

Knowledge, attitude and practice of insulin use and its adverse effects in adult diabetic population

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ABSTRACT

Background: Diabetes is a disease when left untreated, leads to many complications. India is emerging as a diabetic capital of the world. Insulin is widely used as a therapeutic option, and hence this study was conducted to assess the awareness of Insulin use and its adverse effects in diabetic population.

Methods: The study was a questionnaire survey conducted in adult patients with diabetes who are on Insulin therapy. The participants' knowledge, attitude and practice were assessed by using a questionnaire consisting of 32 questions. Scores were allotted to each question, and evaluated after applying appropriate statistical tests.

Results: The mean age of the participants was 57.26±11.24 years. About 54% were males. 46% belonged to rural areas. The mean knowledge score was 17.53±4.40, mean attitude score 7.42±4.85 and the mean practice score was 6.56±1.91. 40% responded that they will return the expired insulin vials to the pharmacy. The most common reason for non adherence was economical constraints (60%). The females had better knowledge (17.60±4.43 vs. 17.45±4.40, p>0.88), attitude (8.21±3.84 vs. 6.58±5.56, p>0.09) and practice (6.97±1.84 vs. 6.13±1.92, p<0.02) of insulin use than males. Also, the urban population had better knowledge (17.58±3.64 vs. 17.32±4.97, p>0.297), attitude (8.70±3.95 vs. 6.06±5.37, p <0.002) and practice scores (6.92±1.89 vs. 6.38±1.92, p>1.395) than the rural counterparts.

Conclusions: There exists a gap between knowledge attitude and practice of insulin use. This can be overcome by conducting awareness programmes by health care providers, to sensitise people about the proper use, side effects and the methods of disposal of insulin vials.

Keywords: Awareness, Attitude, Diabetes, Insulin, Knowledge, Practice

INTRODUCTION

Diabetes mellitus is a disease characterised by an increase in plasma blood glucose (hyperglycaemia).¹ The underlying defect is either insulin deficiency or insulin resistance. Based on aetiology, diabetes is classified to be Type 1 or Type 2.² Type 1 is due to absolute insulin deficiency caused by autoimmune destruction of β cells and Type 2 is characterised by resistance to the action of insulin.³ India is rapidly emerging as the diabetic capital of the world. Currently, there are approximately 63 million diabetics in India, second only to China, and this figure is likely to increase substantially by 2025.⁴ The prevalence in

Tamil Nadu is estimated to be 10.4% and cases are seen in urban and rural areas.⁵ Diabetes, if left untreated, may lead to complications like diabetes ketoacidosis, hyperglycaemic hyperosmolar state, diabetic nephropathy, retinopathy and neuropathy due to microangiopathy and macrovascular diseases like coronary artery diseases, diabetic myonecrosis, peripheral vascular diseases and stroke due to accelerated atherosclerosis.⁶ Insulin is mandatory for type 1 diabetes and is frequently required in type 2 diabetes as the disease progresses. Statistics from developed countries show that more than 30% of all diabetics use insulin either singly or in combination with oral anti-diabetic drugs (OADs), though this figure may be lower for India.⁷ It is essential that diabetic people learn to

handle all aspects of their management, including learning how to measure doses accurately with an insulin pen or syringe, how to inject, and how to adjust the dose on the basis of blood glucose values in relation to various factors, and to be aware of the self management of low blood glucose. Previous studies showed that the knowledge and attitude regarding insulin is good, however the adherence and practice remained poor due to reasons like lack of committed effort and low socioeconomic status.⁸ Another study cited that some aspects of practice like regular check-up of blood glucose and not skipping meals or insulin doses were satisfactory following an intervention.⁹ Hence, this study was proposed in order to improve the awareness of the disease, the drugs and its complications, so as to empower this population to combat this deadly disease effectively.

METHODS

This study was designed to assess the knowledge, attitude and practice of insulin use and its side effects among adult diabetic population and to correlate the knowledge, attitude and practice scores with various demographic variables. The study was a prospective, clinical, observational, and descriptive and questionnaire based survey conducted at Chennai Medical College Hospital and Research Centre (SRM Group), Irungalur, Trichy, in the Departments of General Medicine and Pharmacology. Patients above the age of 18 years of both sexes, patients with type I diabetes mellitus, patients with type 2 diabetes mellitus who are on Insulin therapy and those who are willing for the study were included. Patients with extremes of age, mentally not sound, pregnant and lactating female, patients who on other drugs (Oral hypoglycaemic drugs) for control of diabetes and patients who are allergic to or who have any contraindications to insulin use were excluded from the study. The study was conducted with 100 diabetic patients who fulfilled the inclusion and exclusion criteria. The study was conducted over a period of three months (From May 2016 to July 2016). Prior to the enrolment, an informed written consent was obtained from the patient or caretaker in a language which they can best understand.

The patient information like age, sex, occupation, income, past history, family history of diabetes, treatment history was elicited. A pretested questionnaire was administered to the patients. The questionnaire was consisting of three domains namely, knowledge, attitude and practice of use of insulin and its side effects. The construct validity and content validity was tested by a group consisting of one senior pharmacologist and two physicians. The questionnaire was pre-tested by a group of 30 diabetic patients using insulin with education up to primary level to remove any ambiguity in the interpretation of responses. The questionnaire was reframed accordingly and it was readministered to the same 30 respondents in a gap of about 5 days to ensure that the questionnaire was unambiguous. The final questionnaire consists of a total of 32 questions (knowledge = 10, attitude = 11 and practice

= 11). Each correct answer in knowledge domain was allotted a score of 1. A score of 1 was allotted to a yes response, a score of 0 to a No response and a score of 0.5 was allotted to a partial response. The responses for the first 5 questions in the attitude domain was graded as follows: Strongly Agree: +2, Agree: +1, Unsure: 0, Disagree: -1, Strongly Disagree: -2. The score was reversed for the next 6 questions. Each correct answer in the practice domain was allotted a score of 1. A score of 1 was allotted to a yes response, a score of 0 to a No response and a score of 0.5 was allotted to a sometimes/partial response. The final score in the knowledge domain ranged from 7 to 39. The final score in the attitude domain ranged from -22 to +22. The final score in the practice domain ranged from 9 to 11. The correlation of the scores in relation to various demographic variables was also assessed.

For continuous and normally distributed values, the two tailed paired t test was used for intragroup analysis and student's independent t-test was used for intergroup analysis. For continuous and not normally distributed variables, Mann Whitney U-test was used. For discrete variables, Chi square test was used. The KAP scores before and after the intervention was analysed by Wilcoxon matched pairs signed rank tests. Correlation was assessed using correlation and regression tests. The p value of <0.05 was considered statistically significant. The statistics were done using Epi info software.

RESULTS

The study was conducted in 100 diabetic patients who fulfilled the inclusion and exclusion criteria. The mean age of the study population was 57.26 ± 11.14 years. The age wise distribution of the population is shown in (Figure 1).

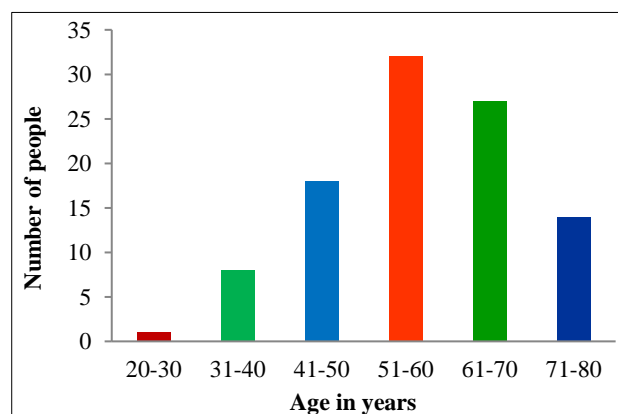


Figure 1: Age wise distribution of the study population.

The gender wise distribution of the population is shown in (Figure 2). About 46% (n=46) patients belonged to rural areas and 54% (n=54) were from urban areas. The questionnaire used to assess the knowledge domain, attitude domain and practice domain are shown in (Table 1, Table 2 and Table 3) respectively.

About 40% (n=40) responded that they will return the expired insulin to the local pharmacy, about 30% (n=30) responded that they will not take the insulin, and about 28% (n=28) responded that they will throw it in the dustbin, and 2% (n=2) responded that they will take the insulin. The following figure shows the reasons behind non adherence of insulin (Figure 3). The mean knowledge score of the study population was 17.53 ± 4.40 . The mean attitude score of the study population was 7.42 ± 4.85 and the mean practice score of the study population was 6.56 ± 1.91 . The

study results revealed that the mean knowledge score of the female population (17.60 ± 4.43) was higher than males (17.45 ± 4.40), but the results were not statistically significant ($p > 0.88$). Though the females possessed positive attitude towards insulin use as revealed by the higher attitude scores (8.21 ± 3.84) than males (6.58 ± 5.66), the results were not significant ($p > 0.09$). The female population had a higher practice score (6.97 ± 1.84) than males (6.13 ± 1.92) and it was statistically significant ($p < 0.02$).

Table 1: Knowledge of insulin use and its adverse effects.

Question	Response
Pick out the correct statement	a) Diabetes is a disease characterized by low blood glucose and low insulin
	b) Diabetes is a disease characterized by high blood glucose and low insulin
	c) Diabetes is a disease characterized by low blood glucose and high insulin
	d) Diabetes is a disease characterized by high blood glucose and high insulin
Which of the following are the symptoms of diabetes? (Answers may be multiple)	a) Frequent passage of urine
	b) Frequent eating
	c) Frequent drinking
	d) Weight loss
	e) Fatigue
	f) Weakness
	g) Blurred vision
	h) frequent skin infections
	i) Slow healing lesions after minor trauma
Which one of the following systems is involved in the complications of diabetes? (Answers may be multiple)	a) Eye b) Kidney c) Nervous system
	d) Gastrointestinal system
	e) Genitourinary system
	f) Cardiovascular system
	g) Limbs h) Skin
Are you aware of the various types of Insulin?	a) Yes b) No c) Partially
Are you aware of the various insulin delivering devices?	a) Yes b) No c) Partially
Which of the following is/are the side effects of Insulin therapy? (Answers may be multiple)	a) Low blood glucose
	b) Lipodystrophy
	c) Allergy
	d) Oedema
Which of the following are the preferred sites of injection of Insulin? (Answers may be multiple)	a) Upper arm
	b) Thigh
	c) Lower abdomen
	d) Buttocks
Source of information about Insulin (Answers may be multiple)	a) Books
	b) Television
	c) Internet
	d) Others
Which of the following are symptoms of low blood glucose? (Answers may be multiple)	a) Sweating b) Rapid heartbeat
	c) Tremor d) Dizziness
	e) Visual disturbances f) Fatigue
Are you aware of HbA1c, the blood test used for long term control of blood glucose?	a) Yes
	b) No
	c) Partially

Table 2: Attitude towards insulin use and its adverse effects.

Question	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
Insulin can be pre-mixed in the same syringe					
Insulin is the only cure for diabetes					
Insulin can be stopped once blood glucose is controlled					
Once Insulin is started diet and exercise are not needed					
Diabetes can be controlled by diet alone					
Insulin can be administered even if the vial is having clumps					
Diabetes is a lifelong disease					
Insulin can cause harm					
Insulin should not be administered at the same site					
Too high or too low insulin can cause drastic alterations in blood glucose					
I can self-administer Insulin					

Table 3: Practice of insulin use.

Question	Response
When do you inject insulin?	a) 20 minutes before food
	b) With food
	c) 20 minutes after food
	d) Anytime
Do you practice rotation of sites?	a) Yes
	b) No
	c) Sometimes
How often do you check your eyes?	a) Once in a year
	b) Once in 2 years
	c) Once in 3 years
	d) Once in 4 years
How often do you check your blood glucose and HbA1c?	a) Once in 3 months
	b) Once in 6 months
	c) Once in 9 months
	d) Annually
How often do you check your lipid profile and serum creatinine?	a) 1 year
	b) 2 years
	c) 3 years
	d) 4 years
How do you store Insulin?	a) At refrigerator above freezing point
	b) At room temperature
	c) At refrigerator in freezing point
	d) Anywhere
Do you check for expiry date before using insulin?	a) Yes
	b) No
	c) Sometimes
What will you do to the expired insulin?	a) Return it to the local pharmacy
	b) Will not take
	c) Throw it in the dustbin
	d) Will take
How do you inject insulin?	a) Retracting the injected surface, with needle at 45 degree, subcutaneously
	b) Retracting the injected surface, with needle at 90 degree, subcutaneously
	c) Retracting the injected surface, with needle at 45 degree, intramuscularly
	d) Retracting the injected surface, with needle at 90 degree, subcutaneously
Reasons for non-adherence	a) Economic reasons
	b) Fear of side effects or hypoglycaemia
	c) Disappearance of symptoms
	d) Blood glucose controlled
Do you keep a readily available source of blood glucose available when you go out?	a) Yes
	b) No
	c) Sometimes

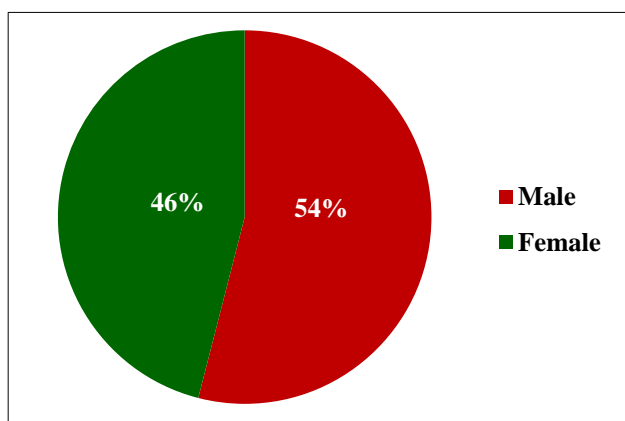


Figure 2: Gender wise distribution of the study population.

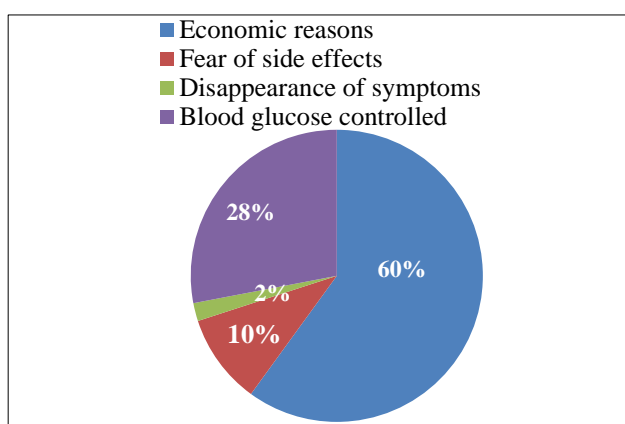


Figure 3: Reasons behind non adherence of Insulin.

The study also revealed that the urban population had a higher knowledge score (17.58 ± 3.64) than the rural population (17.32 ± 4.97), but the result was not statistically significant ($p > 0.297$). The urban population also had a positive attitude towards insulin use (8.70 ± 3.95) than the rural counterparts (6.06 ± 5.37), and it was statistically significant ($p < 0.002$). The urban population had a better practice of insulin use than their rural counterparts (6.92 ± 1.89), (6.38 ± 1.92), but the result was not statistically significant ($p > 1.395$).

DISCUSSION

This study was conducted in 100 patients with diabetes on Insulin therapy after fulfilling the inclusion and exclusion criteria. The mean age of the study population was 57.26 ± 11.14 years. Type 2 diabetes is predominant in the adult population, although some people with type 1 diabetes progress to adult stage. This is consistent with the study conducted by Jaya Prasad Tripathy et al, which showed that the prevalence of diabetes is higher among the individuals belonging to the age group ranging from 45 to 69 years.¹⁰ The study showed that the males had a higher incidence of diabetes (54%) than the females (46%). This is consistent with the study conducted by R.M. Anjana et al, which showed that the prevalence of diabetes is higher

among the male gender.¹¹ Factors like increased visceral fat for a given body mass index, increased insulin resistance due to the higher proportion of visceral and hepatic fat compartments, impaired fasting glycaemia, (IFG), increased testosterone and low estrogens, along with the biological susceptibility to diabetes might contribute to this increased incidence among males.¹² This study also revealed that the urban population (54%) had a higher prevalence of diabetes than the rural population (46%). This is consistent with the study conducted by Anamitra Barik et al, which showed that the prevalence of diabetes is higher among the urban population.¹³ Factors such as a decrease in physical activity and consumption of high sugar and fat diets are responsible for this increased prevalence. Also, the diabetes rates in India are quickly escalating because of the rapid urbanization that is sweeping the country.¹⁴ However, with the increase in urbanisation of the rural areas along with other factors like increasing age, obesity, alcohol use and a family history of diabetes might contribute to the increasing incidence of this disease among the rural population as well, as evident by the study conducted by Arun Gangadhar Gorpade et al.¹⁵ It is interesting to note that the study population had good awareness about the proper disposal of expired insulin vials. About 40% ($n=40$) responded that they will return the expired insulin to the local pharmacy, about 30% ($n=30$) responded that they will not take the insulin, and about 28% ($n=28$) responded that they will throw it in the dustbin, and 2% ($n=2$) responded that they will take the insulin. This however, is in contrast to the study conducted by Abebe Basazn Mekuria et al, wherein the respondents mentioned that they will dispose the used or expired insulin in the toilet or into the household garbage bin (36.2%).¹⁶ Most of the study population followed their daily regimens of insulin intake almost regularly, and non-adherence was restricted only to a few patients on a few occasions, the primary reasons being economic issues (60%), achievement of glycemic control (28%), fear of side effects (10%) and disappearance of symptoms (2%). This however is in contrast to a study conducted by Peyrot M et al, wherein the top five reasons for non adherence included a busy schedule, traveling, skipping of meals.¹⁷ This contrast could probably be explained by the fact that the study was conducted in a semi urban and rural population where economic constraints and lack of knowledge about the proper use and adverse effects contributed to non adherence.

The study revealed good knowledge, positive attitude and good practice of insulin among the study participants. This could possibly be explained by the fact that the study was conducted in semi urban or urban areas with a moderate level of literacy. This was consistent with the study conducted among the urban population by Abebe Basazn Mekuria et al, which showed that the urban population had better knowledge, positive attitude and better practice than their rural counterparts. Factors such as a higher education level, higher socio economic status, and awareness through frequent sensitization programmes conducted in urban areas might have contributed to the difference, as

evidenced by the study conducted by Deepa et al.¹⁸ This study also showed that females had a better knowledge, positive attitude and good practice of insulin administration than males. This might be due to the fact that women are more sensitive to illnesses and more willing to seek medical advice, have a greater interest and concern for diabetes and are and are more willing to seek medical advice. They also make greater use of diabetes services and have a larger network of people to discuss medical problems. Women also report more illnesses than men. Hence, women appear to be more knowledgeable and have a positive attitude about insulin use and its adverse effects.¹⁹

CONCLUSION

This study revealed the fact that though most of the study population has good knowledge and positive attitude about insulin self administration, there exists a small gap between the knowledge and practice domains. This might be due to practical problems like financial and economic constraints, temporary relief of symptoms or control of blood glucose, or from the fear of adverse effects, especially hypoglycaemia. Also, this divide is more obvious in the rural population than urban. This barrier can be overcome by conducting frequent sensitisation programmes about the use of insulin and its adverse effects, and the consequences of irregular treatment. Also it becomes the duty of the health care provider to educate the patient regarding the proper technique of self administration of insulin, so that patients might be able to manage the disease effectively, along with proper dietary advice. Thus India, which is designated as the diabetic capital of the world, will be able to combat this deadly non-communicable disease effectively, through simple measures as suggested above, so that we can achieve the goal of a healthy population in the long run.

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Ethical approval: The study was approved by the Institutional Ethics Committee of Chennai Medical College Hospital and Research Centre

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