Factors Affecting the Level of Glycosylated Hemoglobin in Patients with Diabetes: A Systematic Review

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ABSTRACT

Introduction: *Diabetes is considered to be the most commonly diagnosed disease of metabolic disorders and a global challenge. Given that hemoglobin glycosylated (HbA1C) shows us blood glucose over the past 8-12 weeks, and a Standard Criterion for long-term control of blood sugar. And was the need for a systematic study to examine the factors affecting this type of hemoglobin in diabetic patients. Therefore, this systematic review was conducted to determine the Factors affecting the level of glycosylated hemoglobin in patients with diabetes.*

Materials and Methods: *The present study is a systematic review study that Searching articles on search engines, scholar, Embassy, Science direct, Google Scholar, and Pub Med in English and English were searched by search engines, sites and databases. Using the published articles in the last 25 years about the factors influencing the level of hemoglobin glycosylated in diabetic patients. In the first stage, 36 articles were found. Of these, 10 articles related to the topic that were published in the last 25 years were reviewed.*

Results: *In this study, various studies were conducted. One of them was a study aimed at determining the effect of self-management program on blood glucose and glycosylated hemoglobin in patients with type 2 diabetes, showed that two months after the intervention, blood glucose and hemoglobin glycosylated in the intervention group improved was significantly before intervention. These changes were not seen in the control group. In addition, after intervention, there was a significant difference between the two groups in terms of glycosylated hemoglobin.*

Conclusion: *The results of the studies showed the effective factors on glycosylated hemoglobin affect diabetic patients. One of them is a self-managed program which leads to improved blood glucose levels and decreased hemoglobin glycosylated levels in people with type 2 diabetes. And it can be said that self-management promotion program can be used as a strategy to improve the health of the patients concerned.*

Keywords: *Hemoglobin glycosylated, Diabetes, Diabetic patients, HbA1C, Effective factors*

INTRODUCTION

Diabetes is the most commonly diagnosed disease of metabolic disorders and a major global challenge. This disease is a chronic, metabolic disease characterized by increased levels of glucose in the blood. Diabetes is also a major cause of morbidity and mortality in the industrialized world (1-6). It is estimated that about 2 percent of the general population in Iran and 7.3 percent of people over 30 have diabetes. The disease with its complications is not reversible in many cases (7-12). Patients with diabetes also have a higher risk of developing cancers than the general population (13, 14). In general, diabetic complications can cause many diseases. Most studies have shown this that Patients with diabetes who are less self-healing have more complications, such as blindness, depression, foot ulcer, etc. (15). Among patients with diabetes, one of the most common psychiatric disorders is depression (16). This disorder is one of the most common and debilitating problems for youth and adolescents. (17, 18). Depression and daily stress

may cause some health disorders (19). High occupational stress is known as a known psychosocial factor in cardiovascular disease (20). Diabetes is also one of the most common endocrine complications in thalassemic patients (21). Thalassemia is a hereditary condition of the disease, which is associated with several complications (22-24).

Compliance with a diet plan and diet in diabetic patients is one of the pillars of diabetes management. Lifestyle, including nutritional behaviors, plays an important role in preventing and managing diabetes. However, compliance with a diabetic diet is one of the most important challenges in controlling diabetes (25). Researches findings have shown that it is possible that almost all aspects of people's lives can be affected by diabetes (26-28).One of the most important preventive methods is to control blood glucose in addition to training diabetic patients for foot care. Given that hemoglobin glycosylated (HbA1C) shows us blood glucose over the past 8-12 weeks, and a Standard Criterion for long-term control of blood sugar. And was the need for a systematic study to examine the factors affecting this type of hemoglobin in diabetic patients. Therefore, this systematic review was conducted to determine the Factors affecting the level of glycosylated hemoglobin in patients with diabetes.

MATERIALS AND METHODS

In this systematic study, the studies studied were in English or Persian, access to their full text was possible. And unnamed studies were deleted without history and non-academic. To achieve relevant studies, a wide range of keywords including hemoglobin glycosylated, diabetes, diabetic patients, HbA1C, and effective factors was used as a one-to-one search, combined with the method "And" and "OR". In order to achieve the goal of the study and to improve the accuracy of its study and its comprehension, this integrated overview study was conducted based on the Broome method. The purpose of this method was to achieve the purpose of the study and to enhance the study's thoroughness and comprehension. The method is based on three steps in the search of texts, data evaluation and data analysis. In the search phase of the texts, the studies after the retrieval were examined in terms of the criteria for entering the study in four stages. After obtaining the terms of entry into the study, the content of the study is evaluated and at the end the analysis

of the data was done. The present study is a systematic review study that Searching articles on search engines, scholar, Embassy, Science direct, Google Scholar, and Pub Med in English and English were searched by search engines, sites and databases. Using the published articles in the last 25 years about the factors influencing the level of hemoglobin glycol slated in diabetic patients. In the first stage, 36 articles were found. Of these, 10 articles related to the topic that were published in the last 25 years were reviewed.

RESULTS

The result of a study that was done to determine the effect of zinc supplementation on glycosylated hemoglobin in type 2 diabetic patients. The mean serum zinc concentration and hemoglobin glycosylated dose at 25 mg after administration of zinc level did not show any significant changes. But in the dose of 50 mg, serum zinc concentrations showed a significant increase compared to zinc injection after Zn administration. And the level of hemoglobin glycosylated significantly decreased significantly after intervention. In both groups, there was no significant difference between fasting blood glucose and glucose 2 hours after meal before and after intervention (29).The result of a study that was done to determine the effect of Cinnamon on HbA1c in type 2 diabetes patients, showed that there was no significant difference in hemoglobin glycosylated levels between the two groups of cinnamon and placebo on the first day and 60 days after the intervention (30).The result of a study that was done to determine The effects of cranberry on glucose levels and HbA1C with type 2 diabetes patients, showed that there was no significant difference in the characteristics of the subjects (age, FBS, HbA1c) between the two groups at the beginning of the study. In the group receiving cranberry, the FBS and HbA1c factors decreased significantly in comparison with the control group at the end of 6 weeks (31).The result of an another study that was done to determine the effect of self-care behaviors training on glycosylated hemoglobin in diabetic patients, the mean of hemoglobin glycosylated before intervention in intervention and control groups was 1.66±8.18 and 2.10±8.41, respectively. Which after the intervention reached 1.48±7.78 and 2.11±8.82, respectively (32)? In one study, personality stress, cortical and HbA1c; and personality type with cortical

and HbA1c; cortical also had a significant correlation with HbA1c. Based on the regression analysis, the stress factor alone and in combination with the personality type had an effect on HbA1c.Also, stressor alone and with personality type was effective on cortical levels (33).There was no significant correlation between daily sleep hours and fasting blood glucose and hemoglobin glycosylated levels in a study. However, the high sleep rate increased the mean of both tests, but this amount was not statistically significant (34).The result of a study that was done to determine the effect of oral vitamin C on fasting blood glucose and hemoglobin glycosylated levels in patients with type 2 diabetes mellitus, it was shown that in the control group, the reduction in biochemical indices was significantly more than the control group. This means that there was a significant difference between the two groups after the intervention (35).The result of an another study showed that as a result of exercise exercises in water in the experimental group, body mass index, waist to hip ratio and body fat percentage decreased significantly. Independent t-test also showed that HbA1C showed a significant decrease in the control group compared to the control group compared to the control group (36). The reduction of HbA1c and fasting glucose levels after 8 weeks of aerobic training was not significant in the experimental group. But serum insulin and insulin resistance significantly decreased.

There was no significant difference between the values of HbA1c and fasting glucose in the experimental and control groups; however, there was a significant difference between insulin serum levels and insulin resistance in the two groups (37). In a study that aims to determine the effect of self-management program on blood glucose and glycosylated hemoglobin in patients with type 2 diabetes, showed that two months after the intervention, blood glucose and hemoglobin glycosylated in the intervention group improved was significantly before intervention. These changes were not seen in the control group. In addition, after intervention, there was a significant difference between the two groups in terms of glycosylated hemoglobin (38).

DISCUSSION AND CONCLUSION

According to the results of study (29), Zinc levels in diabetic patients can be said to reduce glycosylated hemoglobin and improve the control of the disease in them. It seems that some of the diabetic patients suffer from a lack of zinc and this would create disturbances in the control of their disease.In study (30), the use of one gram of cinnamon for 60 days did not decrease hemoglobin glycosylated in type 2 diabetic patients. However, it is suggested that further studies with higher levels of cinnamon and longer duration of use be proposed. In the case of study (31), It can be said that the reduction of fasting blood glucose and hemoglobin gyrated by cranberry use is valuable in controlling diabetes. The incidence of these changes is probably due to anthocyanin compounds in cranberry. In the case of study (32), It can be concluded that self-care behaviors training program has been effective in reducing glycosylated hemoglobin in diabetic patients. And can be used by nurses and other health staff as an appropriate method for controlling diabetes in patients.

In the case of study (33), it can be said that personality stress and type are correlated with serum cortical and HbA1c and personality type acts to increase the effect of stress on diabetic patients. In the case of study (34), it can be said that high levels of sleep cause an increase in fasting blood glucose and hemoglobin glycosylated levels in diabetic patients. In the case of study (35), it can be said that vitamin C can reduce the level of glycosylated hemoglobin and fasting blood glucose in patients with type 2 diabetes through competition with glucose. According to study (36), it can be suggested that eight weeks of sports activities in the water by reducing anthropometric indices, the levels of CRP, Glycosylated hemoglobin and also, the index of insulin resistance can prevent type 2 diabetes and its metabolic complications. According to study (37), It can be said that aerobic training for 8 weeks with increasing severity in type 2 diabetic women, it affects serum insulin levels and insulin resistance index, but the level of HbA1c and glucose in fasting blood does not have much effect. According to study (38), it can be said that self-management program results in improved blood glucose and decreased hemoglobin glycosylated levels in type 2 diabetic patients. Therefore, self-management promotion program can be used as a strategy to improve the health of the patients.

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