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Assessment of insulin administration among diabetic patients in India- a review article

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Abstract

Background and aim: To conduct a descriptive review and synthesize data from all studies assessing the knowledge, attitude, practice, and adverse events of insulin administration and storage techniques in patients with diabetes in India.

Methods and Materials: Literature search regarding the knowledge, attitude, practice, and adverse events of insulin administration were performed using the Google Scholar search engine as well as Pub Med up to December 2021.

Results: A total of 14 studies were selected which were published from 2014 to 2021. About six of the studies was cross-sectional and the other six of them included cross-sectional, observational survey through a questionnaire. The sample size was around 55-750 and the age range was 30-70 years. A higher level of knowledge and economic status improved insulin administration among the patients. The younger population had a more positive attitude towards insulin administration than the older patients. Insulin practices as well as the adverse events followed by the insulin administration were assessed.

Conclusion: The study is a review to examine the knowledge, attitude, practice, adverse events, and storage of insulin among diabetic patients. Diabetes education must be provided to patients as well as health care providers for improved clinical practices of insulin.

Keywords: *Insulin, Hypoglycemia, Diabetes, Knowledge, Attitude, Adverse events.*

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Introduction

Diabetes Mellitus is a chronic metabolic disorder characterized by hyperglycemia resulting in insufficient insulin secretion, resistance to the action of insulin, or both with disturbance in carbohydrate, fat, and protein metabolism. Patients with diabetes are at an increased risk of cardiovascular, peripheral vascular, and cerebrovascular diseases [1-2]. In 2016, diabetes was India's sixth-leading cause of early death. With the rising incidence and prevalence of diabetes, more people will require appropriate and judicious medical care from health professionals [3]. India had 72 million diabetic patients in 2017 [2-3]. This figure is likely to increase substantially by 2040 and hence termed the 'Diabetic Capital of the World' [4, 5]. Insulin self-administration is dependent on the patient's understanding and attitude toward insulin therapy [6].

Insulin is the mandatory therapy for Type I diabetes and is also critical in many cases for the management of Type II diabetes. Even though about 3.2 million Indians depend on insulin injections for the management of diabetes, at least one-third of them fail to take insulin as prescribed and 20% of adults deliberately skip their doses [1, 7].

Insulin therapy requires coordination and understanding of patients with diabetes along with the health care professionals responsible for their treatment. Inadequate awareness regarding insulin use is liable to impact its adherence and acceptance and outcome of therapy. Hence better knowledge about the insulin and technique of insulin administration are significant in controlling hyperglycemia and can diminish the

prevalence of complications. This study was carried out with the objective to assess the knowledge, practice, and adverse events of insulin administration and storage techniques in patients with diabetes [7].

Materials and Methods

The consensus document was outlined in a stepwise manner with due thought given to clinical evidence from the published literature and the clinical opinion of the experts. Our study aimed to collect data regarding knowledge in insulin administration techniques and their resulting adverse events on diabetic patients. Firstly, literature searches were performed using the Google Scholar search engine as well as PubMed up to December 2021. Search terms included the words like 'Insulin', 'Injection technique', 'KAP of insulin', 'adverse events' etc. The literature search included cross-sectional studies, questionnaire-based surveys, quasi-experimental studies, and observational studies. Secondary studies such as articles, systematic reviews, and articles with invalid information, articles that evaluated only oral antidiabetic drugs, studies conducted outside India, and those which do not have access to their full texts and non-English studies were excluded.

The full texts of all selected articles were obtained and subjected to a thorough examination. Additional sources of information and data for this review were found in the references of the paper retrieved. Using the standardized piloted form, the following information was collected: location and year of data collection, type and size of samples, study design and methods, knowledge of insulin administration practice, assessment criteria, and their results.

Results

Settings, study samples, and definition

The 14 studies that were reviewed were all written in English and published between 2014 and 2021. All the selected studies were conducted in India. About six of the studies were cross-sectional and *the* other six of them utilized cross-sectional, observational KAP *surveys* through validated *questionnaires*. Also, there was a quasi-experimental study and ***an*** observational study. The sample size of the studies was around 55-750. The majority of the studies were carried out after taking informed written consent from the participants and eight of them had also taken approval from Institutional Ethics Committee. One study obtained Ethics Committee approval only whenever specifically requested by a center and/or by local regulations and one study was registered under the Clinical Trials Registry of India.

Population Descriptors

Diabetic patients of both gender on insulin therapy irrespective of Type I and Type II diabetes and who were willing to participate were included in the study. The majority of the studies comprised participants above the age of 18 and the range of age was between 30-70 years. In addition, patients who were unable to participate due to physical or mental limitations were excluded.

Assessment of knowledge, attitude, and practice on insulin

According to other parts of India, the patients in the eastern parts had more knowledge, about the administration of insulin [8]. Among diabetic patients, females were more concerned than males with transporting insulin at the right temperature, and younger patients had more knowledge and practice in this area than older patients. KAP of the diabetic patients were also dependent on the health facilities and their accessibility in each area [5]. Higher levels of education and economic status were linked to a better understanding of diabetes complications. Knowledge of exercise, diet, and drug therapy among diabetic patients was also very poor [8-9]. There is a significant gap between the knowledge and practice of insulin among diabetic patients. Diabetes education has a key role in increasing the quality of diabetic care, self-management, and patient outcomes [7, 9].

Assessment of insulin practices among diabetic patients

Most patients including adults skip daily doses intentionally due to a lack of awareness of insulin administration. They were reluctant to take insulin due to fear of hypoglycemia and financial constraints [10]. The majority of them were using needles and syringes [11]. Adherence to the technique of waiting for 5-10s before removing the injected insulin needle was not optimal. It was found that needle reuse was a common practice. The abdomen was the common site used for injecting insulin followed by the thigh. Most of the patients practiced site rotation. Most of the patients kept insulin in the refrigerator. Maintenance of proper temperature of insulin vials while traveling was followed only by a few. The majority of the patients were throwing needles and syringes into the trash and

public drainage system [4, 11].

Assessment of adverse events followed by insulin administration

Pain at the injection site was one of the most common reasons for non-adherence. Hypoglycemia is one of the main complications associated with the treatment of diabetes. At least one episode of hypoglycemia was experienced by the majority of the patients during treatment. There were findings of skin bruising and muscle wasting. LH was found to have a significant association with the angle of injection, site of injection, periodic injection site rotation, storage of insulin, and timely needle change. Patients with LH tended to have worsening glycemic control. There was also persistent swelling at the injection site, which was indicative of LH.LH had no association with insulin hygiene, gender, type of DM, length of the needle, and skin fold. Weight gain was also an adverse event attributed to insulin treatment [8].

Discussion

This study reflects the KAP and adverse events of insulin therapy among diabetic patients in India. The KAP was associated between age, educational levels, and financial standards of diabetic patients [12]. The study focused on the interventions regarding insulin administration among diabetic patients, counseling, and demonstration. The gap between insulin administration guidelines and clinical practice due to poor communication between patient and physicians have a great role in the defective consumption of insulin. The studies also revealed despite the therapeutic effects and benefits of insulin, many patients are said to be hesitant to begin treatment due to pain and inconvenience, as well as the social stigma of using needles in public [10]. The studies also conveyed that most of the patients in the eastern parts of India had a false belief in herbal drugs or bitter condiments incurring diabetes. The interventional studies in south India conveyed that most of the patients were lacking knowledge on insulin administration and increased their self-administration of insulin. Proper intervention and awareness resulted in the best insulin practices among them**.** Compared to other parts of India, patients in the eastern region had more knowledge of insulin practices. The regular checking of blood glucose levels by using a glucometer was comparatively low, but most of the patients had the knowledge and a thorough belief that insulin can completely cure diabetes. Adults had a more positive approach to insulin administration than old patients [7].

It was evident that most of the patients used needles and syringes instead of modern devices due to their poor financial backgrounds. The majority of them were injecting themselves with a needle and syringe. This preference for needles/syringes was owing to the fact that certain hospitals provide insulin with needles and syringes for free, whereas patients must pay for the pen device. Certain studies reveal that despite medical advice, several well-educated subjects refused to use insulin [9]. Failure to meet therapeutic goals can be due to a variety of factors, including patient adherence to treatment regimens [13]. Other important findings were a lack of understanding of the importance of maintaining insulin administration consistency and a strong aversion to discussing insulin treatment with a physician. Other than patients, nursing staff and other health care providers also lacked knowledge of insulin administration practices. The studies had disadvantages such as a small cohort of subjects, a lack of adequate diabetes educators, a lack of structured audio-visual-based sessions, and maybe the lack of continuing communication with patients by telephone, email, and other means, which could have enhanced KAP. Overall, the findings suggest that both patients and healthcare providers need to be more aware of diabetes. This can be addressed through more widespread insulin-related training programs for nurses and physicians. Short-term courses and online programs for T1DM patients may assist them to improve their overall self-care [12]. Effective education about insulin administration and glycemic control improves the KAP among the patients or caregivers [14].

Conclusion

Our study looked at diabetic patients' knowledge, attitudes, and practice regarding insulin use, injection techniques, storage, and side effects. Our study showed that the level of knowledge on insulin therapy was inadequate. There is a need to concentrate on improving knowledge about different types of insulin, and their side effects, particularly hypoglycemia, LH, and injection sites. Patients must be educated on the proper timing of insulin delivery about meals, the proper use of skin folds (for longer needles), and angulations during insulin injection in terms of practices. Diabetes education must be imparted by physicians by counseling the diabetics at each follow-up visit while physicians themselves should be enriched with more knowledge through CME (Continuing Medical

Education) and other programs.

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Conflict of Interest

The authors declare no conflict of interest.

Abbreviations

KAP: Knowledge, attitude, and practice;
LH: Lipohypertrophy.

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