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Review Article

Insulin Self-Management in Patients with Diabetes and Web-Based Mobile Training

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Abstract

Diabetes is one of the most significant health problems today. Insulin is the cornerstone of diabetes treatment as a life-saving treatment for patients with type 1 diabetes and a therapeutic option for patients with type 2 diabetes. Administering insulin correctly and effectively is of extreme importance for patients with diabetes. Self-management in insulin treatment and the ability of patients to carry out the treatment by themselves are quite important for the success of the treatment. Continuous and effective training should be provided to patients for successful self-management in insulin therapy. Numerous training methods have been used in patients with diabetes from the past to the present, and one of these methods is web-based education. In this review, insulin self-management and web-based diabetes training are discussed.

Key words: diabetes; insulin treatment; insulin self-management; web-based mobile training

Summary

Diabetes Mellitus

Diabetes mellitus (DM) is the common name for heterogeneous metabolic disorders characterized by chronic hyperglycemia as the main manifestation [1,2]. According to the data from the International Diabetes Federation (IDF), currently, there are 537 million people with diabetes worldwide. The total number of people with diabetes is expected to reach 643 million by 2030, and 783 million by 2040. This figure is quite significant, and according to 2021 data, a total of 6.7 million people has died due to diabetes [3]. Insulin therapy is one of the most important and indispensable treatments for patients with diabetes. The effective and proper use of insulin therapy is extremely important in protecting against complications of diabetes and slowing its progression [4-6].

Insulin Therapy

Insulin is a molecule synthesized in the endoplasmic reticulum (ER) of beta cells in the islets of Langerhans and plays a key role in the development and progression of the diabetes clinic as it plays the main role in glucose homeostasis [7]. Today, insulins are analog insulins expressed as human-sequenced insulin produced by recombinant DNA technique. Bovine and porcine insulins and semi-synthetic insulins derived from swine are also available [8].

Insulin therapy is the administration of insulin that cannot be synthesized or actively used in patients with diabetes. Insulin is only effective when used properly. Improper use of insulin leads to failure in its absorption, hardening of the insulin injection site, and, most importantly, failure to regulate blood glucose levels to the desired level [9].

The structure of the fat tissue under the skin changes with repeated injections at the same site, leading to insufficient absorption of insulin. To prevent complications, proper care should be taken at the injection site, and the injection should be carried out properly.

Insulin Self-Management in Individuals with Diabetes

With the discovery of insulin, self-management has become the most important component of the new era in diabetes treatment. The ability of individuals with diabetes to continue their insulin therapy by themselves, and gain the skill to administer insulin has become the main goal. The scope of insulin therapy self-management is as follows:

- The patient should be able to monitor his/her blood glucose regularly,
- The patient should be able to adjust the insulin dose according to the blood glucose level,

- The patient should know the hypoglycemia values well, and avoid insulin doses that will cause hypoglycemia,
- The patient should know the types and properties of insulin,
- The patient should administer injections with the right technique, at the right dose, and at the right time,
- The patient should know the insulin injection sites, and be able to know how to perform injection site rotation both in the selected site and between the sites,
- The patient should know the absorption rate of insulin according to the site, and the factors affecting this rate,
- The patient should know the insulin storage conditions,
- The patient should know which type of insulin he/she is using, and its mechanism of action,
- The patient should know the complications that may occur due to insulin, and how to prevent these complications,
- The patient should know the insulin transportation conditions,
- The patient should know how to adjust insulin dose according to his/her diet, exercise,
- The patient should know the steps to correctly and effectively perform insulin injections [10,11].

  Most patients do not effectively and properly administer insulin, leading to an increase in irreversible complications in the future. Healthcare team members who plan, implement, evaluate, and follow up on the results of this self-management training have important responsibilities [12].

Web-Based Mobile Training in Diabetes

Today, in line with the advances in technology, web-based applications have gradually increased and started to have an important place in the management of diabetes. Web-based applications are more effective than other training materials in terms of continuity and permanence.

Jain et al. [13] investigated the views of patients and healthcare professionals on technology-aided self-management training on diabetes and found that patients generally prefer technologies with reliable information that is easy to access, use, and apply.

Poduval et al. [14] investigated the applicability, acceptability, and potential impact on diabetes self-management of the HeLP-Diabetes application, a web-based structured training program for patients with type 2 diabetes. They argued that the training in the application proved to be applicable and acceptable, and also positively improved the management of diabetes.

Xia et al. [15] investigated the effect of the web-based WeChat and TangPlan applications that supports self-management in patients with type 2 diabetes on metabolic values, and found that glycemic controls were achieved, serum lipid values improved, and body weight was reduced at the end of the six-month application.

Murray et al. [16] developed an evidence-based, theoretically informed web-based self-management program to improve the self-management of individuals with diabetes, and implemented the program after the initial diagnosis in primary health care services. At the end of the follow-up, they concluded that it was an effective self-management program in primary health care services.

Olson et al. [17] developed a web-based self-management program to support diabetes management, and evaluated the outcomes of people with diabetes. Their MyDESMOND web program is a digital diabetes training and support program for individuals with diabetes, and it is also the first evidence-based digital training and support program for Australians. As a result of their research, Olson et al. stated that they achieved positive outcomes in the management of diabetes.

Studies also show that web-based applications are used effectively in diabetes management. However, the training is generally provided as diabetes management with content consisting of diet, exercise, and drug treatment. Training on insulin therapy, which is a crucial aspect of diabetes management, is very limited. The significance, continuity, and longevity of training for the proper application of insulin therapy, which constitutes an important step in diabetes management, are emphasized.

Gentile et al. [18] investigated the reason for the development of lipohypertrophy in the majority of individuals with diabetes receiving insulin, and revealed that lacking training has a significant impact and that even in initially trained participants, training on correct injection techniques has a temporary effect if it is not regularly memorized. They emphasized the importance of continuity and effectiveness of training to improve the knowledge and skills of patients.

The insufficient number of studies designed for the management of insulin therapy in individuals with diabetes in the literature indicates an important gap in the literature and the need for further, comprehensive research. New studies are needed in this area.

Abbreviations

DM: Diabetes Mellitus

IDF: International Diabetes Federation

ER: Endoplasmic Reticulum

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