

Knowledge, attitude and practices on insulin therapy among patients with type 1 diabetes

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Submitted on 23.07.2022 and accepted for publication on 04.01.2023

ABSTRACT

Introduction: The incidence of type 1 diabetes mellitus (T1DM) is increasing worldwide. Daily administration of multi-dose or single-dose Insulin therapy is the cornerstone in the treatment of T1DM. The recent studies highlighted the gap in knowledge, attitude, and practice (KAP) towards insulin therapy for the optimal control of hyperglycemia T1DM. The study aimed to assess knowledge, attitudes, and practices regarding insulin therapy among T1DM patients attending the diabetic clinic, Teaching Hospital Karapitiya (THK).

Methods: A cross-sectional descriptive study was conducted using an interviewer-administered questionnaire to elicit socio-demographic information and KAP towards insulin therapy. A total of 62 attending the diabetic clinic at THK were recruited.

Results: The study population consisted of 91.9% early young adults (ages 18-25 years) while the remainder represented late young adults (ages 26 - 30 years). A good knowledge, attitude and practice were seen in 61.3%, 62.9% and 38.1% of the patients respectively. Age, level of education, duration of DM, regular clinic visits and favourable attitudes were associated with good knowledge whereas level of education, duration of DM, regular clinic visits and good knowledge were associated with favourable attitudes. Duration of DM and regular clinic visits were the only factors associated with good practices. Higher level of knowledge or higher level of education were not associated with good practices towards insulin therapy ($p>0.05$).

Conclusions & recommendations: Though majority had good knowledge and attitudes, practices were unsatisfactory in the majority of them. Self-management education and training giving special attention to psychosocial aspects of living to improve self-care behaviour are recommended to address the gap between knowledge and practices.

Keywords: *Insulin therapy, knowledge, practice, type 1 diabetes.*

Introduction

Type 1 diabetes mellitus or insulin-dependent diabetes mellitus is a chronic disease characterised by hyperglycaemia secondary to insulin deficiency. The pathogenesis of T1DM involves T cell-mediated B cell destruction in the pancreas resulting in long term macro- and microvascular complications (1).

It has become a global epidemic because the disease is highly prevalent in both developed and developing countries. It is estimated that nearly 90,000 children are diagnosed with T1DM each year worldwide (2). Over the past two decades, the prevalence of DM in South Asia has risen substantially while it is

projected that the prevalence of diabetes will be 13.9% by 2030 in Sri Lanka (3). The prevailing burden of diabetes has made a substantial negative impact on the healthcare system, life expectancy, economic development, and productivity.

As the disease is incurable, the management of T1DM primarily requires lifelong insulin injections. Insulin is one of the five “high-alert” medications identified by the Joint Commission on Accreditation of Healthcare Organizations (4). Hence medication adherence is pivotal for optimal glycaemic control, preventing disease progression and delaying complications. Sound knowledge, attitudes, and skills in health literacy and numeracy and practices place special emphasis on the successful self-administration of insulin. Literature revealed that good knowledge and favourable attitudes are strongly linked with better treatment adherence to insulin therapy (5-8). Furthermore, different studies conducted worldwide showed the influence of socio-demographic factors for knowledge, attitudes, and practices (KAP) on insulin therapy (9, 10).

Appropriate knowledge, attitude, and practice (KAP) towards insulin therapy is invariably helpful in achieving recommended standards for diabetes management. Hence assessment of KAP would be helpful to prevent morbidity and mortality associated with DM. While studies to evaluate patients’ KAP have been performed in many countries around the world, there is a paucity of data regarding KAP of type I diabetes patients in Sri Lanka. The present study aims to fulfill this research gap.

Methods

Study design, setting and participants

This descriptive cross-sectional study was conducted at Teaching Hospital Karapitiya (THK), Galle, Sri Lanka. The study population comprised of type 1 diabetic patients who were on self-administered insulin therapy and attending to the diabetic clinic over a period of eight weeks. According to the records of the diabetes clinic, there were 73 registered T1DM patients who were on regular follow-up of the clinic. The study utilised all registered T1DM patients attending the diabetic

clinic of THK. Patients who were mentally handicapped and unable to read and write in Sinhala or Tamil languages were excluded from the study.

Data collection instrument

Data collection was performed using a self-administered questionnaires designed to obtain relevant socio-demographic characteristics, knowledge, attitude, and practice towards insulin therapy. The questionnaire comprised of four sections including socio-demographic characteristics, and questions to assess knowledge (36 items), attitude (7 items) and practice (9 items) about insulin therapy. Respondents were provided with three categorical responses “yes”, “no” and “do not know” for knowledge and practice questions. One point was offered for each correct acceptable response and the total score was calculated. The questionnaire was developed by authors based on relevant information in the previously published literature and it was initially prepared in English and then translated into the local language Sinhala by language experts, because there was no previously developed and validated questionnaire to use. The questionnaire was pretested to assess the quality (validity and reliability), before commencing the actual data collection using a sample of 10 patients attending the general diabetic clinic and relevant modifications were done to make it more understandable to patients. The data were collected through face-to-face interviews. Scores for knowledge, attitudes and practices were grouped using the same database because there were no previously defined cut off values. Good knowledge and poor knowledge refer to a person who scores greater than or lesser than the mean value (≥ 25.7) of knowledge-based questions respectively. A person who scores more than or lesser than the mean value (≥ 4.5) for the attitude questions was referred to as favourable attitude and unfavourable attitude respectively. Good practice refers to a person who scores greater than the mean value (≥ 5.5) of practice-related questions.

The study was approved by the Ethics Review Committee, Faculty of Medicine, University of Ruhuna. Informed written consent was obtained from study participants prior to data collection.

The *Statistical Package for the Social Sciences (SPSS™, Inc. version 20)* was used to analyse the data. Independent t-test was used to determine the influence of socio-demographic variables on knowledge, attitude, and practices. Pearson chi-square test was used to assess the relationship between percentage scores and socio-demographic variables. A *p*-value less than 0.05 was considered as statistically significant.

Results

Out of 73 registered T1DM patients attending the diabetic clinic, 62 patients participated in the study yielding a response rate of 84.9%. Out of them, 32 (51.6%) were males and 30 (48.4%) were females. The mean age of the study participants was 19.13 ± 5.4 with a range of 10 to 37 years. More than half of respondents ($n=35$, 56.4%) were aged less than 20 years. Most of the patients were Sinhalese ($n=52$, 83.9%) by ethnicity and approximately 60% of patients had educated up to tertiary level and above. About 37.1% ($n=23$) of the participants declared that they do not attend diabetic clinic regularly. Thirty-seven (59.7%) respondents were taking insulin therapy for more

than 3 years whereas others ($n=25$, 40.3%) have been on insulin therapy for less than 3 years. Majority of participants ($n=53$, 86%) had gained information related to diabetes directly from the health sector.

Knowledge on insulin therapy

Questions were designed to elicit participants' knowledge on insulin storage, technique of self-administration of insulin, complication of insulin therapy and diabetic ketoacidosis. The mean knowledge score was 25.7 ± 6.3 out of 36 ranging from 12 to 36. Overall knowledge regarding insulin therapy among type I diabetes patients was good ($n=38$, 61.3%). Table 1 depicts the participants' responses to some selected questions. Forty-nine respondents (79%) correctly answered that insulin is used to lower the blood glucose level. Approximately 80% were unaware that insulin is destroyed if the vial exposed to sunlight. Fifty-six (90.3%) respondents correctly answered that fasting or delay in diet after insulin administration leads to hypoglycemia. Only twenty (32.2%) respondents were aware that injection site should not be cleaned using surgical spirit before injecting insulin.

Table 1: Response of participants to selected items of the knowledge questionnaire

Items	Correctly answered (%)	Incorrect/ Don't know (%)
Insulin is used to lower the blood sugar level	49 (79.0%)	13 (21.0%)
Insulin destroys if the vial exposed to sunlight	14 (22.5%)	48 (77.4%)
Insulin vials should not be stored in the freezer compartment of a fridge	39 (62.9%)	23 (37.0%)
Injection site should not be cleaned using surgical spirit before injecting insulin	20 (32.2%)	42 (67.7%)
The sites for insulin injection are the abdomen, thigh, glutei, and deltoid	48 (77.4%)	14 (22.5%)
The use of the rotation of the injection site is to reduce pain and prevent wasting of subcutaneous tissues	38 (61.2%)	24 (38.7%)
The insulin vial should be kept at room temperature at least for 10 to 15 minutes before giving injection	43 (69.3%)	19 (30.6%)
Lipohypertrophy develops because of injecting insulin on same site regularly	36 (58.0%)	26 (41.9%)
Fasting or delay on diet after insulin administration leads to hypoglycaemia	56 (90.3%)	6 (9.6%)
The complications of insulin therapy are hypoglycaemia, lipohypertrophy and insulin resistance	52 (83.8%)	10 (16.1%)
Glucose strips of glucometer are for single use only	55 (88.7%)	7 (11.2%)

Attitudes on insulin therapy

The mean attitude score of the respondents was 4.5 ± 2.6 with a range of 2 to 7. Thirty-nine (62.9%) of respondents had favorable attitude towards insulin therapy while remainders had an unfavourable attitude on insulin therapy. The summary of responses is showed in Table 2. Majority of them had negative attitudes on insulin therapy such as worrying about others getting to know about them being diabetic (62.9%), less flexibility of life affecting social behaviour (74%), and addiction to insulin (63%). The positive attitudes include as the ability of insulin to reduce complications of diabetes mellitus (71%) and that it enables correcting blood sugar level (81%).

Practice towards insulin therapy

Practices regarding insulin therapy were assessed using 9 item scale (Table 3). The mean practice score was 5.34 ± 1.4 with a range from 0 to 9. Respondents who had practices score more than mean value were categorised as satisfactory and less than mean value were categorised as unsatisfactory. Majority of them had unsatisfactory practices towards insulin therapy such as not checking blood sugar regularly (91.9%), not checking the expiry date of insulin vial before injection (60%) and not washing hands with soap and water before handling injection devices (67.7%).

Only forty-five patients (72.6%) had kept the insulin vial at room temperature at least 10-15 minutes before injection. All respondents used to eat some food shortly after insulin injection.

Socio-demographic determinants of knowledge, attitude, and practices on insulin therapy

The study findings revealed that knowledge and attitude towards insulin therapy considerably associated with level of education attained ($p < 0.05$) with those who had educated up to G.C.E. (Ordinary Level - O/L) having the lowest scores, while those with G.C.E. (Advanced Level - A/L) and above education scored highest. The age group more than 20 years had highest scores on knowledge questions compared to participants age less than 20 years ($p < 0.05$). Regular attendance for diabetic clinic had a significant effect on knowledge, attitude, and practices ($p < 0.05$). High level of knowledge was not associated with good practices towards insulin therapy ($p < 0.05$). However, those who had better knowledge had favourable attitude on insulin therapy compared to counterpart. Knowledge of insulin therapy was positively associated with age, higher level education, regular clinic attendance and duration of treatment. Gender was not associated with knowledge, attitude, and practices. Regular clinic attendance and duration of treatment were found to be significantly associated with better practices ($p < 0.05$).

Table 2: Attitude towards insulin therapy

Item	Agree	Disagree	Not sure
I worry that people will get to know that I have diabetes if I am on insulin treatment	39 (62.9%)	20 (32.2%)	3 (4.8%)
Insulin has the ability to prevent complications of diabetes	44 (70.9%)	12 (19.3)	6 (9.6%)
Insulin decreases the blood glucose level	50 (80.6%)	4 (6.4%)	8 (12.9%)
Insulin can cause permanent damage or worsening of my health	7 (11.2%)	16 (25.8%)	39 (62.9%)
Insulin treatment will make life less flexible, affecting my social life and hobbies (e.g. performing exercise, dining outside)	46 (74.1%)	10 (16.1%)	6 (9.6%)
People can become addicted to insulin injection	39 (62.9%)	12 (19.3%)	11 (17.7%)
Taking insulin means diabetes had turned serious	36 (58%)	9 (14.5%)	17 (27.4%)

Table 3: Practices towards insulin therapy

Item	Always	Sometimes	Never
Do you check capillary blood sugar regularly?	5 (8.1%)	50 (91.9%)	7 (11.2%)
Do you usually check the expiry date of insulin?	25 (40.3%)	30 (59.7%)	7 (11.2%)
Do you change the site of injections frequently?	21 (33.8%)	36 (58%)	4 (6.4%)
Do you clean the injection site with soap and water before administer insulin?	17 (27.4%)	45 (72.6%)	8 (12.9%)
Do you keep the insulin vial at room temperature at least for 10 to 15 minutes before injection?	13 (20.9%)	45 (72.5%)	4 (6.4%)
Do you wash the hands with soap and water before handling injection devices?	20 (32.3%)	33 (53.2%)	9 (14.5%)
Do you remove air bubbles from the insulin syringe before injecting?	21 (33.9%)	38 (61.2%)	3 (4.8%)
Do you dispose used insulin needles in a special container at home?	12 (19.3%)	39 (62.9%)	11(17.7%)
Do you eat food shortly after insulin injection?	62 (100%)	-	

Discussion

In this cross-sectional study, it is found that the majority of T1DM patients had good knowledge and favourable attitude towards insulin therapy. In contrast, over 50% of respondents had poor self-care practices. Level of education, regular clinic attendance and duration of treatment were the factors significantly associated with knowledge and attitude on insulin therapy. The study population consisted of 92% early young adults while the remainder represents late young adults. The findings reflect the evolving concern of health care needs for young adults.

Nearly two thirds (61.3%) of the study sample had a good knowledge on insulin therapy in this study. This was higher than other countries such as India (52.5%) (7), Nepal (46%) (8), Egypt (33.3%) (11) and Ethiopia (38.4%) (6). Furthermore, the percentage of favourable attitudes toward insulin therapy was found be 62.9% in this study. The corresponding figure in a previously conducted study among the general public in Southern Sri Lanka was 12% among patients with type 2 diabetes (12). This difference is understandable, because type 2 diabetes is commoner among elderly patients, compared with type I diabetes which is commoner among young patients.

In this sample also there were 58% respondents with level of education up to university entrance or above. This must have positively affected knowledge, and attitudes, and it is consistent with previous literature (6, 8, 10, 12).

A noteworthy finding of this study is the gap between knowledge and practices towards self-administration of insulin. Although most of the respondents had achieved a good educational level, it is not reflected in their practices. Possibly this may be due to poor and uncoordinated health education and the findings reflect the need for patient-centered health education interventions. Although diabetic nurse conducts patient awareness programs at each clinic visit, patient compliance and attendance for these programs were relatively poor due to several reasons (busy clinic setting, ignorance, long OPD waiting time). The other plausible reason may be due to a lack of motivation from health care professionals and family members to apply the knowledge into practice with overconfidence. However, as insulin is the definitive treatment for type I diabetes management, patient requires meticulous treatment adherence for its therapeutic success. In resource-poor setting, long OPD waiting time can be effectively utilised by

showing insulin-related videos to improve knowledge and practices towards insulin therapy.

In the present study, a large proportion (81%) of respondents ignored the correct disposal of insulin injection devices. Similarly, the study conducted in India revealed malpractice towards disposal of devices used to inject insulin (14). Most of the patients used to dispose sharp waste into household garbage bin or toilets. These incorrect practices might lead to needle prick injuries and blood-borne diseases. With regards to self-care practices over one half of respondents did not monitor their blood sugar regularly, the finding is in concordance with a Bangladesh study that showed frequency of diabetic patients who did not check their blood sugar as 90%. Further previous studies in India and Sri Lanka have reported poor patient compliance towards blood sugar monitoring (12, 15).

Limitations

In this study we used an investigator-developed questionnaire using information obtained from previous publications and group the knowledge, attitudes and practices (above or below the mean) because to the best of our knowledge there was no previously validated questionnaire or cutoff values to use. As a result, our data is not 100% comparable to other studies.

Conclusions and recommendations:

This study shows that there is a gap between knowledge and its application on insulin therapy in the selected group of patients with T1DM attending the diabetic clinic at THK. In Sri Lanka, young adults with T1DM are referred to routine medical clinic setting. Therefore, the scarcity of endocrinological care of young adults may be associated with psychosocial issues, long waiting time and difficulty in getting appointments. Hence greater attention has to be paid to facilitate a healthy supportive system with novel technologies to reinforce independent diabetic care for young adults with T1DM. The implementation of frequent hospital-based counselling and education programmes at clinic visits, particularly to ensure therapeutic compliance would be more helpful to fill the gap between knowledge and practices.

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