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Pharmacist-Led Self-management Interventions to Prevent Diabetic Outcomes: A systematic Review

Abdullah Hamad Ali Alyami* [(1)], Saleh Hamad Saleh Al Hannan [(1)], Hussain Ghanem Alqashanin [(1)], Essa Yahyaa Aldashl [(1)], Faisal Mohammed Alsharyah [(1)], Yahya Hamad Alyami [(1)], Hussin Mahdi Al Salem [(1)], Ali Hussian Salem Algarad [(1)], Hadi Hamad Alhannan [(2)]

(1) Pharmacy Technician, Eradh Complex For Mental Health, Najran, Saudi Arabia.

(2) Nurse Specialist, Khabash General Hospital, Najran, Saudi Arabia.

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*Corresponding author

Abstract

Introduction: Managing diabetes necessitates a rigorous treatment regimen entailing patient-driven self-care. Pharmacists occupy a favorable position to offer essential self-care support. This review delves into whether interventions led by pharmacists to foster self-management in diabetic patients yield favorable clinical and patient-reported outcomes.

Methods: In accordance with PRISMA guidelines, this review followed an extensive literature search. The search encompassed terms like "pharmacist," "diabetes," and "self-management," across databases such as PubMed, Embase, and the Cochrane Library spanning from the database's inception to August 2022. Reference lists of systematic reviews and incorporated studies were also explored. Inclusion criteria encompassed interventions tested through randomized controlled trials (RCTs) centered around self-management, conducted in ambulatory care settings, led by pharmacists, and reporting at least one clinical or patient-reported outcome. Primary outcomes encompassed HbA1c as a long-term diabetes follow-up parameter, self-management, and intervention components. Secondary outcomes included blood glucose, blood pressure, BMI, lipids, medication adherence, quality of life, and diabetes knowledge.

Results: A total of 22 studies, including more than 3,000 patients, were incorporated. Pharmacist-led self-management interventions encompassed education on diabetes complications, medication, lifestyle, and instilling self-management skills. Several studies adopted a tailored approach based on patient requirements. The interventions led by pharmacists exhibited a positive impact on HbA1c levels, yielding a significant average reduction of 0.71%. Additionally, these interventions displayed favorable effects on blood pressure, , lipid profiles and quality of life.

Conclusions: Pharmacist-led interventions focused on self-management exhibit a notable positive impact on HbA1c levels among individuals with diabetes. This outcome underscores the heightened contribution of pharmacists in patient-centered healthcare. The implication drawn from these findings advocates for pharmacists to actively provide self-management assistance to individuals with diabetes, aiming to enhance overall diabetes-related outcomes.

Keywords: ***Diabetes, Quality of life, self-management, Complications, Prevention.***

Introduction

Diabetes presents a multifaceted challenge in terms of management. Its treatment involves a combination of lifestyle adjustments and medication to regulate blood glucose levels. Despite available interventions, diabetes frequently comes hand-in-hand with complications and concurrent health conditions, further heightening the intricacies of managing the disease [1]. Central to diabetes management is self-care, a responsibility primarily shouldered by the patient [2]. Self-management of chronic conditions encompasses the individual's capacity to navigate symptoms, treatment protocols, physical and psychosocial repercussions, and lifestyle changes intrinsic to living with a chronic ailment. Effective self-management entails the ability to monitor one's condition and to enact cognitive, behavioral, and emotional adjustments essential for maintaining a satisfactory quality of life [3].

Patients, particularly those grappling with complex diseases like diabetes, often necessitate guidance in cultivating and sustaining self-management skills [4]. Physicians, nurses, dieticians, and diabetes educators have shown that self-management interventions can enhance HbA1c outcomes in individuals with diabetes [5]. While various reviews have explored the contribution of pharmacists to diabetes care, these reviews have either covered a broad range of pharmacist interventions, not solely those related to self-care, or focused solely on adherence [6, 7]. In the context of the UK, the National Service Framework for Diabetes has notably included 'Empowering People with Diabetes'. The primary objective here is to augment personal agency in the day-to-day management of diabetes, thereby enhancing the overall quality of life for each individual [8]. A central aim of this approach is to cultivate a healthcare service where self-management stands as the cornerstone of effective diabetes care. The essence of empowerment lies in patients possessing the requisite knowledge, skills, attitudes, and self-awareness to influence both their own behavior and that of others, ultimately leading to an improved quality of life. Hence, empowerment serves as a pivotal outcome resulting from diabetes education, positioning self-management education as a pivotal strategy in promoting patient empowerment. Similarly, the American Diabetes Association, through its National Standards for Diabetes Self-Management Education (DSME), has recognized self-management education as the linchpin of care for individuals with diabetes seeking successful health-related outcomes [9]. Within this framework, DSME's effectiveness is maximized when it is delivered by a diverse, multidisciplinary team, orchestrated through a comprehensive care plan. Notably, a more recent review of the current DSME standards has distilled five overarching principles from existing evidence, shaping the revision and enhancement of these standards [10].

The value of Diabetes Self-Management Education (DSME) is underscored by research that demonstrates a significant impact. For instance, patients who have not received DSME are shown to be at a fourfold increased risk of major diabetes complications compared to those who have engaged in some form of DSME [11]. However, there is a concern regarding the variation in the provision of education in the UK. While most individuals with diabetes receive some form of education at the time of diagnosis, the extent and content of these programs differ substantially among services. Many of these educational initiatives lack structure and formal evaluation, and there is a shortage of individuals who have received proper training for delivering education in this context. Similarly, a survey conducted by the Healthcare Commission in 2006 reveals that individuals with diabetes in England are not receiving adequate information to enhance their self-management efforts [12]. Only a small percentage of respondents had participated in educational courses on diabetes and its management. Furthermore, a significant portion of respondents lacked awareness of their diabetes type. This underscores the need for standardized and comprehensive education programs for individuals with diabetes to improve their understanding and self-management capabilities. Several studies did not center on interventions for enhancing the quality of the

self-management skills. Given the evolving shift of the pharmacist's role from drug supply to active drug therapy management, an updated, comprehensive review is essential to synthesize the contemporary evidence regarding the pharmacist's role in fostering self-management skills among diabetes patients. This review aims to assess the efficacy of pharmacist-led interventions in bolstering self-management to enhance clinical and patient-reported diabetes outcomes.

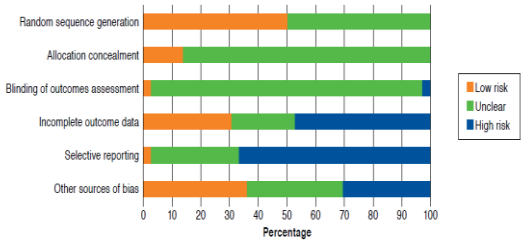
Methods

In accordance with PRISMA guidelines, this review followed an extensive literature search. The search encompassed terms like "pharmacist," "diabetes," and "self-management," across databases such as PubMed, Embase, and the Cochrane Library spanning from the database's inception to September 2022. A study was considered for inclusion in the analysis if it met the following conditions: (1) the study population consisted of individuals diagnosed with diabetes, excluding gestational diabetes; (2) the intervention targeted patients' self-management within an ambulatory care setting; (3) the intervention involved the participation of a pharmacist or a member of the pharmacy team; (4) data related to one or more outcome measures were reported, such as HbA1c levels, diabetes self-care activities, and adherence; (5) the study design was a randomized controlled trial; (6) the full text article was available in English; and (7) the publication was an original study published in a peer-reviewed journal.

The subsequent information was extracted from the studies included in the analysis: general attributes of the study, details about the study population, duration of follow-up, the number and duration of interaction moments within the intervention, a comprehensive overview and components of the intervention (encompassing elements like diabetes education, medication, lifestyle modification, formulation of individual care plans or goal-setting strategies, enhancement of self-management skills, self-monitoring of blood glucose, and other components), the type of intervention (group or individual), education provided to the intervention team, clinical outcomes (including HbA1c levels, blood glucose measurements, blood pressure readings, BMI values, lipid profile data, and additional relevant parameters), and patient-reported outcomes (covering factors such as adherence, diabetes knowledge, quality of life, self-care and self-management skills, and other pertinent factors) as detailed in Supplementary Table 2. Additionally, the presence of tailored interventions, wherein the approach was customized to meet the specific needs of individual patients, was also documented. The classification of a study as tailored was established when the author explicitly communicated this aspect within the research paper. Interventions across the included studies were analyzed and described narratively.

Results

A total of 22 studies, including more than 3,000 patients, were incorporated [13-34]. Pharmacist-led self-management interventions encompassed education on diabetes complications, medication, lifestyle, and instilling self-management skills. Several studies adopted a tailored approach based on patient requirements. Four of the included studies had a cluster randomized design and 19 were randomized controlled trials. All studies were published from 2005 onwards. Most of the studies were conducted in North America, followed by Asia, Europe, Australia, and South America. The majority of the studies focused primarily on diabetes mellitus type 2 patients. The assessment of bias across the 22 included studies showed varying degrees (Figure 1). In exactly half of these studies (50.0%), the allocation sequence was adequately generated. Concealment of the allocation sequence and blinding of outcome assessors were observed in a minority of studies (13.9% and 2.8%, respectively). The presence of potential bias due to selective outcome reporting was identified in the majority of studies (97.3%). Only 11 studies (30.6%) presented complete outcome data, while 13 studies (36.1%) were devoid of other sources of bias. The interventions offered in the studies that were included were administered by trained pharmacists, either individually or as part of a multi-disciplinary team. One study did not specify the composition of the intervention team beyond the inclusion of a pharmacist



(Figure 1): Risk of Bias in Included Studies Presented as Percentage Across All Studies

[17]. The majority of interventions were geared towards individual patients, although a subset of interventions was delivered through group sessions [20-24]. The interventions displayed variability in terms of their intensity and the quantity and nature of their components. This intensity, gauged by the frequency of contact moments, exhibited variations across the studies, spanning from weekly interactions to sessions occurring once every three months. The studies reported instances of face-to-face engagement with pharmacists, as well as combinations of face-to-face meetings and telephone communications with these professionals [26-31]. While the total duration of contact varied among the studies, not all of them presented this information. Notably, self-management skills support was integrated into the intervention in 17 studies, and 13 studies involved training participants in self-monitoring blood glucose. Moreover, 12 studies incorporated the use of individual care plans or goal-setting strategies to enhance the outcomes associated with diabetes management.

Discussion

This review presents compelling evidence suggesting the advantageous impact of pharmacist-led self-management interventions for patients with diabetes which is in agreement with previous review studies [35]. All the studies included in the analysis relied on proxies to gauge the effects of self-management interventions; a minority of them directly assessed the influence of these interventions on self-management skills. On the whole, the interventions led by pharmacists yielded positive outcomes across a range of parameters. The findings demonstrate favorable effects on HbA1c values, blood pressure, BMI, and self-management skills. Additionally, the results imply that pharmacist-led self-management interventions enhance medication adherence, diabetes knowledge, and quality of life [13, 17-19, 21, 23-25]. The results revealed a significant decrease in HbA1c values due to pharmacist-led interventions. This reduction's magnitude (-0.71%) is clinically significant and can potentially correlate with a decreased risk of microvascular complications [36].

These findings align with Another study reported a combined effect of -1.00 ± 0.28% on HbA1c values [37]. However, it's important to note that their review encompassed various types of pharmacist interventions for diabetes patients. In comparison to systematic reviews exploring the effects of self-management interventions led by physicians, nurses, or diabetes educators, the impact of pharmacist-led self-management interventions was more than threefold greater [38]. The value added by pharmacist-led interventions in achieving diabetes-related goals is corroborated by Greer et al., revealing a statistically significant relative risk of 1.83 [21], in favor of diabetes patients benefiting from pharmacist-led disease management. The breadth of intervention content within the included studies is also consistent with earlier reviews [21, 37, 39], underscoring the diverse nature of these interventions.

Fifteen studies were conducted to assess alterations in systolic blood pressure across the study duration. In each of these studies, the intervention group displayed a decline in average systolic blood pressure from the study's initiation to the final follow-up [13-21, 23, 25, 27, 30, 32, 34]. Furthermore, 15 studies demonstrated that the intervention group showcased a more substantial enhancement in this measure compared to the control group. The variance in the change between the groups spanned from -3.3 mmHg to -23.05 mmHg, with statistical significance established in only 9 studies. Nonetheless, one study revealed baseline mean discrepancies between the intervention and control groups, and adjustments for this variance were not appropriately carried out. Pertaining to diastolic blood pressure, 12 studies provided data on this unique

parameter. Across all these studies, average diastolic blood pressure exhibited a decrease within the intervention group throughout the follow-up period. Notably, 14 studies underscored a more significant reduction in this aspect within the intervention group relative to the control group, as depicted. Nonetheless, statistical significance was observed in merely a third of the studies, indicating a difference in change from baseline to final follow-up between the intervention and control groups. The range of change between the groups spanned from -0.21 mmHg to -9.1 mmHg. Health-Related Quality of Life Analysis: Among the studies, examinations incorporated Health-Related Quality of Life (HRQoL) as an outcome metric [28-33]. A diverse array of tools were employed to assess this parameter. Generic tools, like the 36-Item Short Form Health Survey and the EuroQoL-5 Dimension questionnaire, were employed in seven studies, enabling applicability across various health conditions and ailments. On the other hand, three studies utilized tools tailored specifically for diabetes, such as the Audit of Diabetes-Dependent Quality of Life questionnaire and the Diabetes Quality of Life questionnaire, while one study employed a combination of both generic and diabetes-specific tools. The majority of the studies exhibited a heightened HRQoL (comprising overall or subdomain scores) within the intervention group from baseline to the final follow-up, surpassing improvements observed in the control group. Outcomes obtained from the EuroQoL-5 Dimension questionnaire, employed to gauge HRQoL, yielded mixed results. One study showed a 0.06 improvement within the intervention group during the follow-up period, whereas another study recorded a decline of 0.04. Notably, only one study reported a statistically significant variance in the change between the intervention group and the control group [17].

Collective evidence stemming from the studies encompassed in this analysis suggests that pharmacist interventions targeted towards individuals with type 2 diabetes can wield a constructive influence on clinical outcomes. This is exemplified by the observable reduction in A1c, blood glucose, blood pressure, and BMI, as well as the enhancement in the lipid profile within the intervention group during the follow-up period across nearly all studies. In comparison with the control group, the impact of pharmacist interventions on these metrics consistently surfaced as more pronounced in the intervention group across most studies. Notably, some of these studies underscored the statistical significance of the disparity in the change between the two groups [21, 22].

However, it's pertinent to acknowledge that not all studies yielded a statistically significant difference in these outcomes. This variability could be attributed to several factors, such as limited sample size, abbreviated follow-up duration, potential cross-contamination between patients in the intervention and control groups, dissimilar statistical methodologies employed for analysis (including paired-samples or independent-samples tests), and potential discrepancies in baseline values between the study groups.

In a majority of the studies incorporated in this analysis, the trend favored the pharmacist interventions when considering medication adherence. This trend aligns with the observations made in two prior systematic reviews that delved into the influence of pharmacist interventions on this specific outcome. These findings collectively imply that pharmacists, through their orchestrated interventions, could potentially wield a pivotal role in bolstering adherence to prescribed medications among individuals with type 2 diabetes. This, in turn, could yield a positive impact on the overall treatment outcomes. Notably, in certain studies scrutinizing this parameter, the observed surge in medication adherence within the intervention group throughout the follow-up duration coincided with an amelioration in other indicators, such as A1c levels, blood pressure, and lipid profile. It's crucial to acknowledge that the primary approach commonly employed to gauge medication adherence (self-reported adherence) might potentially lead to an overestimation of actual adherence rates. This should be taken into account when interpreting the outcomes.

Conclusions

This comprehensive systematic review offers compelling evidence that pharmacist-led interventions wield a constructive impact on the metabolic control, medication adherence, and Health-Related Quality of Life (HRQoL) of individuals grappling with type 2

diabetes. These encouraging findings underscore the potential of integrating pharmacists into healthcare teams for the effective management of this specific patient demographic.

The extensive dataset accumulated within this review opens up the possibility of conducting a meta-analysis in the foreseeable future. By focusing on a more homogenous subset of studies from the current review, it could be feasible to perform a comprehensive analysis of specific outcomes. Subsequent studies that aim to assess the efficacy of pharmacist interventions in the context of type 2 diabetes management should encompass a diverse range of endpoints, encompassing clinical, humanistic, and economic dimensions. Furthermore, for specific outcomes such as medication adherence, it is advisable to adopt meticulously accurate methodologies in order to furnish more dependable evidence pertaining to the impact of the intervention under scrutiny.

Future research endeavors should delve deeper into identifying the pivotal elements within the interventions that contribute most significantly to the observed effects. Furthermore, dedicating efforts to constructing standardized and rigorously validated assessment tools for specific outcomes, like HRQoL, could enhance the analytical potential of pooling data from various studies concerning these domains.

Conflict of interests

The authors declared no conflict of interests.

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