Research Article

An Interventional Study To Assess Knowledge On Insulin Self Administration Among Diabetic Patients In Tertiary Care Hospital Of Dakshina Kannada

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ABSTRACT

Hyperglycemia is the defining characteristic of diabetes mellitus (DM) caused by abnormalities in insulin secretion, insulin action or both. In order to prevent complications, optimal glycemic management is necessary to lower DM morbidity and mortality. The technique for injecting insulin is one of the areas where mistakes are most likely to occur. Correct administration of insulin is associated with better management of diabetes and eventually a good quality of life. An interventional study was carried out for subjects who were on insulin of either gender for a period of 6 months with a validated questionnaire to assess the knowledge on insulin self-administration. A total of 100 patients were interviewed, of which 54% were male and 46% were female. Among the 100 participants, only 41% had adequate knowledge regarding insulin before intervention. Knowledge regarding self-administration of insulin was assessed and it was found that 33% of the individuals didn't know the complications of insulin therapy were low blood sugar levels and insulin resistance. Only 26% of the participants had knowledge on correct angle for the administration of insulin whereas 74% were not aware of the correct angle of insulin administration. There was a significant difference between the correct responses of the participants before and after intervention. In the study, suboptimal responses to insulin delivery were reported. Patients knowledge was enhanced by education regarding insulin self-administration. Therefore, during each hospital visit, barriers should be filled by instructing patients on how to inject insulin.

INTRODUCTION

Diabetes mellitus (DM) is a chronic progressive metabolic disorder characterized by hyperglycaemia and is caused by abnormalities in insulin secretion, action, or both. Given that both developed and developing countries are affected by the disease, it is a problem for everyone's health.[1] In the past ten years, decreased beta-cell

function has come to be understood as a major issue in Type 2 Diabetes Mellitus (T2DM), which has long been known as non-insulin dependent diabetes or adult-onset diabetes characterized by insulin resistance that may eventually proceed to absolute resistance.[2]For the prevention and/or delay of complications, optimal glycaemia management is essential to reducing DM morbidity and mortality.[3]

Only patients who follow self-management practices like maintaining a healthy diet, getting sufficient exercise, monitoring their blood sugar levels, taking their medications as prescribed, being able to deal with any problems they may encounter with their diabetes, and developing healthy coping mechanisms can achieve optimal glycaemia control.[4]

The cornerstone of type 1 and type 2 diabetes treatment plans is insulin therapy (IT), which is a crucial component of the drugs used to treat DM.[5] Insulin therapy (IT) presents many challenges due to complexities associated with its intricate use. Sufficient knowledge of its use can help to prevent complications, adverse patient outcomes, poor adherence to therapy and invariably poor glycaemia control. Educating patients about insulin self-administration helps to increase self-confidence and pride in their role to their management. Moreover, an appropriate injection technique is important for proper delivery to subcutaneous tissues and to prevent intramuscular injuries and lipo-hypertrophy.[6]Insulin is one of the oldest valuable anti-diabetic medications available and also the most effective agent in dropping hyperglycaemia when used in appropriate doses. [7] The insulin injection technique is one of the most common areas with the likelihood of errors. It requires sound knowledge on self-insulin administration by patients so that they can contribute meaningfully to the management of their lives.[8]Correct administration of insulin is associated with better

management of diabetes and eventually a good quality of life. [9]

During the course of T2DM, IT may be crucial for many people. Even though insulin is more effective than oral anti hyperglycaemic drugs (OHA) at lowering glycated haemoglobin (HbA1c), many people with T2DM are still hesitant to begin insulin therapy. This "psychological insulin resistance" involves anxiety over hypoglycaemia, weight gain, injections, and emotions of failure and guilt. As a result, it is reasonable to assume that insulin therapy may have a negative impact on psychological health and wellbeing. [10]

Diet, physical activity and medication all have a role in controlling blood sugar and many patients also need to take insulin supplements as part of their care. Therefore, in order to utilise insulin correctly outside of the hospital, patients need to be proficient at insulin injection.[11]

OBJECTIVES

To assess the knowledge of diabetes mellitus patients regarding self-administration of insulin injection.

METHODOLOGY

MATERIALS AND METHODS

STUDY DESIGNS: A Prospective Interventional study was conducted at Teaching hospital attached to Srinivas Institute of Medical Science and Research Centre, Mukka-574146 for duration of 6 months from January 2022 to June 2022. The study protocol was approved by the Institutional Ethics Committee (IEC) of Srinivas Institute of Medical Science, Mukka, Mangaluru.

SAMPLE SIZE: The study was limited for a sample of 100 based on the time Schedule allotted for the project including other circumstances.

STUDY CRITERIA

Inclusion criteria:

- Patients above 18 years of age.
- Patients who are prescribed with insulin.
- Both male and female patients

Exclusion criteria:

- Patients below 18 years of age
- Pregnant women.
- Participants who are not physically and mentally able to respond the interview.

SOURCE OF DATA: Data(s) for the study were collected using data collection form from the patient medical files and through direct interaction with the patient.

STUDY METHOD

- Ethical committee approval was obtained before starting this study.
- Patient data collection form was designed as per need of the study to attain the accessory information.
- Case files of the patients prescribed with insulin was reviewed.
- Patient information leaflet was provided for preview on administration of insulin for patients with lower estimated average score.
- Questionnaires was prepared and given to patients before and after intervention.

PRE-EDUCATIONAL INTERVENTION ASSESSMENT

- **Patient selection**
  Participants were segregated based on inclusion and exclusion criteria
- **Obtaining informed consent**

Informed consent form was obtained from the selected participant in English and Kannada.

- **Providing intervention**
  Participants were provided with questionnaire and based on the above operational definition, scores were reviewed and intervention was provided for the following:

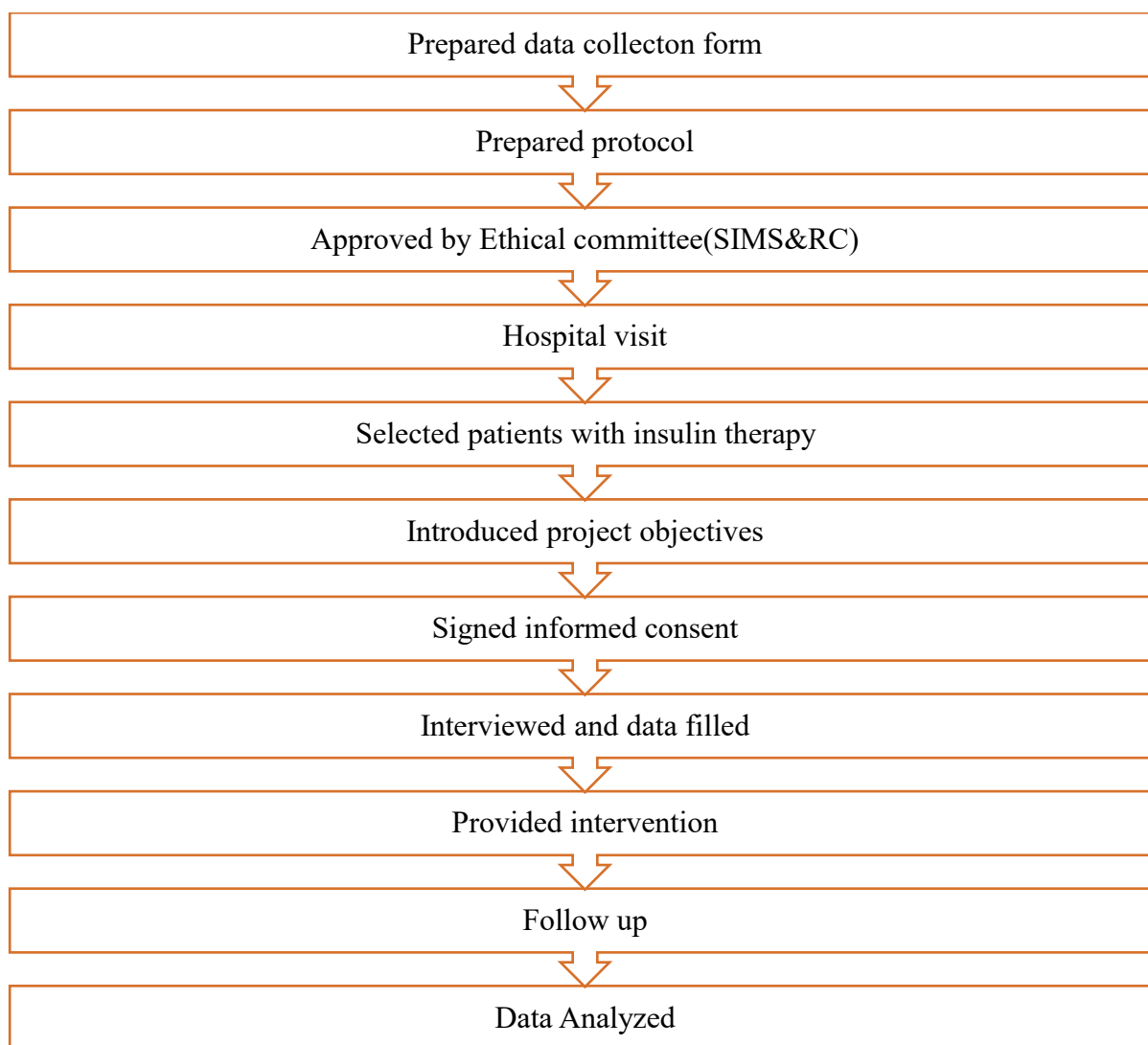Poor knowledge Score: PIL, patient counselling
Medium knowledge score: PIL

POST EDUCATIONAL INTERVENTION ASSESSMENT

- **Patient Review:** After reviewing the scores of questionnaires, the patients were followed up after 1 month.
- **Patient information leaflet:** The patient information leaflet (PIL) is used to educate the patients on insulin self administration.
- **Source of Data collection:** Information provided by patients.

DATA ANALYSIS

The collected data(s) were analysed using Microsoft Excel (version 2013) and SPSS software (version 27) and summarised using descriptive statistics in the form of tables and figures. Self-administration data was evaluated using independent T-test for sample.

OPERATIONAL MODALITY

Prepared data collecton form

⇩

Prepared protocol

⇩

Approved by Ethical committee(SIMS&RC)

⇩

Hospital visit

⇩

Selected patients with insulin therapy

⇩

Introduced project objectives

⇩

Signed informed consent

⇩

Interviewed and data filled

⇩

Provided intervention

⇩

Follow up

⇩

Data Analyzed

RESULTS

Socio-Demographic Details

Among 100 patients enrolled, 54% were male and 46% were female participants. 10 belonged to the age group of 18-30 years, 27 belonged to 31-45 years, 37 belonged to 46-60 years and 26% were above 60 years of age. Most of the participants had primary to university education (92%) and only (8%) of them were illiterate. Majority of the participants were previously diagnosed (68%) and 38% of them were newly diagnosed with diabetes. The average duration of diabetes was 2.96±3.11 years. (Tab 1)

Table 1: Demographic Details of participants

Demographic Characteristics	No. of participants (n=100)	Percentage
GENDER		
Female	46	46%
Male	54	54%
AGE		
18-30	10	10%
31-45	27	27%
46-60	37	37%
> 60	26	26%
EDUCATION QUALIFICATION		
Illiterate	8	8%
Primary education	31	31%
Secondary education	29	29%

University	32	32%
TIME OF DIAGNOSIS		
Previously diagnosed	68	68%
Newly diagnosed	32	32%
DURATION OF DIABETES (Years)		
< 2	49	49%
2-5	31	31%
6-10	16	16%
> 10	4	4%

ASSESSMENT OF KNOWLEDGE TOWARDS INSULIN SELF-ADMINISTRATION

The below table depicts that 78% of the participants had adequate knowledge regarding diabetes and 63% correctly stored insulin in the refrigerator. Poor knowledge was observed regarding angle of administration (26%). Majority (60%) of the individuals didn't know the distance to rotate insulin injection on the same sight is one thumb. More than half (40%) had answered that insulin injection is taken soon after or just before taking food. Only 33% study participants had knowledge on the complication of insulin therapy and nearly three fourth (70%) knew the benefit of insulin self-administration (Tab 2, Fig 1, 2, 3,4)
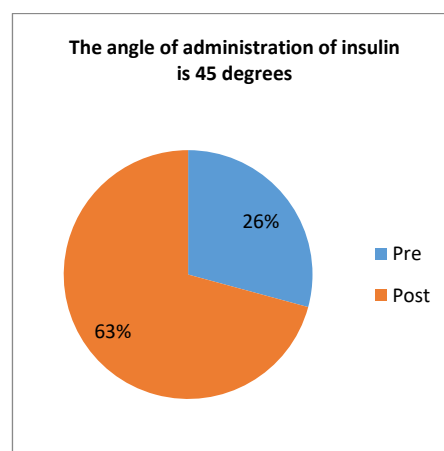
Table 2: Knowledge regarding self-administration of insulin (n=100)

| Assessment of knowledge	Pre-Intervention	Post-Intervention
	Frequency (%)	Frequency (%)
Do you know about DM	78	82
DM means high blood glucose	62	67
Do you know about insulin	41	67
Insulin vial is stored in refrigerator or cold place	63	89
The sights for insulin injection are abdomen or thigh	26	54
Insulin injection is taken soon after or just before taking food	40	68
The angle of administration of insulin is 45 degrees	26	63
The distance to rotate on the same sight is one thumb	40	71
The complication of insulin therapy are low blood sugar and insulin resistance	33	56
Massage after injection is used to enhance the rapid absorption of insulin	48	65
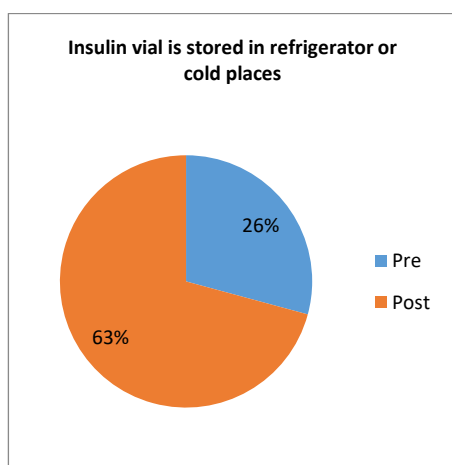
Figure 1: Insulin vial storage

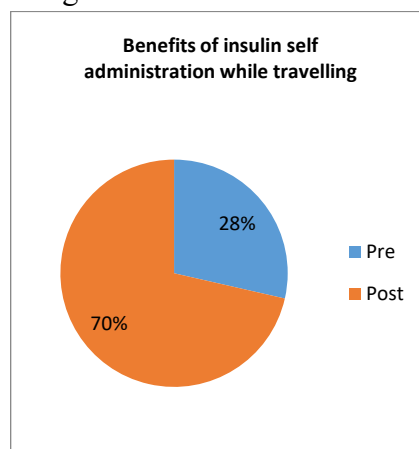

Figure 2: Angle of administration

Among the 100 participants, only 41% had adequate knowledge regarding insulin before intervention. Majority of the participants (63%) knew insulin is to be stored in a refrigerator or a cool place. Only 26% of the participants had knowledge on correct angle for the administration of insulin whereas 74% were not aware of the correct angle of insulin administration.
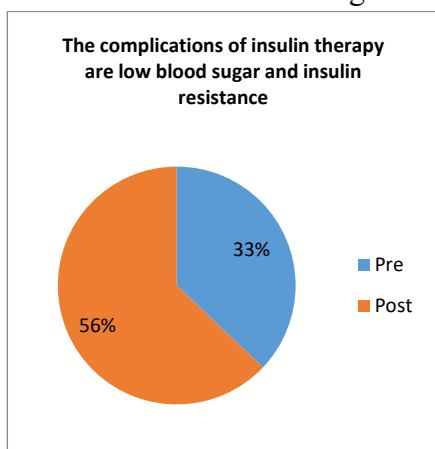
Figure 3: Complication of insulin therapy

Figure 4: Benefits of insulin self-administration

In our study, few (33%) responded that complication of insulin therapy is low blood sugar known followed by insulin resistance whereas 67% of them didn't know regarding complications. Also 28% participants agreed that the benefits of insulin self-administration are time-saving, inexpensive and easy to take on self while travelling around and 70% of the study participants didn't agree with this as they prefer insulin administration by someone around rather than by themselves.

Table 3: Self administration of insulin (pre)

PRE-INTERVENTION	FREQUENCY (%)	MEAN ± SD
Good Knowledge	10	9.3 ± 0.45
Average Knowledge	71	6.28 ± 0.98
Poor Knowledge	19	3.36 ±0.74

Table 4: Self administration of insulin (post)

POST-INTERVENTION	FREQUENCY (%)	MEAN ± SD
Good Knowledge	58	10.46 ± 1.003
Average Knowledge	30	6.56 ± 1.22
Poor Knowledge	12	3.5 ± 0.64

There was a significant difference between the correct responses of the participants before and after intervention (p value < 0.001) (Tab 3, Tab 4).

COMPARISON OF PRE AND POST DATA OF SELF ADMINISTRATION OF INSULIN

Before the intervention knowledge was found to be 47.5% and after the intervention, there was a significant increase in knowledge, and it was found to be 69%.
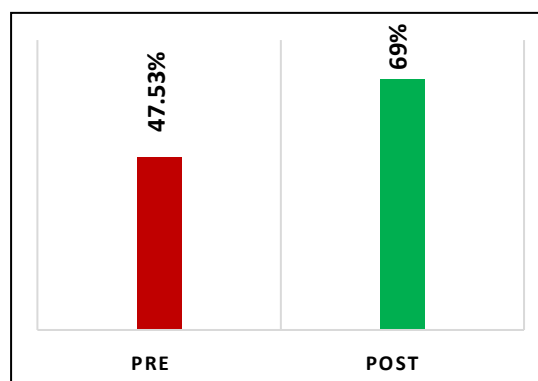
Figure 5: Overall Knowledge analysis

DISCUSSION

Insulin therapy necessitates the understanding and cooperation of patient. Diabetes can worsen due to improper insulin administration. Therefore, it is necessary to assess the patients knowledge on insulin self-administration. In this study, a total of 100 patient data was collected. Questionnaire was provided regarding self-administration of insulin and scores were recorded. After the questionnaire was answered and based on the medium and low Knowledge scores, the patients were counselled about the appropriate technique of insulin self-administration post the intervention period. According to the findings of the study, the current mean age of the study population was 51.05±14.84 years. The results were consistent with the similar studies conducted by **Choudhury S** *et al.* [12] The occurrence of DM in this age group may be due to sedentary lifestyle with limited physical exercise. For gender, male patients (54%) outnumbered female patients (46%), similar results were found in the studies conducted by **Shrestha D** *et al.*, [13] and **Dinesh PV** *et al.*, [14] where the majority of the participants were male. The reason being male patients are predominant in the prevalence of diabetes due to lifestyle differences between men and women in India, where men spend more time having meal outside. In the current study, the mean duration of diabetes was 2.96±3.1 years. This result was contradictory to the study conducted by **Netere AK** *et al.*, [15] and **Bezawada S** *et al.* [16]

In the present study, most patients had completed primary education (92%) which was similarto the study conducted by **Dinesh PV** *et al.*, [14] where most patients had upper primary schooling. Knowledge regarding self-administration of insulin was assessed and it was found that 33% of the individuals didn't know the complications of insulin therapy were low blood sugar levels and insulin resistance which was lower compared to studies done in Nigeria and Ethiopia.[17] Limited knowledge regarding complication of insulin therapy may lead to decreased awareness of patients for complication and can be of high economic burden to the country in its management. In the study few (26%) responded correctly that the angle of insulin administration was 45 degree which was similar to study conducted by Gerensea H et al.,[18] inappropriate angle of administration may increase the variability of insulin absorption and may impair glycaemic control.

Intervention was provided at patient level using PIL. There was a significant improvement in the Knowledge scores from 47.5% to 69% indicating success of the intervention.

CONCLUSION

Diabetes mellitus poses a permanent threat to people and their families across the nation. This study showed that there was inadequate knowledge and poor skills among the diabetes patients regarding self-administration of insulin therapy. In addition, study findings had revealed that there is an immense need for education on self-care management. Hence to meet this need, education was provided regarding diabetes and insulin self-administration. Significant improvement was observed in all aspects of the therapy. It is very important to acknowledge the complexity of insulin administration and crucial education should be provided regarding the same. It may be concluded that people with diabetes should get continuing, need-based, high-quality diabetes education that is tailored to their needs and provided by qualified healthcare professionals.

ACKNOWLEDGEMENTS

ABBREVIATION

DM: Diabetes mellitus, **WHO**: World Health Organization, **ISA**: Insulin self-administration, **T2**: Type 2, **OHA:** Oral Anti hyperglycemic Drugs, **HbA1c:** Glycated Hemoglobin, **PIL:** Patient Information Leaflet, **SPSS:** Statistical Package for Social Sciences, **IT:** Insulin Therapy, **SD:** Standard Deviation.

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