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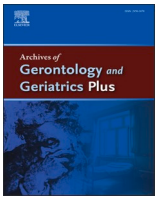

Exploring the influence of COVID-19 on studies of frailty and diabetes: A concise review

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ABSTRACT

This manuscript provides an in-depth exploration of the effects of COVID-19 on frailty and diabetes research, featuring a concise review of relevant literature from the National Library of Medicine. Findings underscore the critical role of early frailty assessments in managing diabetes to mitigate mortality rates.

Dear Editor,

This study scrutinizes the influence of COVID-19 on the National Library of Medicine's (NLM) research concerning frailty in relation to diabetes, cardiovascular diseases, and cancer, with a particular emphasis on diseases that involve both frailty and diabetes. It brings to light a recent literature review, undertaken utilizing NLM resources, which validates a consistent upward trend in the volume of articles on frailty and diabetes, a pattern seemingly driven by the COVID-19 pandemic. The study succinctly highlights a comparable increase in research impacted by COVID-19

Diabetes mellitus is widely recognized as a risk factor that can lead to more severe clinical outcomes in patients with COVID-19. The connection between these two conditions appears to be bidirectional (Nassar et al., 2021). In essence, an increase in COVID-19 infections correlates with a rise in diabetes cases. This study explores the connection between frailty and the incidence of diabetes.

Frailty is essentially described as a noticeable condition of increased vulnerability due to the decline in reserve and function across various physiological systems associated with aging. This results in a compromised ability to handle daily or sudden stressors.

During the COVID-19 pandemic, the impact on public health has been profound, particularly for individuals with pre-existing conditions such as diabetes, cardiovascular diseases, and cancer. The pandemic has notably influenced the progression of these three diseases, each of which represents a significant area of concern and a focus of ongoing research within the medical community. This paper specifically examines the intersection of frailty and diabetes in the context of COVID-19's influence.

Fig. 1 depicts the yearly fluctuations in the quantity of articles cataloged in the NLM that pertain to frailty in conjunction with diabetes, cardiovascular diseases, and cancer respectively. The dataset encompasses a ten-year period, stretching from January 1, 2013, to December 31, 2022. A notable escalation in the volume of articles was observed starting in 2019, a trend that could potentially be linked to the COVID-19 pandemic. The number of articles addressing both frailty and diabetes continues to rise monotonically. In contrast, the number of articles discussing both frailty and cardiovascular diseases reached its zenith in 2021, while those concerning both frailty and cancer peaked in 2020 before experiencing a resurgence in 2022. This hypothesis on both frailty and diabetes will undergo further substantiation in the forthcoming brief review.

Diabetes disrupts our body's ability to use insulin, a hormone that controls blood sugar by transporting glucose from the bloodstream into cells. This disruption impairs metabolism and can lead to persistently high blood sugar levels, which can damage organs and blood vessels. This study quantifies the interest in metabolic research by tallying the number of related articles.

A recent literature review on the correlation between frailty and diabetes was conducted using resources from the NLM. The "Standards of Care in Diabetes" by the American Diabetes Association (ADA) encapsulated the ADA's current recommendations for clinical practice (ElSayed et al., 2023). It is designed to outline the elements of diabetes care, establish general treatment objectives and guidelines, and provide tools for assessing the quality of care. The responsibility of annually updating these standards, or more frequently, if necessary, lies with the ADA Professional Practice Committee. This committee was comprised of experts from various disciplines (ElSayed et al., 2023).

Purnamasari et al. reported that sarcopenia, the loss of muscle mass and strength, typically associated with aging, may be accelerated by chronic diseases like type 2 diabetes mellitus (T2DM) (Purnamasari et al., 2022). Insulin resistance in T2DM can lead to sarcopenia, while muscle loss in sarcopenia may contribute to T2DM. Their review explored the complex relationship between T2DM and sarcopenia, focusing on pathophysiology and vascular complications (Purnamasari et al., 2022).

Sinclair et al. discovered that multimorbidity and frailty, which are prevalent in older diabetes patients, lead to adverse outcomes such as increased healthcare utilization, disability, and mortality (Sinclair & Abdelhafiz, 2022). The severity of these outcomes was proportional to the number of morbidities and frailty level. Mental health disorders exacerbated these effects. Comprehensive diabetes guidelines should include mental health screening and management. The independent effects of multimorbidity and frailty need further exploration.

Wu et al. found that both pre-frailty and frailty are associated with an increased risk of diabetic microvascular complications (DMC) in patients with type 2 diabetes (Wu et al., 2022). The risk of DMC, including

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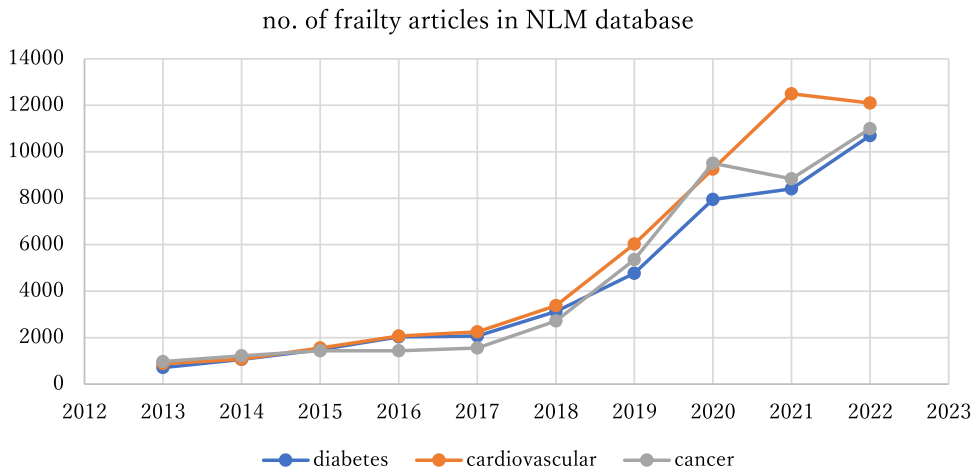

Fig. 1. number of frailty articles in National Library of Medicine in conjunction with diabetes, cardiovascular disease, and cancer from 2013 to 2022.

diabetic nephropathy, retinopathy, and neuropathy, increased with each point increase in frailty score. These findings suggested the importance of early frailty assessment in diabetes management (Wu et al., 2022).

Zeng et al. revealed that frailty and pre-frailty were prevalent in older Chinese adults with diabetes, with rates of 22.7 % and 58.5 % respectively (Zeng et al., 2022). Factors such as living alone, poor economic status, disability, and comorbidities were strongly associated with these conditions. The findings highlighted the need for increased awareness and early diagnosis of frailty in this population (Zeng et al., 2022).

Weng et al. found that chronic kidney disease (CKD), frailty, and physical function impairment were all associated with increased mortality in older patients with diabetes (Weng et al., 2023). The combined effects of these three factors significantly impacted patient outcomes. Their study emphasized the importance of considering these factors in managing diabetes in older patients (Weng et al., 2023).

Liu et al. revealed that metformin, a common antidiabetic drug, was associated with a reduced risk of frailty in patients with type 2 diabetes (Liu et al., 2023). However, the protective effects of metformin on adverse outcomes were not observed in frail diabetic patients. The study suggests that early identification and prevention of frailty may enhance the benefits of metformin in diabetic patients (Liu et al., 2023).

Cao et al. discovered that frailty, even in its early stages, was associated with an increased risk of cardiovascular disease (CVD) and type 2 diabetes mellitus (T2DM) among long-term cancer survivors (Cao et al., 2023). The findings suggested that routine monitoring and prevention of frailty among cancer survivors could help prevent late comorbidities and improve their quality of life (Cao et al., 2023).

Espinoza et al. reported that the randomized clinical trial investigated the potential of metformin, a drug known to improve insulin resistance and inflammation, to prevent frailty in older adults with pre-diabetes (Espinoza et al., 2022). Their study included 145 participants, with assessments for frailty and glucose tolerance conducted every six months over a two-year period. The findings could have implications for future screening and treatment strategies for pre-diabetes in older adults to prevent frailty (Espinoza et al., 2022).

Diabetes, recognized as a risk factor for severe COVID-19 outcomes, exhibits a bidirectional relationship with the virus, contributing to a surge in diabetes cases concurrent with escalating infections. This review study delves into the link between frailty, an increased vulnerability state often associated with aging, and diabetes. The findings underscore the significance of early frailty assessment in managing diabetes. It was observed that frailty and pre-frailty in conjunction with COVID-19 are common in older adults diagnosed with diabetes and correlate with a higher mortality rate. The interplay of chronic kidney disease, frailty, and physical function impairment had a substantial impact on patient outcomes. A thorough count and examination of articles pertaining to both frailty and diabetes were conducted from 2013 to 2022, utilizing the resources of the National Library of Medicine. Fig. 1 illustrates a consistent increase in the number of articles studying both frailty and diabetes from 2013 to 2022. This upward trend could potentially be linked to the COVID-19 pandemic The results highlight the importance of conducting early evaluations for frailty in the management of diabetes to reduce death rates.

CRediT authorship contribution statement

Yoshiyasu Takefuji: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Conceptualization.

Statements and declarations

This research has no fund.

Data availability

The author has no permission to share data.

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