Assessment of the knowledge on insulin therapy among adult diabetics patients in Jabir Abuleiz center, Khartoum, Sudan

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ABSTRACT

Objectives: The objective of the study is to assess the knowledge and practice concerning insulin therapy in adult diabetic Sudanese patients and relate it with their control of diabetes and selected demographic variables. Methods: Personal interview, using a specific pretested designed questionnaire was used to collect data from 200 adult diabetic patients in Jabir Abuleiz center in Khartoum state. Result: The result showed that only 15% of the respondent had adequate knowledge about insulin use. Also, good knowledge was associated with a higher level of education and good glycemic control (P < 0.001). Conclusion: Knowledge about insulin therapy has an important role in the control of diabetes mellitus. Those who are knowledgeable about insulin therapy are more likely to have good control of HbA1c.

Keywords: Diabetes, insulin, knowledge, Sudanese

Introduction

Diabetes mellitus (DM) is a group of metabolic diseases, characterized by high blood glucose levels caused by a relative or absolute insulin deficiency. World Health Organization (WHO) has estimated that about 366 million individuals will be affected by DM in the world by the year 2030.[1] More than 3 million patients decease yearly with underlying DM.[2,3] DM is considered the leading cause of death in most developing nations.[4,5] This might be endorsed to poorly controlled hyperglycemia, which is correlated with several life-threatening complications such as renal failure and cardiovascular diseases.[6] Optimal glycemic control is obligatory to decrease morbidity and mortality of DM via the prevention and/or delay of complications.[7] Best glycemic control can be only accomplished when the patients are adherent to self-management behaviors like a healthy diet, physical activity, monitoring of blood glucose, taking medications appropriately, ability to resolve diabetes problems, and healthy coping.[7,11]

Primary care physicians or family physicians are frontline care providers in the management of diabetes and its complications. Routine management of diabetes is increasingly delivered in primary care where patients can receive care closer to home, but this could not be achieved without adequate knowledge of patients toward insulin therapy. Despite the abundance of guidelines high quality of care is not always achieved; risk factor control continues to be suboptimal, with international variation in the achievement of clinical targets. Interventions to improve diabetes management are not always successful, with limited impact on clinical outcomes.[12]

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Insulin therapy presents many challenges because of difficulties associated with its complicated use. Adequate knowledge of its use can help to prevent complications, adverse patient outcomes, poor adherence to therapy, and always poor glycemic control. Nevertheless, the knowledge scores of patients with DM were not satisfactory. Educating patients on insulin helps to improve self-confidence and arrogance of contribution in their management. Furthermore, an appropriate injection technique is important for accurate delivery to subcutaneous tissues and to avoid intramuscular injuries and lipo hypertrophy. The American Diabetic Association created a set of guidelines for insulin storage, mixing of insulin, proper use of insulin syringe, and other considerations. However, patients particularly in developing countries may not follow the guideline due to low socioeconomic problems.

Although insulin is recognized as the ideal treatment for DM, a lack of knowledge and coordination among physicians and patients regarding appropriate insulin use is reported. A limited study has been done in Sudan that focused on the knowledge of insulin administration among patients with DM. Therefore, this study aimed to assess knowledge of diabetic patients regarding insulin at Jabir Abuleiz Center, which is the biggest diabetes specialized center in Khartoum, Sudan.

**Material and Methods**

This is a nonexperimental, cross-sectional study. A total of 100 participants were recruited from the outpatients and inpatients attending the Department of General Medicine and General Surgery.

The study was approved by the institutional ethics committee. Informed written consent to participate in the study was obtained from the study participants.

Both male and female adult patients with DM receiving insulin injections for more than 6 months duration and willing to participate in the study were included in the study. Participants who were not physically or mentally able to respond to the interview were excluded.

The sample size of the study was 200. It was estimated with 5% precision, 95% of confidence level and 50% anticipated proportion.

**Knowledge**

Knowledge refers to the correct responses given by the patients with DM on insulin therapy like the types and site of insulin injection, storage of insulin, rotation of the site, dosing and complications of insulin, transportation of insulin, disposal of insulin syringe/pen needle, and symptoms of hypoglycemia, which are assessed by using a structured interview guide.

The data were collected using structured questionnaires to assess the level of knowledge by 30 statements and modified 3-point Likert scale. The knowledge of the respondents was categorized as follows: (a) Poor: 0-10, Average: 11-20, and (c) Good: 21-30.

**Data analysis**

The collected data were coded, entered, and analyzed by using Statistical Package for Social Sciences version 20 software. Descriptive statistics such as frequency distribution and percentages were performed to summarize the result. Chi-Square test was used in bivariate analysis and \( P \) value considered as significant if <0.05.

**Results**

In total, this study enrolled 200 diabetic patients, of which 130 (65%) were males and 70 (35%) were females, and their mean age was 55.8 ± 8.2 years. The mean of DM duration was 15 ± 8.2 years and the duration of insulin therapy was 7 ± 6.1 years. For glycemic control, the mean of HbA1c was 8.6 ± 2.2% and 127 (63.5%) of cases were uncontrolled. More details of patients are presented in Table 1.

As illustrated in Figure 1, the levels of knowledge were moderate in 130 (65%) patients, poor in 42 (21%), and good in 30 (15%) patients.

**Table 1: The baseline characteristics of patients with diabetes mellitus**

| Characteristics            | n   | %   |
|----------------------------|-----|-----|
| Gender                     |     |     |
| Male                       | 130 | 65.0|
| Female                     | 70  | 35.0|
| Age (Yrs.); mean±SD        |     |     |
| <35                        | 4   | 2.0 |
| 35-45                      | 16  | 8.0 |
| 46-56                      | 77  | 38.5|
| 57-67                      | 97  | 48.5|
| >67                        | 6   | 3.0 |
| Education                  |     |     |
| Illiterate                 | 41  | 20.5|
| Primary                    | 72  | 36.0|
| Secondary                  | 32  | 16.0|
| Higher secondary           | 31  | 15.5|
| Graduate and above         | 24  | 12.0|
| Occupation                 |     |     |
| Unemployed                 | 109 | 54.5|
| Private                    | 27  | 13.5|
| Government                 | 26  | 13.0|
| Self-employed              | 38  | 19.0|
| Incomes (SDG)              |     |     |
| <10,000                    | 165 | 82.5|
| 10,001-20,000              | 27  | 13.5|
| 20,001-30,000              | 3   | 1.5 |
| >30,000                    | 5   | 2.5 |
| DM duration (Yrs.); mean±SD| 15±8.2|     |
| HbA1c (%)                  | 8.6±2.2|     |
| Uncontrolled (HbA1c >7%)   | 127 | 63.5|
| Duration of insulin therapy (Yrs.); mean±SD | 7±6.1 |
Table 2 reveals that the level of knowledge about insulin therapy was found to be associated with the level of education. The higher the level of education of the patients is, more the likelihood to be knowledgeable about insulin therapy (P value < 0.001).

Table 3 shows that the monthly income of the patients was not found to be significantly associated with levels of knowledge about insulin therapy (P value = 0.193).

As shown in Table 4, glycemic control was associated with knowledge about insulin therapy. It was observed that glycemically controlled patients were more knowledgeable than uncontrolled patients (P < 0.00).

Discussion

In this study, the percentage of good knowledge on insulin self-administration was found to be 15%. This was observed to be higher than 4% in Southern India,[9] lower than 33.3% in Egypt,[10] 52.5% in India,[11] 46% in Nepal,[12] 50.3% in Turkey,[13] and 70.4% in Tigray, Ethiopia.[14] The variation observed compared to other studies could be due to the differences in sample size, the operational definition used, and the methodology in general. Besides, the socioeconomic, cultural, and educational profile of the study population may create a significant variation between studies. Also, access to optimal education and demonstration of insulin self-administration by health care providers could be one of the factors in this discrepancy.

In this study, respondents who achieved secondary school and above were found to have increased rates of knowledge on insulin self-administration than primary school achievers and below (P value < 0.001). The finding was consistent with a study conducted in different countries.[15,16,17] This may be because good educational status gives good knowledge of diseases, disease treatment, importance, practice, and adherence to treatments.

Table 2: The association between knowledge about insulin therapy and levels of education

| Knowledge | Poor | Moderate | Good | P       |
|-----------|------|----------|------|---------|
| Illiterate| 21 (51.2%) | 20 (48.8%) | 0 (0%) | <0.001  |
| Primary   | 16 (22.2%) | 49 (68.1%) | 7 (9.7%) |         |
| Secondary | 1 (3.1%)  | 23 (71.9%) | 8 (25%)  |         |
| Higher secondary | 1 (3.2%) | 23 (74.2%) | 7 (22.6%) |         |
| Graduate and above | 2 (8.3%) | 15 (62.5%) | 7 (29.2%) |         |

Table 3: The association between knowledge about insulin therapy and income

| Knowledge | Poor | Moderate | Good | P       |
|-----------|------|----------|------|---------|
| <10,000   | 34 (20.6%) | 108 (65.5%) | 23 (13.9%) | 0.193   |
| 10,001-20,000 | 7 (25.9%) | 17 (63%) | 3 (11.1%) |         |
| 20,001-30,000 | 0 (0%) | 1 (33.3%) | 2 (66.7%) |         |
| >30,000   | 0 (0%)  | 4 (80%)  | 1 (20%)  |         |

Table 4: The association between knowledge about insulin therapy and glycemic control

| Knowledge | Poor | Moderate | Good | P       |
|-----------|------|----------|------|---------|
| Controlled (HbA1c ≤7%) | 5 (6.8%) | 50 (68.5%) | 18 (24.7%) | <0.001  |
| Uncontrolled (HbA1c >7%) | 36 (28.3%) | 80 (63%) | 11 (8.7%) |         |

Remarkably, the present study showed that insufficient knowledge of insulin use was associated with poor glycemic control among our series (P value < 0.001). These findings were in agreement with several previous studies like Bukhsh et al. in Pakistan,[18] Solanki et al. in India,[19] and Tahiya et al. in Saudi Arabia.[20]

Primary care physicians (PCPs) treat a vast majority of DM patients worldwide.[21] Thus, this work could provide to PCP and other health care professionals who treat patients with DM the latest information and figures in the current awareness of DM patients regarding the management of patients with type 2 DM.

This study is not without limitation, as the cross-sectional design of the study may not allow generalization of the study findings to the complete population in Sudan. Further research may be needed in Sudan to assess knowledge about insulin therapy. Despite these limitations, our study is novel and provides first-hand information to evaluate knowledge about insulin therapy among individuals with diabetes in Sudan. Diabetologists, PCPs, and pharmacists are needed to work together to increase the level of knowledge and self-care about diabetes.

Conclusion

DM imposes a lifelong threat on individuals and their families. This study showed that the level of knowledge on insulin therapy
was inadequate and associated with low educational levels and poor glycemic control. In addition, the study findings revealed that there is an immense need for education on diabetes and insulin therapy in PHCs.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. Informed consent was obtained for participation.

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**Summarization the key points**

- The level of knowledge on insulin therapy was suboptimal
- The level of knowledge on insulin therapy was associated with low educational
- The level of knowledge on insulin therapy was correlated with poor glycemic control.

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**Conflicts of interest**

There are no conflicts of interest.

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