JOSING: Journal of Nursing and Health
Volume 3, Nomor 1, December 2022
e-ISSN: 2745-7877
p-ISSN: 2746-0851
DOI: https://doi.org/10.31539/josing.v3i1.4701

THE HEALTH STATE OF PATIENTS WITH DIABETES DURING THE COVID-19 TRANSITION PERIOD

Rumentalia Sulistini[1], Devi Mediarti[2], Nikson Sitorus[3], Rosnani[4]
Health Polytechnic the Ministry of Health of Palembang[1,2,4]
Ministry of Health Research and Development Jakarta[3]
rumentalia@poltekkespalembang.ac.id[1]

ABSTRACT

This study aims to identify the health status of diabetic patients and related factors related to the COVID-19 transition period. This study used a cross-sectional design. Statistical tests showed a significant relationship between the length of illness (p= 0.003) and body mass index (p= 0.026) with health status scores. Vaccination history and other characteristics have no relationship with the patient's health. However, length of illness, body mass index, age, and level of education can significantly predict the patient's health. Measures of condition, body mass index, age, and level of education can be used to indicate a patient's state of health, with the duration of illness having a more significant effect. In conclusion, the health state during the transition from pandemic to endemic, according to the perception of people with diabetes mellitus, was good, the vaccination program must be continued, and community support, especially for cadres, is practical to improve the management of diabetics.

Keywords: Health status, Diabetes Mellitus, Vaccination

INTRODUCTION

In recent years, research related to diabetes mellitus has attracted the attention of many experts. In general, this research studied the development of all new technology Sankoda et al., (2021) to improve the support for people with diabetes (Natalicchio et al., 2022). The prevalence of diabetes mellitus incidence increases worldwide every year. This problem has received special attention from the public. Compared to the past medical history, the pandemic patients have had a higher percentage of diabetes mellitus. The mortality rate during the pandemic period was 30.16% higher than the pre-pandemic timeframe, which was 3.21% (Khan et al., 2022; Setyawati et al., 2020).

The cases of COVID-19 that entered Indonesia also made it difficult for health workers to face the increasing number of patients. Not to mention that they are required to use Personal Protective Equipment (PPE), which is tightly closed so they are not exposed to the virus and the lack of rest time makes them also complain about such a heavy workload. *Coronavirus* is a disease that infects the respiratory system in humans, causing respiratory and systemic symptoms (Padilla et al., 2021; Yuliana, 2020). The spread of COVID-19 in Indonesia is increasing, so the government must make several efforts to break the chain of the virus range (Padilla & Andri, 2022; Padilla et al., 2021).

Although there are still some COVID-19 cases, this disease slowly became endemic Batty (2021); Cohen et al., (2022); Gostin, (2022), and the cases have decreased since the beginning of 2022 (WHO, 2021). Since diabetes is a comorbid disease, the COVID-19 transition period requires extra care. Despite initially facing

several rejections, Indonesia's community vaccination program has become a cornerstone strategy for combating COVID-19 (Firdaus, 2022). Eventually, more than 50% of Indonesians were vaccinated (Rozek et al., 2021; Nurhaliza et al., 2022). It is aimed that the COVID-19 vaccination program would create herd immunity Firdaus (2022) in the community so that the number of transmissions decreases, people become healthier, and their health state improves. However, new disease variants are developed due to viral mutations (El-Shabasy et al., 2022). Noh et al., (2021) showed that the transmission of COVID-19 would continue. Thus, monitoring of comorbid diseases should also be continued. Furthermore, patients with non-communicable diseases, especially diabetes, were at high risk of contracting COVID-19 (Widyahening et al., 2022). For this reason, it was necessary to encourage vaccination, continue implementing health protocols, maintain personal hygiene, and maintain healthy living behavior to mitigate COVID-19 disease.

The COVID-19 pandemic had occurred for two years, and at this point, it slowly entered an endemic phase. The government had implemented various strategies and procedures to suppress disease transmission and prevent deaths, but the incidence of diabetes continued to increase. Within a decade (2009–2019), diabetes cases have climbed to the third-ranking cause of death Hidayat et al., (2022) in Indonesia (49.9%), and it was expected the cases would not continue to increase. Therefore, to effectively manage diabetes during the transition period, understanding the health state of patients with diabetes and the related factors is essential.

RESEARCH METHODS

Study Design and Setting

This research was a quantitative study with a cross-sectional design. The data collection was performed by conducting an online survey. The data collection was conducted for one month, during April 2022, in Palembang City, South Sumatra, Indonesia. The researchers involved cadres from a community service called Integrated Assistance Posts (Posbindu) and health workers at Community Health Centers (Puskesmas) in their respective working areas during the patient selection process. After reading the informed consent on the front page, the patients agreed to be involved in the study and continued to open the survey link on that page.

Sample

The nonprobability sampling technique was performed as the sampling method. The inclusion criteria were patients with type 2 diabetes mellitus, aged over 18 years, and can read. Criteria exclusion was a diabetic with a mental disorder. Calculating the sample size using the Lemeshow formula obtained 207 respondents, but seven people did not fill out the questionnaire entirely, so the respondents numbered 200 people. The data collection was conducted using a Whatsapp-distributed Google form, assisted by the cadres and the health workers in their respective working areas.

Data Collection Instruments and Techniques

The data collection process was performed online. The research instrument included data on patients' characteristics, which consists of categorical data—sex, education, occupation, marital state, and numerical data—age, length of illness, body

mass index (BMI), history of injuries, history of having COVID-19, history of vaccination, blood sugar levels, and health state. The previously mentioned variables were independent variables, except for health state, which served as the dependent variable. Health state was measured using the EQ-VAS questionnaire, with a 0-100 value range; 0 represented the worst state, and 100 represented the best state. The EQ-VAS has been used in many studies.

Data Analysis

The data analysis for sex, occupation, marital state, and vaccine history variables with the health state variable was performed using an independent t-test. The relationship between age and education level with health state was analyzed using an ANOVA test. Furthermore, the relationship between the length of illness, BMI, and blood sugar levels with health state was assessed using a Pearson-correlation test. The multivariate analysis was then continued by performing a multiple linear regression test to determine the predictive and most influential variables and health state. Variables included in the multivariate analysis were variables with a p-value < 0.25 in bivariate analysis and substantially important variables (blood sugar levels).

Ethical Consideration

This study was conducted under ethical approval by the Poltekkes Kemenkes Palembang ethics committee with the number: 0263/KEPK/Adm2/III/2022. This study also obtained permission from the Palembang City Health Office with the number 800.212997/Dinas/2022.

RESULTS

Gender, education, marital state, occupation, history of having COVID-19, vaccination history, age, length of illness, Body Mass Index (BMI), and blood sugar levels were among the characteristics of people with diabetes mellitus.

Table. 1
The Analysis of the Patient's Characteristics, Vaccination History, BMI, and Length of Illness, Dependent on the Patient's health State (n=200)

Characteristics	Mean	SD	*p*-value	Total (n=200)
Sex				
Men	79.89	5.25	0.939[a]	90 (45.0 %)
Women	79.82	7.39		110 (55.0%)
Education Level				
Low	80.21	5.96	0.206[b]	146 (73.0%)
Moderate	79.35	4.79		46 (23.0%)
High	76.25	17.27		8 (4.0%)
Marital State				
Not Married	78.50	10.55	0.683[a]	10 (5.0%)
Married	79.92	6.25		190 (95.0%)
Occupation				
Not working	77.31	9.49	0.145[a]	13 (6.5%)
Working	80.03	6.23		187 (93.5)
COVID-19 Vaccination History;				
Vaccinated	79.53	6.56	0.356[a]	128 (64.0%)
Unvaccinated	80.42	6.38		72 (36%)

Age;				
≤ 40 tahun	80.21	5.96	0.628[b]	11 (5.5%)
41 – 60 tahun	79.35	4.79		141 (70%)
> 60 tahun	76.25	17.27		48 (24%)
Length of Illness;	5.31	1.69	0.003[c]	5.31 + 1.68
Body Mass Index (BMI);	23.03	2.02	0.026[c]	23.03+ 2.02
Blood Sugar Level	294.03	54.96	0.039[c]	294.03 + 54.96

According to table 1, the respondents were predominantly female (55.0%), had low education levels (73.0%), were married (95.0%), and were employed (93.5%). The description of the patient's physical state predominantly included the absence of diabetes wounds (99.0%), the absence of COVID-19 infection (99.5%), and having COVID-19 vaccination (64%). The mean age was 54.5 years (95% CI: 53.20-55.79), the average length of illness was five years, the mean body mass index (BMI) was 23, and the mean blood sugar levels were 294 mg/dl. The patient's health state was assessed based on analog visuals according to the patient's perception. This study had an average value of 79.85 (0-100 value range) with a standard deviation of 6.5. The smallest number for health state assessment was 35, and the most significant number was 100. From the estimation results, it could be concluded that 95% of the patients were believed to have an average health state of 78.94-80.76.

Table 1 shows no statistically significant difference in the health state scores between men and women, single and married, unemployed and employed, and vaccinated and unvaccinated. Additionally, there was no variation in the average health state score between the three age groups or the education levels. The health state score and the long relationship between diabetes and health state have demonstrated a weak relationship (r=0.208). Meanwhile, the health state score and the length of illness were significantly correlated based on the results of statistical tests (p=0.003). The relationship between Body Mass Index (BMI) and health state scores showed a weak relationship (r=0.158) and had a negative pattern, meaning that each increase in BMI would decrease the score for health states. On the other hand, the statistical test results showed a significant relationship between BMI and health state scores (p=0.026). The results of statistical tests also showed that there was no significant relationship between blood sugar levels and health state scores (p=0.379).

Table. 2
The Final Model of Multivariate Analysis

Variable	B	SE	Beta	*p*-value	95% CI
Length of Illness	0.839	0.301	2.78	1.292	5.07 – 5.54
Body Mass Index	-0.447	0.223	-0.139	0.046	22.74 – 23.31
Age	-1.425	0.985	-0.112	-0.149	53.20 – 55.79
Education Level	-0.823	0.911	-0.069	0.816	286.36 – 301.68

After performing multivariate analysis, the independent variables included in the regression model were the length of illness, body mass index, age, and level of education. In the "Model Summary" table, the coefficient of determination (R square) showed a value of 0.075, meaning the regression model obtained could explain 7.5% variations in patients' health state. In the ANOVA box, the results of the F-test showed the *p*-value (sig) = 0.004, meaning that at 5% alpha, the regression model fits the existing data. Alternatively, it could be interpreted that the four variables could

significantly predict health state. From the Beta Coefficient, it was found that the length of having diabetes illness was the variable that had the most significant influence on health states.

DISCUSSION

During the COVID-19 transition period, the slowly evolving pandemic situation improved with a significant reduction in the death rate (Pontoh et al., 2022; Telenti et al., 2021). The average health state based on the perception of patients with diabetes using the EQ-VAS questionnaire was 80, indicating that the health state during the early transition period in 2022 was good. This EQ-VAS instrument predicted the health state according to the patient's perception with a value range of 0 to 100 and was more accessible for the patient to use. Even when a patient felt healthy, it did not necessarily mean that they had received all their recommended vaccinations. According to a study, only 0.15% of patients with diabetes had all recommended vaccinations, and 36% were unvaccinated. According to several opinions, vaccination for patients with diabetes should be emphasized to avoid transmission because a Coronavirus infection would have a terrible prognosis (COVID-19) (Pal et al., 2021). The analysis results, however, indicated that there was no statistically significant relationship between the vaccination histories of patients with diabetes and their health state during the transition time. Some patients with diabetes who were being interviewed revealed that their concern about the vaccine's side effects and the findings of unstable blood sugar testing was the main inhibiting factor of vaccination.

Individual compliance was crucial to maintain the current health state of a patient with diabetes. Patients who fail to comply are more likely to develop obesity, complications, and increasing blood sugar levels. The most commonly found complication is foot ulcers, and this state decreases the patient's quality of life (Sothornwit et al., 2018). This study's result also showed that the length of illness and Body Mass Index (BMI) had a significant relationship with the patient's health state. However, the relationship between the two variables was weak. These two factors—age and education level- could predict the patients' health state. Furthermore, the length of illness had the most significant influence on the health state of patients with diabetes. Several studies have demonstrated that demographic factors influence the quality of life of patients with diabetes Arab-Zozani et al., (2020); Nguyen et al., (2020), and education level was the most influential factor (Sitorus et al., 2022).

Several studies explained that the lack of awareness of the importance of health Isworo et al., (2021) became one of the causes of the failure of diabetes management. In order to lower the risk of morbidity, comprehensive patient care management was necessary, according to the severity of diabetes and COVID-19 disease (Susilo et al., 2021; Zaki et al., 2020). At this time, patients needed to know how to maintain their health (Ligita et al., 2019). The cross-sectional design provides limitations in this study; the causal relationship cannot be determined between the related variables. However, with the results of this analysis, we get an idea that the health state of patients with diabetes mellitus is not related to the COVID-19 vaccine that has been obtained. However, several variables, including BMI, length of illness, age, and education level, were among the factors that could potentially predict the health state of patients with diabetes.

CONCLUSION

The Health state during the transition from pandemic to endemic, according to the perception of people with diabetes mellitus, was good.

SUGGESTIONS

The health condition of diabetics must be carried out through continuous monitoring and the community, especially cadres as the closest part, has an essential role in managing DM sufferers through routine activities every month (Posbindu).

REFERENCES

Arab-Zozani, M., Hashemi, F., Safari, H., Yousefi, M., & Ameri, H. (2020). Health-Related Quality of Life and its Associated Factors in COVID-19 Patients. *Osong Public Health and Research Perspectives*, *11*(5), 296–302. https://doi.org/10.24171/j.phrp.2020.11.5.05

Batty, M. (2021). The COVID Years: Predictable Unpredictability. *Environment and Planning B: Urban Analytics and City Science*, *49*(1), 3–6. https://doi.org/10.1177/23998083211072588

Cohen, L. E., Spiro, D. J., & Viboud, C. (2022). Projecting the SARS-CoV-2 Transition from Pandemicity to Endemicity: Epidemiological and Immunological Considerations. *PLOS Pathogens*, *18*(6), e1010591. https://doi.org/10.1371/journal.ppat.1010591

El-Shabasy, R. M., Nayel, M. A., Taher, M. M., Abdelmonem, R., Shoueir, K. R., & Kenawy, E. R. (2022). Three Waves Changes, New Variant Strains, and Vaccination Effect Against COVID-19 Pandemic. *International Journal of Biological Macromolecules*, *204*, 161–168. https://doi.org/https://doi.org/10.1016/j.ijbiomac.2022.01.118

Firdaus, S. U. (2022). The Urgency of Legal Regulations Existence in Case of COVID-19 Vaccination Refusal in Indonesia. *Journal of Forensic and Legal Medicine*, *91*, 102401. https://doi.org/https://doi.org/10.1016/j.jflm.2022.102401

Gostin, L. O. (2022). Life After the COVID-19 Pandemic. *JAMA Health Forum*, *3*(2), e220323. https://doi.org/10.1001/jamahealthforum.2022.0323

Hidayat, B., Ramadani, R. V., Rudijanto, A., Soewondo, P., Suastika, K., & Ng, J. Y. S. (2022). Direct Medical Cost of Type 2 Diabetes Mellitus and Its Associated Complications in Indonesia. *Value in Health Regional Issues*, *28*, 82–89. https://doi.org/10.1016/j.vhri.2021.04.006

Isworo, A., Sari, Y., Sumeru, A., & Nuriya, N. (2021). Barriers in Diabetes Self-Management: A Qualitative Study from the Perspective of Nurses in Primary Health Centers, Indonesia. *Open Access Macedonian Journal of Medical Sciences*, *9*(E), 1345–1352. https://doi.org/10.3889/oamjms.2021.7451

Khan, F., Paladino, L., & Sinert, R. (2022). The Impact of COVID-19 on Diabetic Ketoacidosis Patients. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, *16*(1), 102389. https://doi.org/10.1016/j.dsx.2022.102389

Ligita, T., Wicking, K., Francis, K., Harvey, N., & Nurjannah, I. (2019). How People Living with Diabetes in Indonesia Learn about Their Disease: A Grounded Theory Study. *PLoS ONE*, *14*(2), 1–19. https://doi.org/10.1371/journal.pone.0212019

Natalicchio, A., Sculco, C., Belletti, G., Fontanelli, M., Galeone, C., & Bossi, A. C. (2022). Patient-Support Program in Diabetes Care During the COVID-19 Pandemic : An Italian Multicentric Experience. *Patient Preference and*

Adherence, 113–122. https://doi.org/10.2147/PPA.S343949

Nguyen, H. C., Nguyen, M. H., Do, B. N., Tran, C. Q., Nguyen, T. T. P., Pham, K. M., Pham, L. V., Tran, K. V., Duong, T. T., Tran, T. V., Duong, T. H., Nguyen, T. T., Nguyen, Q. H., Hoang, T. M., Nguyen, K. T., Pham, T. T. M., Yang, S., Chao, J. C. J., & Duong, T. V. (2020). People with Suspected COVID-19 Symptoms Were More Likely Depressed and Had Lower Health-Related Quality of Life: The Potential Benefit of Health Literacy. *Journal of Clinical Medicine*, *9*(4). https://doi.org/10.3390/jcm9040965

Noh, J. Y., Jeong, H. W., & Shin, E. C. (2021). SARS-CoV-2 Mutations, Vaccines, and Immunity: Implication of Variants of Concern. *Signal Transduction and Targeted Therapy*, *6*(203). https://doi.org/10.1038/s41392-021-00623-2

Nurhaliza, M., & Rosyada, A. (2022). Social Vulnerability towards Covid - 19 Cases in Palembang City : A Spatial Analysis in Indonesia. *Al-Sihah: The public Health Science Journal14*(1), 76–91. https://doi.org/10.24252/al-sihah.v14i1.27267

Padila, P., & Andri, J. (2022). Beban Kerja dan Stres Kerja Perawat di Masa Pandemi Covid-19. *Jurnal Keperawatan Silampari*, *5*(2), 919-926. https://doi.org/10.31539/jks.v5i2.3582

Padila, P., Andri, J., Sartika, A., Andrianto, M. B., & Harsismanto, J. (2021). Single Parent Psychology Who Confirmed Positive COVID-19. *JOSING: Journal of Nursing and Health*, *2*(1), 1-7. https://doi.org/10.31539/josing.v2i1.2964

Padila, P., Rinaldi, S., Andri, J., Harsismanto, J., & Andrianto, M. B. (2021). Stres dengan Sistem Pembelajaran Online pada Mahasiswa di Era Pandemi COVID19. *Journal of Telenursing (JOTING)*, *3*(2), 591-599. https://doi.org/10.31539/joting.v3i2.2699

Pal, R., Bhadada, S. K., & Misra, A. (2021). COVID-19 Vaccination in Patients with Diabetes Mellitus: Current Concepts, Uncertainties and Challenges. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, *15*(2), 505–508. https://doi.org/https://doi.org/10.1016/j.dsx.2021.02.026

Pontoh, R. S., Toharudin, T., Ruchjana, B. N., Gumelar, F., Putri, F. A., Agisya, M. N., & Caraka, R. E. (2022). Jakarta Pandemic to Endemic Transition: Forecasting COVID-19 Using NNAR and LSTM. *Applied Sciences*, *12*(12), 1-16. https://doi.org/10.3390/app12125771

Rozek, L. S., Jones, P., Menon, A., Hicken, A., Apsley, S., & King, E. J. (2021). Understanding Vaccine Hesitancy in the Context of COVID-19: The Role of Trust and Confidence in a Seventeen-Country Survey. *International Journal of Public Health*, *66*, 636255. https://doi.org/10.3389/ijph.2021.636255

Sankoda, A., Waki, K., Yamaguchi, S., Mieno, M., Nangaku, M., Yamauchi, T., & Ohe, K. (2021). Effect of Digital Health among People with Type 2 Diabetes Mellitus During the COVID-19 Pandemic in Japan. *Journal of Diabetes Science and Technology*, *16*(1), 256–258. https://doi.org/10.1177/19322968211050040

Setyawati, A., Ngo, T., Padila, P., & Andri, J. (2020). Obesity and Heredity for Diabetes Mellitus among Elderly. *JOSING: Journal of Nursing and Health*, *1*(1), 26-31. https://doi.org/10.31539/josing.v1i1.1149

Sitorus, N., Suriani, O., Suryaputri, I. Y., Purba, F. D., & Hanafi, A. S. (2022). Association between Blood Pressure and Quality of Life of Patients with Diabetes Mellitus Type 2 in the Bogor City Indonesia. *Open Access Macedonian Journal of Medical Sciences*, *10*, E, 136–140. https://doi.org/10.3889/oamjms.2022.8172

Sothornwit, J., Srisawasdi, G., Suwannakin, A., & Sriwijitkamol, A. (2018). Decreased

Health-Related Quality of Life in Patients with Diabetic Foot Problems. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, 11, 35–43. https://doi.org/10.2147/DMSO.S154304

Susilo, D. H., Kusbaryanto, K., & Kusumo, M. P. (2021). Diabetes Mellitus Management During the Coronavirus disease-19 Pandemic: Literature Review. *Open Access Macedonian Journal of Medical Sciences*, *9*(F), 541–548. https://doi.org/10.3889/oamjms.2021.6597

Telenti, A., Arvin, A., Corey, L., Corti, D., Diamond, M. S., García-Sastre, A., Garry, R. F., Holmes, E. C., Pang, P. S., & Virgin, H. W. (2021). After the Pandemic: Perspectives on the Future Trajectory of COVID-19. *Nature*, *596*, 495–504. https://doi.org/10.1038/s41586-021-03792-w

WHO. (2021). COVID-19 weekly epidemiological update. *World Health Organization*. https://www.who.int/publications/m/item/covid-19-weekly-epidemiological-update

Widyahening, I. S., Vidiawati, D., Pakasi, T. A., Soewondo, P., & Ahsan, A. (2022). Noncommunicable Diseases Risk Factors and the Risk of COVID-19 among University Employees in Indonesia. *Plos One*, *17*(6), e0263146. https://doi.org/10.1371/journal.pone.0263146

Yuliana, Y. (2020). Corona Virus Diseases (Covid-19): Sebuah Tinjauan Literatur. *Wellness and Healthy Magazine*, *2*(1), 187–192.https://wellness.journalpress.id/wellness/article/view/21026/pdf

Zaki, N., Alashwal, H., & Ibrahim, S. (2020). Association of Hypertension, Diabetes, Stroke, Cancer, Kidney Disease, and High-Cholesterol with COVID-19 Disease Severity and Fatality: A Systematic Review. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, *14*(5), 1133–1142. https://doi.org/https://doi.org/10.1016/j.dsx.2020.07.005