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Association between Random Glucose Level, HbA1c and COVID-19 Mortality: A Single Center, Cross-Sectional Study

Introduction

Although coronavirus disease (COVID-19) caused by the acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is no longer new, it is still noted as one of the worst pandemics as it has resulted in millions of confirmed infections and deaths. A prior study has described the increased mortality risk observed among COVID-19 patients with diabetes mellitus (DM), wherein blood glucose level is a critical prognostic factor for COVID-19 mortality in patients with and without DM [1]. On the other hand, conflicting data have been reported on HbA1c levels before admission or at admission in relation to COVID-19-related mortality in patients with DM [2]. This study aims to determine the relationship of random plasma glucose (RPG) and HbA1c levels to COVID-19 mortality in hyperglycemic subjects with and without type 2 diabetes (T2D), as well as in normoglycemic subjects with T2D.

Materials and methods

This retrospective observational study with a cross-sectional method was conducted at a central referral

hospital in Makassar, Indonesia from July 2020 until the required sample size was met. This study applied the purposive sampling technique, with the population being hyperglycemic and T2D patients who have been treated for COVID-19 infection and the sample size being 100 subjects who met the inclusion criteria. Application for ethical clearance was submitted to the faculty's Biomedical Research Ethics Committee and approved prior to the study. For the data analysis process, the chi square test was carried out using SPSS version 25; the statistical test result is considered significant if the p value is less than 0.05.

Results

The results are presented in Table 1.

Discussion

From the correlation of RPG and HbA1c levels to mortality outcomes, the percentage of subjects who died was compared to the percentage of those who survived. In the T2D hyperglycemic variable, 15 subjects died (17.4%), while 71 subjects survived (82.6%). As for the non-T2D hyperglycemic variable, 4 subjects died (57.1%), whereas 3 subjects survived (42.9%). Meanwhile, in the T2D normoglycemic variable, no subject died (0%) and 7 survived (100%). Furthermore, the p-value of = 0.015 ($p < 0.05$) obtained in the chi-square test signifies a statistically significant relationship between variables. Our results are in line with existing studies, showing that poor blood glucose control

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Clinical Diabetology 2023, 12; 5: 318-319

DOI: 10.5603/cd.96589

Received: 21.07.2023 Accepted: 9.08.2023

Early publication date: 16.09.2023

Table 1. Association of Random Plasma Glucose (RPG) and HbA1c to COVID-19 Mortality

| Quantity and Percentage | Variables | COVID-19 mortality | | Total | p-value trend |
|-------------------------|--|--------------------|-------|-------|---------------|
| | | Yes | No | | |
| N | T2D hyperglycemic | 15 | 71 | 86 | 0.015 |
| % | (RPG \geq 140 mg/dL and HbA1c \geq 6,5%) | 17,4% | 82,6% | 100% | |
| N | Non-T2D hyperglycemic | 4 | 3 | 7 | |
| % | (RPG \geq 140mg/dL and HbA1c < 6,5%) | 57,1% | 42,9% | 100% | |
| N | T2D normoglycemic | 0 | 7 | 7 | |
| % | (RPG < 140mg/dL and HbA1c \geq 6,5%) | 0.0% | 100% | 100% | |
| N | Total | 19 | 81 | 100 | |
| % | | 19,0% | 81,0% | 100% | |

HbA1c — glyated hemoglobin; T2D — type 2 diabetes

The chi-square test obtained a p-value of 0.015 (< 0.05), indicating a significant relationship

in T2D or hyperglycemia is associated with mortality in COVID-19 conditions [3, 4]. Based on the findings above, it can be concluded that there is an association of RPG and HbA1c levels to COVID-19 mortality.

Article information

Funding

None.

Acknowledgments

None.

Conflict of interest

The authors declare that there is no conflict of interest.

REFERENCES

1. Liu Ye, Lu R, Wang J, et al. Diabetes, even newly defined by HbA1c testing, is associated with an increased risk of in-hospital death in adults with COVID-19. *BMC Endocr Disord.* 2021; 21(1): 56, doi: [10.1186/s12902-021-00717-6](https://doi.org/10.1186/s12902-021-00717-6), indexed in Pubmed: [33771154](https://pubmed.ncbi.nlm.nih.gov/33771154/).
2. Prattichizzo F, de Candia P, Nicolucci A, et al. Elevated HbA1c levels in pre-Covid-19 infection increases the risk of mortality: A systematic review and meta-analysis. *Diabetes Metab Res Rev.* 2022; 38(1): e3476, doi: [10.1002/dmrr.3476](https://doi.org/10.1002/dmrr.3476), indexed in Pubmed: [34018307](https://pubmed.ncbi.nlm.nih.gov/34018307/).
3. Kaminska H, Szarpak L, Kosior D, et al. Impact of diabetes mellitus on in-hospital mortality in adult patients with COVID-19: a systematic review and meta-analysis. *Acta Diabetol.* 2021; 58(8): 1101–1110, doi: [10.1007/s00592-021-01701-1](https://doi.org/10.1007/s00592-021-01701-1), indexed in Pubmed: [33778910](https://pubmed.ncbi.nlm.nih.gov/33778910/).
4. Wang Z, Du Z, Zhu F. Glycosylated hemoglobin is associated with systemic inflammation, hypercoagulability, and prognosis of COVID-19 patients. *Diabetes Res Clin Pract.* 2020; 164: 108214, doi: [10.1016/j.diabres.2020.108214](https://doi.org/10.1016/j.diabres.2020.108214), indexed in Pubmed: [32416121](https://pubmed.ncbi.nlm.nih.gov/32416121/).

