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ORIGINAL RESEARCH

Knowledge, Attitudes, and Practices Regarding Insulin Administration Among Diabetic Patients – A Cross-Sectional Study

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ABSTRACT

Background: Diabetes Mellitus is a long-term metabolic disorder with increasing prevalence in India, impacting more than 101 million people according to the ICMR-INDIAB study (2023). Insulin therapy is important for glycemic control, especially in poorly controlled diabetes, but its efficacy relies on correct administration methods and compliance. The current study seeks to evaluate the knowledge, attitude, and practice (KAP) of insulin administration among diabetic patients in a tertiary care facility.

Methods: A six-month cross-sectional study was carried out on 176 insulin-treated diabetic patients in both inpatient and outpatient departments. The data were collected through a structured questionnaire that measured KAP concerning the use of insulin. Statistical analysis was carried out using SPSS software with descriptive statistics having a 5% level of significance and 95% confidence interval.

Results: Results indicated pervasive knowledge gaps between patients and appropriate insulin administration practices, including inappropriate injection methods and misconceptions on its effects. Although the majority of patients had accurate answers regarding insulin storage techniques, a sizable percentage of patients showed improper site repetition and failure to monitor blood glucose levels properly. Stigma and myths associated with insulin dependency were prevalent and impacted compliance.

Conclusion: This research highlights the necessity of organized educational interventions to promote patient awareness and compliance with insulin therapy. Enhancing the role of healthcare professionals in patient education and incorporating digital health approaches may enhance insulin administration practices, resulting in improved glycemic control and diabetes management.

Keywords: Diabetes Mellitus, Insulin Therapy, Knowledge, Attitude, Practice, Patient Education.

INTRODUCTION

Diabetes Mellitus (DM) is a long-term metabolic disorder involving high blood glucose levels caused by defects in insulin secretion, insulin action, or both. Diabetes has been increasingly spreading across the globe, and India has become one of the epicenters of this disease. Based on the 2023 study of the ICMR INDIAB, the estimated count of people suffering from diabetes has crossed 101 million [1]. The increase in prevalence has broad public health implications, as diabetes has multiple associated complications that tend to have profound effects on the quality of life of the suffering person.

Complications of uncontrolled diabetes both microvascular and macrovascular increase morbidity and mortality. Among the most serious complications of uncontrolled diabetes are non-healing ulcers that may lead to amputation, coronary heart disease that poses a risk for myocardial infarction and heart failure, diabetic retinopathy causing visual impairment or blindness, and nephropathy leading to chronic kidney disease. Not only do these complications place a huge burden on the healthcare system, but they also significantly lower the life expectancy and well-being of diabetic patients.

Insulin is a central component in diabetes management, particularly in patients with Type 1

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Diabetes Mellitus (T1DM) and those with uncontrolled Type 2 Diabetes Mellitus (T2DM) [2]. In these patients, insulin therapy is critical in the regulation of blood glucose levels and avoidance of long-term complications. Yet, the success of insulin therapy relies heavily on the patient's compliance with proper administration methods. Effective use of insulin has several key steps, such as identification of prescribed insulin, proper storage conditions, preparation of correct doses, effective injection technique, site rotation, proper maintenance of insulin-meal timing, and identification of complications like lipohypertrophy or hypoglycemia [3]. Inability to carry out these basic practices will result in poor blood glucose control, making insulin therapy less efficient and raising the chances of complications.

Notwithstanding the pivotal role of insulin in diabetes care, research indicates that there are knowledge, attitude, and practice (KAP) gaps among patients concerning insulin use. Poor education and myths surrounding insulin therapy result in poor compliance, fear of insulin therapy, and incorrect injection techniques. With these issues in mind, assessing the KAP of insulin use among diabetic patients in tertiary care facilities is critical in determining areas for patient education improvement.

The purpose of this research is to evaluate the knowledge, attitude, and practice of insulin injection among diabetic patients undergoing treatment at a tertiary care center. Identifying the areas of lack of awareness and practices in patients, the results of this study can act as an effective guide for healthcare practitioners to develop efficient educational programs. Improving patient education and counseling on insulin therapy has the potential ultimately to provide improved glycemic control, fewer complications, and enhanced quality of life for people with diabetes.

METHODS

Study Design

This research was carried out as a cross-sectional study to assess the knowledge, attitude, and practice of insulin injection among diabetic patients. Cross-sectional design was used because it offers a good way of determining the status of awareness and practice of insulin usage at a particular moment in time. This is a good approach to understanding the gaps in insulin administration among diabetic patients in a tertiary care setup.

Study Area

The investigation was conducted at a tertiary level healthcare center focusing on diabetic patients receiving insulin treatment. The attendees of the General Medicine Outpatient Department (OPD) as well as patients admitted to the inpatient (IP) unit were included among the participants. This wide scope of selection catered to a variety of patients receiving varying types of care, providing a wide view of the practice of insulin administration.

Study Population

The population under study was diabetic patients who had been put on insulin therapy. Both inpatient and outpatient diabetic patients were considered to compare differences in practice and knowledge between patients receiving constant hospital care and those at home. By considering both the groups, the study sought to offer a balanced analysis of the administration practice of insulin among various groups of patients.

Study Duration

The research was carried out for six months, which provided adequate time for data collection and analysis. The time was selected to allow the study to gather data from a reasonable number of patients while avoiding seasonal fluctuations that could affect diabetes care practices.

Sample Size

Sample size was calculated employing the formula of standard sample size for prevalence studies. According to the provided prevalence rate and desired error of 5%, a sum of 176 insulin-treated diabetic patients was considered for inclusion in the study. The selected sample size was felt to be satisfactory to elicit statistically significant outcomes concerning knowledge, attitude, and practice on administration of insulin.

Study Tools

A standardized questionnaire was employed as the main data collection instrument. The questionnaire was formulated following a thorough review of the literature and was peer-reviewed for validation. It was constructed to comprehensively measure different dimensions of insulin administration, such as the patient's knowledge regarding insulin storage, dose, injection practices, site rotation, and complications, attitudes toward insulin treatment, and their level of adherence to recommended guidelines.

Outcome Measures

The research sought to assess the practice, attitude, and knowledge of insulin administration in diabetic patients. Knowledge was evaluated in relation to the patient's understanding of the types of insulin, storage needs, accuracy of dosage, and potential complications. Attitude was assessed in reference to the patient's belief regarding insulin therapy, readiness to comply with treatment instructions, and any misconceptions about the use of insulin. Practice was examined according to adherence to proper insulin administration methods, such as injection site rotation, needle replacement, and appropriate insulin-meal timing.

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Inclusion Criteria
Diabetic patients who were diagnosed with diabetes and on insulin therapy were included in the study. Inpatient and outpatient diabetic patients who were actively on insulin as part of their treatment were considered for inclusion.

Exclusion Criteria
Some groups of patients were not studied to preserve accuracy and reliability. Patients who were unable to answer or understand the questionnaire were omitted since their answer might not really indicate knowledge and practice. Psychologically unstable, critically ill patients, and those in pregnancy states were not included because their health priorities and control of insulin would be different compared to the universal diabetic patient population.

Advantages and Drawbacks of the Research
The research aimed at giving information regarding the practice and knowledge gaps of insulin therapy among diabetic patients. The determination of these gaps would help improve the patient education program, in the long run, leading to enhanced glycemic control and minimization of complications from diabetes. Given that the study was carried out using a questionnaire, no immediate risk to participants was encountered, thus achieving ethical safety to everyone involved.

Data Collection
Patient demographic information and baseline values were documented prior to the administration of the questionnaire. The standardized study questionnaire was then distributed among the participants and their responses obtained. For the patients who could not respond themselves, e.g., elderly people, mentally disturbed patients, or children, their caregivers were asked to fill the questionnaire for them. This process ensured that all the data pertaining to the relevant information were collected without compromising the integrity of the study [4, 5].

Data Analysis
When data collection was finished, the answers were keyed into Microsoft Excel for preparation and structuring for statistical analysis. SPSS computer software was utilized to conduct descriptive statistical analysis such as frequency distribution and percentage computation. Further statistical tests were conducted where necessary, using a 5% significance level and a 95% confidence level to guarantee the validity of the results.

Study Significance and Rationale
The present study was conducted to evaluate the knowledge gaps and misconceptions about insulin administration among insulin-treated diabetic patients. By understanding areas of patient unawareness, the study offers useful information regarding the need for focused education programs for insulin-treated patients. The findings also underscore the need to improve doctor-patient communication to enhance compliance with insulin therapy and diabetes care overall.

Implications of the Study
The findings of this research can be used as a reference for enhancing patient education and counseling on insulin administration. Through filling the gaps that were noted in the research, healthcare professionals can create systematic educational interventions to improve patient compliance with insulin therapy. In addition, the research highlights the importance of enhanced coordination among physicians, nurses, and pharmacists in diabetes management to provide a more holistic approach to patient care. In the long term, enhancing knowledge, attitude, and practice concerning insulin administration can lead to improved glycemic control, fewer complications, and overall enhancement of the quality of life in diabetic patients.

RESULTS

The purpose of the study was to evaluate the knowledge, attitude, and practice of insulin injection among diabetic patients under treatment at a tertiary care hospital. 176 diabetic patients undergoing insulin treatment were included in the study, and data were obtained using a structured questionnaire. Descriptive statistics were used to analyze the responses, and the results are described in the following sections.

Knowledge of Insulin Administration
Knowledge survey indicated that the majority of patients knew that diabetes mellitus is defined by elevated blood sugar levels. Misconceptions, however, were observed, e.g., that insulin raises blood sugar, and they were not sure about how to store insulin vials properly. Although the majority of patients properly identified that insulin must be administered prior to food, a significant number did not know the significance of air bubble removal prior to injection. Additionally, knowledge of injection sites and the need for site rotation to avoid tissue damage was inconsistent among the participants.

Table 1: Knowledge of Insulin Administration Among Patients

Knowledge Parameter	Correct Response (%)	Incorrect/Unsure Response (%)
Diabetes mellitus leads to high blood sugar	91.5%	8.5%
Insulin increases blood sugar	22.7%	77.3%
Insulin should be stored in the refrigerator	74.4%	25.6%
Insulin injection should be taken before food	69.3%	30.7%

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Air bubbles should be removed before injection	42.6%	57.4%
Correct insulin injection sites include abdomen, thigh, buttocks, and upper arm	60.2%	39.8%
The correct angle for insulin injection is 45° or 90°	55.7%	44.3%
Injection sites should be rotated to prevent tissue damage	68.2%	31.8%
Complications of insulin therapy include low blood sugar and insulin resistance	48.9%	51.1%

Attitude Towards Insulin Therapy

Patient perceptions of insulin treatment were highly diverse. Although the majority of participants recognized the advantages of insulin, a considerable number were concerned with long-term use. Some patients had the misunderstanding that insulin therapy could be stopped once blood glucose was under control, which could have a negative effect on adherence. In addition, a public stigma of injecting insulin in workplaces or public areas was expressed by some respondents, which indicates a possible obstacle to adequate insulin injection.

Figure 1: Distribution of Patient Attitude Towards Insulin Therapy

Figure 1 illustrating patient responses on insulin therapy perception, highlighting agreement or disagreement on various aspects.

Practice of Insulin Administration

Practice assessment reflected improvement opportunities in conformity with best-practice insulin injection procedures. Although the majority of patients claimed proper insulin storage, variations were noted in injection methods and site rotation. A high percentage of patients acknowledged frequent injections in the same location, which raised the risk of lipohypertrophy. Some of the patients also did not always monitor their blood sugar levels or confer with their doctor before adjusting insulin dose, which might result in suboptimal glycemic control.

Table 2: Practice of Insulin Administration Among Patients

Practice Parameter	Correct Practice (%)	Incorrect Practice (%)
Insulin vials stored in the refrigerator	82.4%	17.6%
Insulin injected at 45° or 90° angle	63.1%	36.9%
Injection sites frequently rotated	54.5%	45.5%
Insulin injected before food intake	76.7%	23.3%
Insulin injected into abdomen, thigh, buttocks, or upper arm	72.1%	27.9%
Syringe kept still for 10 seconds before withdrawal	41.5%	58.5%
Regular blood sugar monitoring done	67.6%	32.4%
Skipping meals after insulin administration	18.2%	81.8%
Consults doctor before adjusting insulin dose	79.5%	20.5%
Eats candy or sugar when experiencing low blood sugar	88.1%	11.9%

The findings of the study suggest that although a significant proportion of patients had adequate knowledge of insulin treatment, gaps existed in areas like injection methods, site rotation, and recognition of insulin-associated complications. Attitudinal issues, specifically issues related to long-term use of insulin and stigma, were found among a subset of patients. Additionally, practice deficits such as poor injection techniques and inadequate regular monitoring of blood sugar levels indicate the urgency of specific patient education programs aimed at enhancing compliance and outcomes in diabetes care.

DISCUSSION

The results of the study give vital information on diabetic patients' knowledge, attitude, and practice about insulin administration presenting to a tertiary care center. The outcome stresses substantial gaps in knowledge, typical myths, and patterns of behaviors that might jeopardize glycemic control and management of diabetes on a long-term basis. References to other past studies give appropriate perspectives to such results, calling for focused educational interventions so as to optimize insulin compliance and patient outcomes.

A key observation from this study was that while most patients correctly identified that diabetes mellitus results in high blood sugar, nearly a quarter of the respondents believed that insulin increases blood glucose levels, demonstrating a fundamental misunderstanding of insulin's role in diabetes management. This result is consistent with a research study by Almheiri et al. (2024) [6], which also observed diabetic patients' lack of knowledge about the mechanism of action of insulin, especially in new cases. Likewise, Pardhan et al. (2024) [7] reported that there were insulin misconceptions among individuals who were at risk of diabetes-caused blindness in Bangladesh, pointing to the fact that

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misinformation is a common problem in various demographic groups.

Storage and handling of insulin were also problematic areas within this study. While 74.4% of the patients were aware that insulin vials must be stored in the refrigerator, a high percentage were not familiar with appropriate injection techniques, such as the need to remove air bubbles prior to administration and the need for site rotation to avoid lipohypertrophy. These findings are concerning with those of Almheiri et al. (2024) [6], who noted improper insulin injection methods were a factor in poor glycemic control in their population. In addition, Shortell et al. (2020) [8] highlighted gaps in patient teaching regarding self-care practices, such as insulin storage and administration, that occur in primary care environments and need to be addressed by systematic interventions to improve compliance.

Attitudinal obstacles to insulin treatment were also demonstrated in this investigation, with an appreciable number of patients believing that insulin should be stopped when blood glucose concentrations are managed. This belief is especially troubling as it could promote poor long-term compliance and increasing glycemic states. Stigma related to administering insulin in a public or place of work setting was another potent factor that would influence treatment adherence. Comparable issues were also noted by Smith et al. (2022) [9], who pointed out that perceived stigma tends to influence medication adherence and patient participation in chronic disease care. In addition, resistance to insulin use because of concerns about dependency has been noted in the past by Mackintosh et al. (2020) [10], emphasizing the importance of healthcare providers to intervene through counseling and education on patient issues.

In assessing the practicality of insulin injection, most patients in this study used proper storage procedures but had inconsistencies in injection practice and rotation sites. Over 45% of them confessed to having injected insulin at the same location very often, thus exposing themselves to lipohypertrophy, a condition which hampers insulin absorption and action. The same has been observed by Ramachandran et al. (2024) [11] in their research on diabetes management among adolescents, wherein suboptimal injection practices correlated with increased glycemic variability. Further, Asmare et al. (2024) [12] pointed out that systematic patient education and the inclusion of paramedical personnel, like nurses and pharmacists, play a vital role in resolving such problems and enhancing compliance.

Another important factor noted in this research was the irregularity of routine blood glucose monitoring and self-management activities. A large percentage of patients did not seek advice from their physicians prior to modifying their insulin dose, which can result in either hyperglycemia or hypoglycemia. Parallel gaps in practices of self-care were observed by Horey et al. (2013) [13], with non-structured patient education for management of chronic illness leading to the poor follow-through on treatments. Further, Coulton et al. (2023) [14] discussed that incorporation of psychosocial support as a part of management of diabetes has the potential to increase participation among patients and yield better self-care activities.

These implications reaffirm the requirement for holistic programs for patient education targeted at insulin treatment. The capacity of healthcare professionals, such as nurses, pharmacists, and diabetes educators, must be enhanced to provide patients with proper instructions on insulin injection, storage, and compliance strategies. Existing literature, e.g., by Elwenspoek et al. (2022) [15], has shown that patient-focused educational interventions have a strong positive impact on chronic disease management and treatment outcomes. Thus, an interdisciplinary strategy with physicians, nurses, and allied health staff should be taken into consideration to overcome the knowledge gap and improve patient compliance with insulin therapy.

In summary, this article sheds light on major gaps in the knowledge, attitude, and practice of insulin injection among diabetic patients in a tertiary care setting. The result is in accordance with past studies, which have reported analogous gaps in various groups. Resolution of these matters through organized patient education programs and healthcare provider interventions is critical in order to achieve better diabetes care and optimal therapy outcomes. Longitudinal study is needed on the effect of focused educational treatments and the functions of digital health technologies in fostering patient compliance to insulin therapy.

CONCLUSION

This research uncovers critical deficiencies in the practice, attitude, and knowledge of insulin injection in diabetic patients in a tertiary healthcare facility, accentuating the imperativeness of organized patient education and healthcare practitioner interventions. Most patients had evidenced basic knowledge regarding diabetes and insulin treatment, while myths regarding insulin action, non-standard injection skills, and attitudinal resistances like stigma and fear of addiction were wide-spread. These observations are in consonance with prior research, upholding that low knowledge and low adherence to insulin therapy continue to be central concerns in the treatment of diabetes. These concerns may be resolved to a great extent by incorporating total educational interventions, enhancing patient-healthcare provider relationships, and by including paramedical staff within diabetes management. Future studies would then target an assessment of the effectiveness of specific interventions, use of technology in educating patients, and ways of lowering insulin-use stigma, in order to improve long-term glycemic control and overall quality of life in diabetic patients.

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