The Association between Religiosity and HbA1c Level in Patients with Type 2 Diabetes Mellitus: A Systematic Review

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ABSTRACT

Glycemic control poses a challenge in the management of type 2 diabetes mellitus (T2DM). Religiosity can influence a patient's coping strategies with the disease. However, the relationship between patient religiosity and glycemic control has not been thoroughly explored. In this systematic review, we assessed the relationship between religiosity and glycemic control in patients with T2DM. Using PubMed and Google Scholar, we included articles published in English from 2011 onwards that quantitatively examined religiosity and its relationship with glycemic control based on the glycated hemoglobin (HbA1c) levels. Four studies from four different countries were included, employing varying measurement tools to assess religiosity. The HbA1c level was significantly related to the Diabetes Fatalism Index (p<0.05) and with general gratitude and gratitude to God, as assessed using the Multidimensional Measurement of Religiousness. Religiosity may alleviate stress-related diseases and enhance diabetes care. One study showed a relationship between the HbA1c levels and the Beliefs and Values score amongst Muslims only. Two studies reported a significant correlation between religiosity and HbA1c levels. Reducing fatalistic beliefs and improving gratitude to God could be a viable strategy for helping patients manage T2DM. Further studies are needed to promote such an approach in T2DM management.

INTRODUCTION

Type 2 diabetes mellitus (T2DM) has emerged as a significant global health concern. Diabetes affects 476 million people worldwide with the majority (462 million) attributed to T2DM.[1,2] This is equivalent to 6.28% of the world's population, and the annual death rate from diabetes is 1.37 million.[1,2] By 2025, the number of people with diabetes is projected to increase to 570.9 million, and the number of deaths from diabetes is expected to reach 1.59 million annually.[1] The increased incidence of T2DM is influenced by diverse metabolic risk factors, including a high body mass index, and behavioral factors such as an unhealthy diet, smoking, and a lack of physical activity.[1]

Glycemic control plays a crucial role in mitigating the risk of both microvascular outcomes (neuropathy, end-stage kidney disease, blindness) and macrovascular outcomes (cardiovascular disease, stroke, all-cause mortality).[3] Emphasizing intensive glycemic control is strongly recommended for its efficacy in preventing microvascular outcomes.[3] However, achieving optimal glycemic control in community setting poses challenges due to factors such as a long duration of diabetes, poor medication adherence and dietary habits, and a lack of family support.[4] The glycated hemoglobin (HbA1c) level has become the gold standard for monitoring glycemic control because of its accuracy in predicting microvascular complications.[5]

The positive influence of religiosity, which refers to adherence to faiths among individuals or groups, involving beliefs, doctrines, ethics, rituals, texts, and practices devoted to a higher power of faith, as a way of coping with chronic disease has been reported. Various strategies are employed to help patients face their illness.[6] A review showed that religiosity can affect medication adherence by influencing self-efficacy and knowledge of the illness in patients with chronic disease.[7] Another study found that religiosity factors, mediated by religious practices and social support, can affect medication

adherence and quality of life in diabetic patients.[8] However, the relationship between the level of religiosity and glycemic control has not been extensively discussed. The aim of this review is to assess the relationship between religiosity and glycemic control in patients with T2DM.

METHODS

The review was prepared according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines.[9]

Literature search

The literature search was conducted from September to October 2021 onwards using the Google Scholar and PubMed search engines. The search was limited to English-language reports. The keywords used in the search were "type 2 diabetes mellitus", "diabetes management", "glycemic control", and "religiosity".

Eligibility criteria

The inclusion criteria were as follows: non-interventional studies (cross-sectional, longitudinal, or cohort studies) published in full text within the last 10 years; studies that used HbA1c level as the indicator of glycemic control; and studies that assessed the level of religiosity using valid measurements in patients with T2DM. The exclusion criteria were studies involving patients with T1DM or those with qualitative, retrospective cohort, mixed-methods design, intervention, or other studies that did not report an association between religiosity and glycemic control or did not assess glycemic control using HbA1c level.

Data extraction and publication bias assessment

The authors extracted and compiled data obtained from all the studies identified studies, including types of study, number of samples, sex distribution, countries, mean ages, methods used to assess the level of religiosity, and findings related to the relationship between religiosity and glycemic control. Publication bias was assessed using an adaptation of the Newcastle Ottawa Scale (NOS) for cross-sectional studies with an assessment of 9 or 10 points indicating very good, 7 or 8 points as good, 5 or 6 points as satisfactory, and 0–4 points as unsatisfactory.[10]

RESULTS

Study selection

The flowchart in Fig 1 illustrates the screening, exclusion, eligibility, and study selection process through October 2021. A total of 44 studies were identified from two sources; 30 studies were excluded because they were either not in English or were categorized as systematic review, review, or study that did not specifically focus on patients with T2DM. Of the 14 studies, 10 studies were further excluded as their outcomes did not include the relationship between the level of religiosity and HbA1c level as an indicator of glycemic control. Finally, four studies met all inclusion criteria and were included in this review.
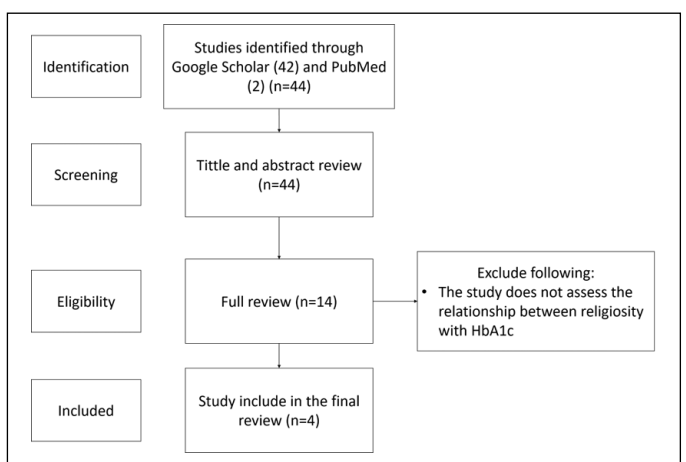

Figure 1: Flow diagram of the reviewed and included studies

Study characteristics

The characteristics of the included studies are presented in Table 1. A total of 2246 participants were involved in these studies with a higher representation of women than men. All studies were carried out on adults between the ages of 47 and 65 and were conducted in four countries: Malaysia[11], Israel[12], USA[13], and Turkey[14]. Two studies were cross-sectional, while the other two were longitudinal. Three studies were undertaken in clinical settings (a medical center and a primary care clinic), with only one conducted in the community. One study focused on determining the effect of religious belief and forgiveness on the coping mechanisms of diabetes patients. Although this study lacked numerical data on HbA1c levels, a statistical analysis of the relationship

between religiosity and HbA1c could be obtained.[14]

Outcome measurement

Various religiosity assessment tools were used in the studies, including the Beliefs and Values Scale (BV) tool (internal consistency α=0.94), Diabetes Fatalism Index (religious/spiritual coping), and perceived self-efficacy components of the Diabetes Fatalism Index (internal consistency α=0.75). One study [13] combined items related to general feelings of gratitude, feeling grateful to God, and Multidimensional Measurement of Religiousness/ Spirituality for Use in Health Research (internal consistency α=0.759, 0.932, 0.861, respectively). Another study[14] used features from the 'Tendency to Forgiveness Scale' and the 'Religiosity Scale' (internal consistency α= 0.839[15] and 0.90 [16], respectively).

Three studies reported a significant relationship between religiosity and HbA1c levels, while one study found an insignificant and weak relationship in the aspects of religious belief and forgiveness.[14] The correlation coefficient (r) ranged from –0.075 and –0.037 to 0.34 with one study reporting a value of b=0.51. Several factors that influence religiosity on HbA1c levels are specific religion,[11] age,[12], income,[12] insulin use,[12] and gender .[13]

The summary of the study characteristic and outcomes is presented in Table 1.

Quality assessment

We employed the Newcastle Ottawa Scale (NOS) to assess the publication biases in the reviewed articles.[17] Two articles were scored as 'very good' and the remaining two as 'satisfactory'. The summary of the NOS assessment is presented in Table 2.

DISCUSSION

This review focused on exploring the relationship between religiosity and glycemic control in patients with T2DM. The degree of glycemic control was determined by HbA1c level, which is considered as the gold standard. Studies included in this review represented heterogeneous populations from four countries. The findings indicate that religiosity could be one factor that influenced the care of diabetic patients. Religiosity is linked to self-esteem and a patient's psychological reactions to a diagnosis.[18] Religious beliefs influence stress responses, which can modify feelings and change the patient's perspective about illness.[19] The interplay between religion and illness may also be associated with lifestyle habits promoted by religious practices as well as adherence to a particular religion.[18]

Moreover, religiosity is connected to coping mechanisms, for example, by facilitating a positive resolution of the psychological impact of negative life events or by empowering individuals when managing poor health.[20] The extent of religiosity can be influenced by several factors such as age, income, specific religion, and medication use (e.g. insulin)[11,12] Besides patient coping mechanisms, religiosity can also be shaped by external factors like social support, which plays a crucial role in diabetes care by fostering healthy lifestyle habits.[21,22] The influence of social support on religiosity is evident through social activities that contribute to maintaining overall well-being.[23] A previous systematic review noted that participation in religious practices directly influenced glycemic control through a self-approach mentality with God, albeit not the sole factor.[24]

Controlling HbA1c is the primary goal in diabetes management and can be influenced by the patient's coping strategies when dealing with the disease.[25] Coping strategies refer to the patient's approach to responding to their condition and determining how they manage it.[25] Improved coping mechanisms can enhance the quality of diabetes management through self-care activities performed at home to control the disease.[26] Interventions focusing on patients' coping mechanisms and acceptance of their condition can enhance diabetes self-care.[27] A greater religiosity score can serve as a coping strategy, encouraging patients to adhere to treatment, thereby potentially improving glycemic control and quality of life.[8] One notable finding from our review is that fatalism in diabetic patients adversely affects glycemic control.[12]

Fatalism in diabetes is defined as "a complex psychological cycle characterized by perceptions of

Table 1. Summary of included studies

Author (year) (Reference)	Country, design, setting, and participants	Sample size, mean of age (year)±SD	Mean HbA1c (%) ± SD	Religiosity assessment tool	Main findings	Selected quotes in the article
How et al (2011) [11]	Malaysia, cross-sectional survey, university-based primary care clinic	188 adults (49 men and 139 women) with a diagnosis of diabetes according to WHO and under dietary control and diabetes treatment 62.7±10.8	8.1 ± 1.41	Beliefs and Values Scale (BV)	Religiosity and fasting blood glucose level were significantly negatively correlated (r=-0.16, p=0.029). However, there was no significant association between religiosity and HbA1c level, except within the Moslem group; those with higher religiosity were associated with lower HbA1c levels. Significant correlation between religion-specific BV scores and HbA1c level was found in Muslims (r=–0.34, p=0.007).	"We produced conflicting findings on religion and religiosity and glycaemic control in type 2 diabetes". "Religiosity was associated with short-term but not long-term glycaemic control. Religion on the other hand was significantly associated with long-term but not short-term glycaemic control."
Berardi et al (2016) [12]	Israel, cross-sectional survey, medical center	183 Jewish adults (56.8% female) diagnosed with T2DM for at least 1 year 65.7±9.2	8.4 ± 1.6	Diabetes Fatalism Index (religious/ spiritual coping and perceived self-efficacy components of the Diabetes Fatalism Index	The Diabetes Fatalism Index correlated with HbA1c level (b=0.51) using multivariate beta regression that included age, income, and insulin use.	"…reducing fatalistic beliefs, particularly those associated with broad concepts of control, may be a viable strategy for managing diabetes."
Krause et al (2017) [13]	USA, longitudinal nationwide study, community	1775 adults (762 men and 1013 women) who reside in the USA and agreed to give a blood sample 47.26±17.70	5.42 ± 0.73	Four items of general feelings of gratitude, three items of feeling grateful to God, and three items of Multidimensional Measurement of Religiousness/ Spirituality for Use in Health Research	HbA1c level correlated significantly with two types of religiosity: general grati-tude and gratitude to God (p=<0.005). The correla-tions coefficients were r=–0.075 and r=–0.037, respectively. The relationship between feeling grateful to God and HbA1c was stronger in women than in men.	"… more work is needed to help us better understand why gratitude is associated with HbA1c." "Data that have been gathered at more than one point in time are needed so that researchers can assess the relationship between gratitude and changes in HbA1c over time."
Yazla et al (2018) [14]	Turkey, longitudinal study, medical center	100 adults (42 men/58 women), treated in the medical center 52.77±9.58	N/A	Tendency to Forgiveness Scale and the Religiosity Scale	HbA1c level correlated non-significantly (p³0.05) with religious belief (r=0.02) and forgiveness (r=0.08)	"That no significant relationship was found between the level of forgiveness and blood glucose or HbA1c values supports the claim that the positive effect of forgiveness on diabetic patients arises due to the alleviation in stress and negative feelings."

despair, hopelessness, and powerlessness about disease control," and studies have shown that fatalism acts as a barrier to effective diabetes management, resulting in worse glycemic control and more symptoms.[28] However, with the help of adaptive therapies such as Acceptance and Commitment Therapy, fatalism can lead patients to accept their disease and reduce symptoms of depression.[29] Understanding the significant role of fatalism in the religious insight of patients can improve diabetes management strategies.[12] Another noteworthy finding is

that gratitude to God may be related to HbA1c control.[13] In clinical settings, encouraging feelings of gratitude can positively impact health by improving subjective sleep quality, blood pressure, glycemic control, asthma control, and dietary habits.[30]

Among patients with diabetes, feelings of gratitude can help increase resilience and reduce stress[31] In another study of Javanese women with diabetes, feeling grateful made patients accepted their health conditions more and

Table 2 Publication bias assessment

Study	NOS
How et al (2011) [11]	6
Berardi et al (2016) [12]	9
Krause et al (2017) [13]	9
Yazla et al (2018) [14]	6

*NOS: Newcastle Ottawa Scale

helped to encourage support from their families to maintain their health[32] Understanding the level of gratitude in patients may improve the motivation for diabetes self-care and help treatment.[33]

Our review has some limitations. Although we included studies that used the religiosity scale, we did not assess the mechanism of religious coping used by patients, despite some studies indicating a relationship between religious coping and glycemic control.[34,35] Additionally, since the tools to measure the level of religiosity vary across studies, the findings should be carefully evaluated to draw a firm conclusion. Another limitation is the inclusion criterion of studies published only in English, studies in languages other than English were not reviewed, which reduced the heterogeneity of this review. According to our review, studies on religiosity included older adult patients aged 47 to 65 years. Given the increasing prevalence of type 2 diabetes in younger people, further studies are required to assess its relationship with religion on diabetes management outcomes and to reduce complications from diabetes.

CONCLUSION

There is evidence of a relationship between religiosity and HbA1c levels as an indicator of glycemic control in patients with T2DM. Considering the potential role of religious coping in patients' self-care motivation and glycemic control, it is recommended further studies on this field, including investigating the role of healthcare providers in incorporating religiosity aspects into T2DM management.

FUNDING

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

ACKNOWLEDGMENT

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