method from the related previous study.[19]

Results and Discussion

Article Selection

After searching with the selected keywords, the authors identified 73 research articles on PubMed and ProQuest, after removing duplicate entries. Based on the inclusion and exclusion criteria, 22 articles were finally selected and examined based on their relevance to the topic. COVID-19, diabetes mellitus, and COVID-19 in DM patients were the subjects of five articles. Additionally, 17 studies were based on preventive behavior for COVID-19, including knowledge, attitude, and practice (KAP) in patients with chronic illnesses, particularly those with diabetes. Finally, the articles were reviewed and discussed using objective and comprehensive analysis with regard to COVID-19, diabetes mellitus preventive behavior, and COVID-19 KAP in patients with chronic illness, specifically in diabetic patients.

This review analyzes articles dealing with the prevention of COVID-19 in diabetics and COVID-19 preventive behaviors. Areas for further study that emerged from the articles have been identified, including knowledge, attitudes, and characteristics in relation to COVID-19 among diabetics. While, the relative lack of publications regarding preventative behavior among diabetic COVID-19 patients can be regarded as a limitation and weakness of the present review. The strengths of this review are twofold: one, it has employed reputable databases (PubMed and ProQuest) consisting of recent publications to select relevant articles; and two, it has facilitated the review of publications on COVID-19 preventive behavior in diabetic. This study recommends that COVID-19 preventive behavior is the most effective strategy to avoid COVID-19, and further emphasizes the need for improving COVID-19 health education programs for DM patients to encourage knowledge development, positive attitudes, and efficient preventative behaviors among them.

Prevention of COVID-19 in Diabetics

To prevent COVID-19, clinicians advise DM patients to wash their hands frequently with soap and avoid touching their faces, except when necessary, to minimize their exposure to virus carriers. Wearing a mask outdoors is also strongly recommended. In addition, DM patients are advised to maintain a healthy diet and stay active. Furthermore, when following a diabetic treatment, patients should check their blood sugar levels regularly,[20,21] and consult a doctor in case of discrepancies. Since pa-

tients must handle both oral and injected drugs, it is imperative for them to wash hands frequently to prevent COVID-19 infection.[21] DM patients' increased risk of suffering from severe diseases is primarily due to uncontrolled blood sugar levels; therefore, it must be monitored regularly.[21] Moreover, healthy lifestyle choices and consistent administration of medication are also advised for DM patients. Besides, taking advantage of telemedicine facilities may further reduce the risk of exposure.

COVID-19 Preventive Behaviors

Behavior and lifestyle significantly affect health status. To reduce patient risk factors and comorbidities public policies should promote healthier lifestyles, including healthier diets and regular physical activity.[6] Since there is no effective treatment for COVID-19 yet, prevention is the best way to minimize infection. Under such circumstances, knowledge and attitude are fundamental for preventive behavior. Sulistyawati, *et al.*,[15] found that in Indonesia respondents with good knowledge and positive attitudes practiced preventive behaviors. Similarly, good knowledge and positive attitudes among the majority of a population indicated a higher likelihood of appropriate COVID-19 preventive behaviors.[14,22] Based on Lee, Kang, and You's study in South Korea, knowledge about COVID-19 related to preventive behaviors, such as wearing masks, hand hygiene, and avoiding crowds impelled people to adopt preventive practices.[22] However, having good knowledge and attitudes to COVID-19 does not necessarily result in improved health practices, as was found for the people of Sudan.[23] To avoid misleading information, adequate information on COVID-19 precautions is essential.[15]

Although a large number of patients with comorbidities, such as diabetes and hypertension, are aware of the symptoms of COVID-19 and have implemented appropriate behaviors, many are yet to make routine changes for preventing infection.[24] Contrary to this, patients in Vietnam and Ethiopia exhibit strong knowledge, positive attitudes, and performed COVID-19 prevention well.[25,26] As mentioned before, sufficient knowledge and a positive attitude in patients with chronic diseases are significant for preventing COVID-19.[26] In comparison, many patients with chronic conditions had low perceptions and willingness to carry out COVID-19 intervention behaviors.[27] Akalu's study (2020) in Ethiopia found that patients with chronic diseases demonstrated poor preventive behavior, such as failing to use masks outdoors as well as unwillingness to avoid crowds and maintaining a distance. In general, patients with chronic diseases and low level of knowledge are less likely to practice COVID-19 preventive behaviors.[5]

The risk of COVID-19 for DM patients must be encountered by appropriate preventive behavior. A study on DM and hypertension patients found that inadequate knowledge increased their risk of COVID-19 infection.[16] COVID-19 knowledge and attitudes were observed to be high in type 1 diabetes mellitus (T1DM) patients in a study involving young adults in India.[28] However, many young adult patients with T1DM were less aware of the risk of COVID-19 compared to those with other kinds of diabetes.[28]

To date, it is unclear whether DM patients comply with COVID-19 preventive measures. Extra and optimal preventive practices were rarely observed in Pakistan.[21] In a Chinese study, DM patients were reportedly more anxious about COVID-19 than non-DM people. In the same study, it was reported that infection was avoided during the COVID-19 pandemic primarily due to behavioral changes, such as maintaining a healthy diet, using medication, and exercising.[29] Furthermore, an Indian study showed that only 28% of DM patients regularly monitored their blood sugar levels during the COVID-19 pandemic.[30]

Knowledge

Sources of verified accurate information are the utmost importance in increasing public knowledge on COVID-19. Fixing hoax circulating in the community will also help reduce inappropriate preventive behavior.[17] Social media is widely used to find information on COVID-19 in Indonesia.[15] To provide error-free and appropriate COVID-19 preventive practices, the overall health education programs regarding COVID-19 must be improved.[14] Although COVID-19 is a new disease, Indonesia, Malaysia, South Korea, China, and Sudan all seem to possess some amount of prior knowledge about it.[15,22,23] Knowledge of COVID-19 is related to COVID-19 attitudes and preventive practices.[22] As an example, DM patients in Ethiopia had adequate knowledge of COVID-19.[16] Meanwhile, results have been inconclusive with regard to appropriate knowledge of COVID-19 and its preventive behavior among patients with chronic diseases like diabetes, hypertension, and chronic lung disease.[5] Considering that effective prevention practices are associated with possessing sufficient knowledge of the same, health sectors should cooperate to increase access to COVID-19 information.[16]

Attitude

Assessment and measurement are essential tools for understanding human attitudes and behavior.[31] Studies related to COVID-19 have shown that communities are becoming increasingly aware of COVID-19.[15,17,22,23] A positive attitude to protection against COVID-19 influences preventive behavior.[2] Since people with DM face an increased risk of being infected with COVID-19 during the pandemic, they took sufficient preventive action

to avoid infection.[29] Findings with regard to DM and hypertension patients as well as T1DM patients showed positive attitudes to COVID-19 preventive behavior.[16,28] These patients maintained social distance and washed their hands frequently to protect themselves.[28]

Characteristics

With an increase in education, knowledge can also be better received and understood. Knowledge of COVID-19 is, therefore, closely related to the level of education.[22,23] Lower levels of education significantly impact knowledge of COVID-19 among patients suffering from chronic diseases. A study on DM and hypertensive patients found that inadequate knowledge and appropriate behavior related to COVID-19 was associated with low educational attainment.[16] The demographic characteristics related to the KAP could serve as a compass for policymakers to focus health education programs toward appropriate target groups.[32] The evaluation of the diabetes KAP has become essential for directing behavioral changes among individuals with diabetes and those at risk.[33] Furthermore, a study on patients with chronic diseases shows that socio-economic characteristics, such as age, education, employment, and income, are connected to low knowledge and poor preventive behaviour.[5]

Conclusion and Recommendation

This study concludes that COVID-19 preventive behavior is the best strategy to avoid contracting the disease, especially in view of its harmful effect on DM patients and the lack of treatment considered adequate for COVID-19. Although vaccination is one of the main steps to avoid transmission, severity of infection, and death as a result of contracting COVID-19 among high-risk patients (comorbid), it is still necessary to practice protective behavior to reduce the risk of transmission of COVID-19. Therefore, future studies on the current topic are recommended, so that health education programs regarding COVID-19 in DM patients can be improved to increase knowledge, help encourage positive attitudes, and implement appropriate COVID-19 prevention behaviors.

Abbreviations

COVID-19: Coronavirus Disease 2019; DM: Diabetes Mellitus; ICU: Intensive Care Unit; KAP: Knowledge, Attitude, and Practice; WHO: World Health Organization; NCD: Non-communicable Disease; MeSH: Medical Subjects Headings; T1DM: Type 1 Diabetes Mellitus.

Ethics Approval and Consent to Participate

Not applicable.

Competing Interest

The authors declare that there are no significant competing financial, professional, or personal interests that might have affected the performance or presentation of the work described in this manuscript.

Availability of Data and Materials

The authors have full access to all the data in the study and take responsibility for the data integrity.

Authors' Contribution

HH and GP conceptualized, investigated, wrote the draft of the manuscript, and validated the study. HH and PD wrote the main manuscript text. PD edited the draft, and all authors contributed to interpreting the results. All authors read and approved the final manuscript.

Acknowledgment

The authors gratefully acknowledge those who have helped and supported this study, and the authors would like to thank the reviewer for the constructive feedback.

References

1. Garg I, Srivastava S, Rai C, Kumar V, Hembrom AA, Ghosh N, et al. Coronavirus (COVID-19): Prognostic risk associated with comorbidities and age. Int J Recent Sci Res. 2020; 11 (04): 37983-6.
2. World Health Organization. WHO Coronavirus (COVID-19) Dashboard. Wolrd Health Organization; 2022.
3. Satuan Tugas Penanganan COVID-19. Data sebaran COVID-19. Satuan Tugas Penanganan COVID-19; 2022.
4. Satuan Tugas Penanganan COVID-19. Data sebaran COVID-19. Satuan Tugas Penanganan COVID-19; 2021.
5. Akalu Y, Ayelign B, Molla MD. Knowledge, attitude and practice towards COVID-19 among chronic disease patients at Addis Zemen Hospital, Northwest Ethiopia. Infection and drug resistance. 2020; 13: 1949-60.
6. Mahamat-Saleh Y, Fiolet T, Rebeaud ME, Mulot M, Guihur A, El Fatouhi D, et al. Diabetes, hypertension, body mass index, smoking and COVID-19-related mortality: a systematic review and meta-analysis of observational studies. BMJ open. 2021; 11 (10): e052777.
7. Karyono DR, Wicaksana AL. Current prevalence, characteristics, and comorbidities of patients with COVID-19 in Indonesia. Journal of Community Empowerment for Health. 2020; 3 (2): 77-.
8. Marçal IR, Fernandes B, Viana AA, Ciolac EG. The urgent need for recommending physical activity for the management of diabetes during and beyond COVID-19 outbreak. Frontiers in endocrinology. 2020; 11: 584642.
9. Saeed S, Awasthi AA, Nandi D, Kaur K, Hasan S, Janardhanan R. Knowledge, attitude and practice towards COVID-19 among individuals with associated comorbidities. JML. 2021; 14 (2): 225.
10. Pugliese G, Vitale M, Resi V, Orsi sE. Is diabetes mellitus a risk factor for Coronavirus Disease 19 (COVID-19)? Acta diabetologica. 2020; 57 (11): 1275-85.
11. Li X, Zhong X, Wang Y, Zeng X, Luo T, Liu Q. Clinical determinants of the severity of COVID-19: a systematic review and meta-analysis. PloS one. 2021; 16 (5): e0250602.
12. Muniyappa R, Gubbi S. COVID-19 pandemic, coronaviruses, and diabetes mellitus. American Journal of Physiology-Endocrinology and

Metabolism. 2020; 318 (5): E736-E41.
13. P2TM Kemenkes RI. Langkah-langkah pencegahan bagi penyandang diabetes melitus di masa pandemi COVID-19. Kementerian Kesehatan Republik Indonesia; 2020.
14. Zhong B-L, Luo W, Li H-M, Zhang Q-Q, Liu X-G, Li W-T, Li Yi. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. International Journal of Biological Sciences. 2020; 16 (10): 1745-52.
15. Sulistyawati S, Rokhmayanti R, Aji B, Wijayanti SPM, Kurnia Widi Hastuti S, Sukesi TW, Mulasari SA. Knowledge, attitudes, practices and information needs during the COVID-19 pandemic in Indonesia. Risk Management and Healthcare Policy. 2021; 14: 163-75.
16. Taye GM, Bose L, Beressa TB, Tefera GM, Mosisa B, Dinsa H, et al. COVID-19 knowledge, attitudes, and prevention practices among people with hypertension and diabetes mellitus attending public health facilities in Ambo, Ethiopia. Infection Drug Resistance. 2020; 13: 4203.
17. Azlan AA, Hamzah MR, Sern TJ, Ayub SH, Mohamad E. Public knowledge, attitudes and practices towards COVID-19: A cross-sectional study in Malaysia. PloS one. 2020; 15 (5): e0233668.
18. Kumar A, Arora A, Sharma P, Anikhindi SA, Bansal N, Singla V, et al. Is diabetes mellitus associated with mortality and severity of COVID-19? A meta-analysis. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2020; 14 (4): 535-45.
19. Hasyim H, Dale P. COVID-19 and the city: a healthy city strategy for pandemic challenges, from planning to action. Jurnal Kesehatan Masyarakat Nasional (National Public Helath Journal). 2021; 16 (1): 189-97.
20. Singh AK, Gupta R, Ghosh A, Misra AJD. Diabetes in COVID-19: Prevalence, pathophysiology, prognosis and practical considerations. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2020; 14 (4): 303-10.
21. Ajay K, Hamza I, Deepika K, Ramsha GQ-u-A, Hamza S, Maria HS, et al. Knowledge & awareness about COVID-19 and the practice of respiratory hygiene and other preventive measures among patients with diabetes mellitus in Pakistan. European Scientific Journal ESJ. 2020;16 (12): 53-62.
22. Lee M, Kang B-A, You MJBPH. Knowledge, attitudes, and practices (KAP) toward COVID-19: a cross-sectional study in South Korea. 2021; 21 (1): 1-10.
23. Mohamed AAO, Elhassan EAM, Mohamed AO, Mohammed AA, Edris HA, Mahgoop MA, et al. Knowledge, attitude and practice of the Sudanese people towards COVID-19: an online survey. BMC public health. 2021; 21(1): 274.
24. Wolf MS, Serper M, Opsasnick L, O'Conor RM, Curtis L, Benavente JY, et al. Awareness, attitudes, and actions related to COVID-19 among adults with chronic conditions at the onset of the US outbreak. Annals of Internal Medicine. 2020; 173 (2): 100-9.
25. Huynh G, Nguyen MQ, Tran TT, Nguyen VT, Nguyen TV, Do Thi Hoai T, et al. Knowledge, attitude, and practices regarding COVID-19 among chronic illness patients at outpatient departments in Ho Chi Minh City, Vietnam. Risk Management and Healthcare Policy. 2020; 13: 1571-8.
26. Andarge E, Fikadu T, Temesgen R, Shegaze M, Feleke T, Haile F, et al. Intention and practice on personal preventive measures against the COVID-19 pandemic among adults with chronic conditions in Southern Ethiopia: a survey using the theory of planned behavior. Journal of multidisciplinary healthcare. 2020; 13: 1863-77.
27. Dires A, Gedamu S, Getachew Y. Perception of COVID-19 prevention methods efficacy and Iitention to use among patients with chronic disease in Dessie Town, Northeast Ethiopia: a multicentered cross-sectional study. Journal of multidisciplinary healthcare. 2021; 14 (June): 1325-39.
28. Pal R, Yadav U, Grover S, Saboo B, Verma A, Bhadada SK. Knowledge, attitudes and practices towards COVID-19 among young adults with type 1 diabetes mellitus amid the nationwide lockdown in India: a cross-sectional survey. Diabetes research and clinical practice. 2020; 166 (January): 108344.
29. Yan AF, Sun X, Zheng J, Mi B, Zuo H, Ruan G, et al. Perceived risk, behavior changes and health-related outcomes during COVID-19 pandemic: findings among adults with and without diabetes in China. Diabetes research and clinical practice. 2020; 167 (January): 108350.
30. Nachimuthu S, Vijayalakshmi R, Sudha M, Viswanathan V. Coping with diabetes during the COVID–19 lockdown in India: results of an online pilot survey. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2020; 14 (4): 579-82.
31. Luo Y-F, Chen L-C, Yang S-C, Hong S. Knowledge, attitude, and practice (KAP) toward COVID-19 pandemic among the public in Taiwan: a cross-sectional study. International Journal of Environmental Research. 2022; 19 (5): 2784.
32. Kasemy ZA, Bahbah WA, Zewain SK, Haggag MG, Alkalash SH, Zahran E, et al. Knowledge, attitude and practice toward COVID-19 among Egyptians. Journal of epidemiology global health. 2020; 10 (4): 378-85.
33. Al-Mutawaa KA, Farghaly AH, Nasir R, Loares AM, Skaroni I, Al-Thani M, et al. Level of knowledge, attitude and practice towards diabetes among nationals and long-term residents of Qatar: a cross-sectional study. BMJ open. 2022; 12 (2): e052607.