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Review

Effects of Pharmacy-Based Interventions on the Control and Management of Diabetes in Adults: A Systematic Review and Meta-Analysis



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Key Messages

- Pharmacy-based interventions have significant positive effects on lowering glycated hemoglobin level and body mass index unit, which associated with diabetes-related complications.
- Effect of pharmacy-based interventions on the health-care utilization and quality-adjusted life years is not clear.

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ABSTRACT

Objectives: The aim of this systematic review and meta-analysis was to evaluate the effects of pharmacy-based interventions on clinical outcomes associated with diabetes-related complications as well as on nonclinical outcomes in people with diabetes.

Methods: We searched 4 main databases (MEDLINE, EMBASE, CINAHL and Cochrane Central Register of Controlled Trials) for studies that considered clinical and nonclinical outcomes of pharmacy-based interventions among people with diabetes. Clinical outcomes included patients' mean reductions of glycated hemoglobin (A1C) levels and body mass indexes (BMIs). Nonclinical outcomes included patients' health-care utilization and quality of life. A meta-analysis was conducted to estimate the pooled net mean difference in clinical outcomes between the pharmacy-intervention and the control groups.

Results: Of the 44 studies included in the systematic review, 32 studies reported results from randomized controlled trials measuring reductions of A1C levels in 4,132 patients. Meta-analysis revealed that the standardized absolute mean difference in reduction of A1C levels from baseline to the time of the last follow up significantly favoured the pharmacy intervention versus the control group (0.96%; 95% CI 0.71 to 1.22; $p < 0.001$). Of the studies, 13 reported BMI kg/m^2 in 1,827 patients. The estimation of standardized absolute mean difference in reduction of BMI unit calculated through meta-analysis was 0.61 (95% CI 0.20 to 1.03; $p = 0.000$) in favour of the pharmacy-intervention group.

Conclusions: Pharmacy-based interventions have significant positive effects on controlling 2 major risks factors associated with diabetes-related complications: A1C levels and BMI. However, there is a dearth of evidence about the effects of pharmacy-based intervention on nonclinical outcomes, including health-care utilization and quality of life.

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R É S U M É

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Objectifs : L'objectif de cette revue systématique et de cette méta-analyse était d'évaluer les effets des interventions en pharmacie sur les résultats cliniques associés aux complications du diabète ainsi que sur les résultats non cliniques chez les personnes diabétiques.

Méthodes : Nous avons fouillé les 4 bases de données principales (MEDLINE, Embase, CINAHL et Cochrane Central Register of Controlled Trials) pour y relever les études qui avaient tenu compte des résultats cliniques et non cliniques des interventions en pharmacie chez les personnes diabétiques. Parmi les résultats cliniques, on a noté des réductions moyennes des concentrations de l'hémoglobine glyquée (A1c) et de l'indice de masse corporelle (IMC) chez les patients. Parmi les résultats non cliniques, on a noté l'utilisation des soins de santé et la qualité de vie. Nous avons mené une méta-analyse pour estimer la différence moyenne nette totalisée des résultats cliniques entre les groupes d'interventions en pharmacie et les groupes témoins.

Résultats : Parmi les 44 études incluses à la revue systématique, 32 études rapportaient les résultats d'essais cliniques à répartition aléatoire qui avaient mesuré les réductions des concentrations de l'A1c chez 4132 patients. La méta-analyse révélait que la différence moyenne standardisée absolue dans la réduction des concentrations de l'A1c du début jusqu'au dernier suivi avait favorisé de manière significative les groupes d'interventions en pharmacie par rapport aux groupes témoins (0,96 %; IC à 95 % de 0,71 à 1,22; $p < 0,001$). Parmi les études, 13 faisaient état de l'IMC kg/m^2 de 1827 patients. L'estimation de la différence moyenne standardisée absolue dans la réduction de l'IMC calculée dans le cadre de la méta-analyse était de 0,61 (IC à 95 % de 0,20 à 1,03; $p = 0,000$) en faveur des groupes d'interventions en pharmacie.

Conclusions : Les interventions en pharmacie ont des effets positifs considérables sur la maîtrise de 2 facteurs de risque majeurs associés aux complications du diabète : les concentrations de l'A1c et l'IMC. Toutefois, il manque de données probantes sur les effets des interventions en pharmacie sur les résultats non cliniques, dont l'utilisation des soins de santé et la qualité de vie.

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Introduction

Diabetes is 1 of the most prevalent and costly diseases; it is the sixth leading cause of disability around the world (1). Diabetes can lead to extensive damage to the microvascular and macrovascular body systems (2). Recent evidence demonstrates an increase in the global prevalence of type 2 diabetes over the past few decades, and these trends are predicted to continue (3,4). However, promotion of community-based interventions, including early screening programs and education about how to effectively self-manage the condition, can lead to a decrease in the burden of diabetes and related complications (5).

Glycated hemoglobin (A1C) levels are a universally accepted measurement of long-term blood glucose control. Decreasing A1C levels has been shown to reduce microvascular complications in clinical trials and macrovascular complications in long-term follow-up studies (6,7). Some of the complications that occur with diabetes can be addressed by lifestyle interventions. One of the main risk factor for diabetes is obesity; an increased body mass index (BMI) is associated with the development of type 2 diabetes and/or diabetes-related complications (8,9).

Diabetes is a chronic disease that requires treatment over a long time period, and health-care professionals have pivotal roles in contributing to diabetes management and control (10). Increasingly, pharmacists are being recognized as having strategic positions in the health-care system due to their accessibility and the expanding scope of their practice. Pharmacists' positive contributions to the long-term prognosis of patients with type 2 diabetes are realized, in part, by improvements in helping these patients control and manage their condition (11).

Pharmacy-based interventions include a wide range of services that aim to enable patients with diabetes to have greater control and management of their disease, such as pharmacist consultations, patient education about self-monitoring and self-management, preventive programming about lifestyle modifications, reminders about annual physical examinations, medication therapy adherence assistance, providing information about the correct use of insulin, antihyperglycemic medications and oral hypoglycemic agents and other interventions to increase awareness of diabetes management.

Recent reviews of the effectiveness of pharmacy interventions have demonstrated their positive impact on clinical outcomes. These positive impacts likely reduce the burden of diabetes-related complications and, by doing so, subsequently lead to reductions in diabetes-related morbidity and mortality (11–14).

Although systematic reviews have evaluated the clinical and nonclinical effectiveness of pharmacy-based interventions in patients with diabetes (11–13), no recent work has calculated the pooled effect of pharmacy-based interventions on mean reductions in A1C levels, except 1 meta-analysis that was conducted in 2007 (15). Therefore, previous reviews noted that there is a need to conduct a future and updated meta-analysis (12). The aim of this systematic review and meta-analysis was to evaluate the effects of pharmacy-based interventions on clinical outcomes associated with diabetes-related complications as well as nonclinical outcomes in people with diabetes. We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines in conducting this systematic review and meta-analysis. The Population, Intervention, Comparison, Outcome and Study (PICO) design for this study was defined to focus the research question following PRISMA guidelines: We considered all patients with diabetes (level of A1C > 6.5%) as the population; pharmacy-based interventions as an intervention; mean change of A1C level, BMI, health-care utilization and quality of life as outcomes; usual care as a comparison; and randomized control trials (RCTs) and nonrandomized studies with the comparator group as study designs. We performed the meta-analysis to assess the pooled effect of pharmacy interventions on the mean reductions of A1C and BMI (kg/m^2) levels.

Methods*Search strategy*

In February 2017, a search strategy was used to retrieve all relevant studies from the following databases: MEDLINE, EMBASE, CINAHL and Cochrane Central Registered for Controlled Trials. The search strategy was developed with the assistance of a medical information specialist in MEDLINE via OVID. Keywords used in the search

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