



The Characteristics and Risk of Mortality in the Elderly Korean Population

Sunghwan Suh

Department of Internal Medicine, Samsung Changwon Hospital, Sungkyunkwan University School of Medicine, Changwon, Korea

Diabetes mellitus (DM) is a chronic condition that is highly prevalent among the elderly, with an estimated 20% to 30% of this population believed to have DM [1]. Elderly patients with DM often have additional medical conditions, such as cardiovascular disease, chronic kidney disease, or heart failure, which increases their risk of mortality and potentially imposes a significant socioeconomic burden on Korean society [2]. Consequently, this study by Lee et al. [3] aims to describe the cause-specific risk of death in the Korean elderly population. Additionally, it categorizes this population according to the glucose spectrum in relation to mortality risk, including normal glucose tolerance, impaired fasting glucose, newly diagnosed DM, early DM, and advanced DM.

The authors analyzed 1,292,264 participants over a median follow-up period of 8.4 years. The primary outcome was death, and the authors collected data on all-cause, system-specific, and disease-specific mortality for the enrolled participants. During the follow-up period, there were 257,356 death events. Overall, elderly individuals with DM were found to have an increased risk of mortality compared to their counterparts without DM, a finding that aligns with a recent study from Hong Kong [4]. When cause-specific mortality was analyzed, individuals with DM exhibited a higher hazard ratio of mortality across all system categories (circulatory, respiratory, genitourinary, neoplasm, and others). Furthermore, the risk of mortality progressively in-

creased in a stepwise manner across the glucose spectrum for all-cause mortality and death, irrespective of underlying diseases such as chronic kidney disease, heart failure, and stroke. Malignancy consistently emerged as the most common cause of death across all glucose spectrum categories in this elderly population. These findings and trends are consistent with previous studies conducted on Korean patients with DM [5,6]. However, another Korean study reported that the first and second leading causes of death in type 2 diabetes mellitus (T2DM) were cardiovascular disease and infectious disease, respectively [7]. The discrepancy in causes of mortality may be attributed to differences in the study population and advancements in the management of risk factors associated with cardiovascular disease.

The mechanistic process potentially linking DM to cancer is not yet fully understood. However, several experimental observations have suggested that multiple risk factors, which involve proliferation and apoptosis pathways, may be shared between T2DM and cancer [8]. These major risk factors include hyperglycemia, hyperinsulinemia, increased bioactivity of insulin-like growth factor 1, oxidative stress, dysregulations of sex hormones, and chronic inflammation. The supraphysiological concentrations of insulin and glycemia to which body tissues are exposed act as a potent growth factor and energy source, respectively. These are essential for neoplastic transformation and cancer progression [9]. On a broader scale, between 8% and 18% of

Received: 13 September 2023, Accepted: 20 September 2023

Corresponding author: Sunghwan Suh
Department of Internal Medicine, Samsung Changwon Hospital, Sungkyunkwan University School of Medicine, 158 Paryong-ro, Masanhoewon-gu, Changwon 51353, Korea
Tel: +82-55-233-5830, **Fax:** +82-55-233-5109, **E-mail:** taret@daum.net

Copyright © 2023 Korean Endocrine Society

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

individuals with cancer also have DM. This association may be due to shared risk factors between T2DM and cancer, such as older age, obesity, physical inactivity, and smoking. A recent study using a large database suggested that the global increases in DM and body mass index (BMI) could lead to a significant increase in the burden of cancer in the coming decades [10]. Therefore, population-based strategies aimed at preventing DM and high BMI could have a substantial impact, given the overlapping risk factors, comorbidities, and shared sequelae, such as cancer, between these two diseases [11]. Consequently, as I have previously suggested in a review article, cancer should be included in routine diabetes assessments [12].

The strength of this study [3] is that it aimed to classify subjects along the diabetes spectrum using easily obtainable variables from a large participant pool. To the best of our knowledge, the participant count in this study surpasses that of other studies. Furthermore, this study accurately represents the general characteristics of the elderly South Korean population. This was achieved by utilizing the Korean National Health Insurance Service database, a single health insurance program that encompasses nearly all South Koreans.

DM is increasingly becoming a significant socioeconomic burden in Korea, particularly among the elderly population. A recent consensus [13] advocates for a comprehensive, multifactorial, person-centered approach to address the lifelong nature of T2DM. As such, it is crucial to classify the elderly population-based on their glucose spectrum and relative risk of mortality. This categorization is vital for the optimal allocation of limited public resources within society. Consequently, these data are invaluable in providing the evidence needed to support the health administration's decisions to optimize healthcare expenses according to each individual's risk category.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

ORCID

Sunghwan Suh <https://orcid.org/0000-0001-6865-966X>

REFERENCES

- Bae JH, Han KD, Ko SH, Yang YS, Choi JH, Choi KM, et al. Diabetes fact sheet in Korea 2021. *Diabetes Metab J* 2022;46:417-26.
- Satman I, Bayirlioglu S, Okumus F, Erturk N, Yemenici M, Cinemre S, et al. Estimates and forecasts on the burden of prediabetes and diabetes in adult and elderly population in Turkiye. *Eur J Epidemiol* 2023;38:313-23.
- Lee J, Kim HS, Song KH, Yoo SJ, Han K, Lee SH, et al. Risk of cause-specific mortality across glucose spectrum in elderly people: a nationwide population-based cohort study. *Endocrinol Metab* 2023;38:525-37.
- Yang A, Shi M, Lau ES, Chow E, Chan JC. Trends in all-cause and cause-specific mortality in older adults with and without diabetes: a territory-wide analysis in one million older adults in Hong Kong. *Diabetes* 2023;72(Supplement 1):1406-P.
- Kang YM, Kim YJ, Park JY, Lee WJ, Jung CH. Mortality and causes of death in a national sample of type 2 diabetic patients in Korea from 2002 to 2013. *Cardiovasc Diabetol* 2016;15:131.
- Park SK, Park MK, Suk JH, Kim MK, Kim YK, Kim IJ, et al. Cause-of-death trends for diabetes mellitus over 10 years. *Korean Diabetes J* 2009;33:65-72.
- Kim KJ, Kwon TY, Yu S, Seo JA, Kim NH, Choi KM, et al. Ten-year mortality trends for adults with and without diabetes mellitus in South Korea, 2003 to 2013. *Diabetes Metab J* 2018;42:394-401.
- Shlomai G, Neel B, LeRoith D, Gallagher EJ. Type 2 diabetes mellitus and cancer: the role of pharmacotherapy. *J Clin Oncol* 2016;34:4261-9.
- Barclay AW, Petocz P, McMillan-Price J, Flood VM, Prvan T, Mitchell P, et al. Glycemic index, glycemic load, and chronic disease risk: a meta-analysis of observational studies. *Am J Clin Nutr* 2008;87:627-37.
- Pearson-Stuttard J, Zhou B, Kontis V, Bentham J, Gunter MJ, Ezzati M. Worldwide burden of cancer attributable to diabetes and high body-mass index: a comparative risk assessment. *Lancet Diabetes Endocrinol* 2018;6:e6-15.
- Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012;380:2224-60.
- Suh S, Kim KW. Diabetes and cancer: cancer should be screened in routine diabetes assessment. *Diabetes Metab J* 2019;43:733-43.
- Davies MJ, Aroda VR, Collins BS, Gabbay RA, Green J,

Maruthur NM, et al. Management of hyperglycemia in type 2 diabetes, 2022: a consensus report by the American Diabe-

tes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetes Care* 2022;45:2753-86.