A STUDY TO EVALUATE THE SELF CARE PRACTICE ON INSULIN USAGE & ADMINISTRATION TECHNIQUES AMONG DIABETIC PATIENTS

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Abstract: **Introduction: Diabetes poses long-term risks to individuals and their families. In both inpatient and outpatient settings, insulin is a high-alert drug. When given incorrectly, insulin can have serious negative effects.**

Objectives: The goal of this study was to assess the selfcare practice on insulin usage and administration techniques among diabetic patients.

Methods: Diabetic individuals from the village of Kondancherry who matched the inclusion criteria and were recruited using an appropriate Convenient sampling method. Data were gathered utilising self-structured checklist and observation (demonstration) method.

Result: Consequently, 57 (57%) of the 100 diabetics studied did not practice appropriate insulin self-care. Regarding the use of insulin, 59 (59%) of users had not taken note of the substance's physical characteristics, and 75 (75%) had not cleansed the injection site. 82 (82%) had not frequently changed the skin site for insulin injection. 75 (75%) had not disposed of the used needles or syringe in a safety box. 68% had not checked the insulin expiry date before using insulin. Only two demographic factors, education and residence had statistically significant relationships with self-care practice on administration (p<0.001 level, respectively).

Conclusion: It is crucial to administer insulin correctly since using the wrong approach might result in hyperglycaemic crisis or severe hypoglycaemia, both of which require trips to the emergency department (ED). Despite these advancements, it is still necessary to evaluate how patients use them in order to pinpoint areas where education needs to be strengthened.

Keywords: **Self-care practice, Insulin Usage, Insulin Administration techniques, Diabetic Patients.**

1. INTRODUCTION

Diabetes mellitus (DM) is a group of metabolic disorders characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both.[1] Hyperglycemia occurs when fasting blood glucose is greater than 125 mg/dL or greater than 180 mg/dL 2 hours after a meal[2]. Type 1 diabetes is caused by a complete lack of insulin secretion. Serological evidence and genetic markers of pathological autoimmune processes occurring in pancreatic islets are often used to identify individuals who are likely to develop this type of diabetes. Type 2 diabetes, which is more common, is caused by both resistance to insulin action and an inadequate compensatory insulin secretory response[3]. Type 1 diabetes, which usually has a childhood onset, and type 2 diabetes, which often has an adult onset but gradually develops in childhood and adolescence. Both types of diabetes can damage the heart, blood vessels, eyes, kidneys and nerves, increasing the overall risk of disability and earlydeath[4].Globally, between the ages of 20 and 79 of people (463 million) had diabetes in 2019. The number of people with diabetes is projected to increase by 10.2% (578 million people) by 2030, with more than three-quarters (79.4%) living in lower and middle-income countries[5]. Each year, diabetes is reported to be the cause[6].An

estimated 463 million people will be affected by diabetes in 2019, and this number is expected to rise to 578 million by 2030 and 700 million by 2045[7]. To control constant worry, patients must use insulin therapy as directed by their healthcare provider[8, 9]. Insulin is one of the oldest and most valuable antidiabetic drugs available and is also the most effective in reducing hyperglycemia when used in appropriate doses [10]. Insulin is used to control blood sugar levels. It is advocated for the treatment of patients with type 1 diabetes and is commonly used as an adjunct to oral hypoglycemic agents in patients with type 2 diabetes who have not reached target blood glucose levels [11]. There are fast-acting, short-acting, medium-acting, and long-acting types of insulin in terms of their speed of action. Insulin management is completed on one-of-a-kind frame sites, wherein the abdomen is the frequently used site for injection.[12].Timeous insulin initiation is of extreme significance to make certain appropriate glycaemic manage in humans with diabetes so as to save each long-time period and acute diabetes emergencies[13]. The insulin injection method is one of the maximum place with the probability of mistakes[14]. Correct insulin management is an essential aspect of DSME, and is appeared as similarly vital in reaching glycaemic manage as the type and dose of insulin prescribed. The gaps in DSME regularly transpire while mistakes with insulin management grow to be evident, regularly with deleterious consequences. Repercussions of wrong insulin management encompass hypo- and hyper glycaemic emergencies [15]. Due to its restrained healing index, the usage of insulin as remedy of diabetes mellitus is regularly restricted. Syringes are regularly used to inject insulin, how ever research on insulin pens display that their use is related to better compliance. Appropriate insulin delivery technology is essential for good glycemic control in diabetic patients. Successful use of insulin is believed to depend on choosing the right type, dose, and approach. Choosing the wrong injection site, using the wrong delivery system, and using the wrong method affect insulin absorption. This leads to poor glycemic control and impacts long-term results.[16]. Lack of knowledge, skills and practice can lead to indifference or disregard for insulin handling and dosing recommendations. The result can be poor insulin stability and efficacy, delayed pharmacological action, treatment failure, and high healthcare costs. Evidence-based insulin handling strategies and skills should be used to improve patient outcomes[11].Insulin therapy is fraught with challenges due to the complexities of demanding applications. A thorough understanding of your application will help you avoid problems, negative patient outcomes, poor adherence to treatment, and consistently poor glycemic control. The American Diabetes Association has produced a series of recommendations for insulin storage, but the level of knowledge and practice among people with diabetes mellitus has been unsatisfactory. It helps build confidence and pride in contributing. Furthermore, proper injection technique is critical for proper delivery to the subcutaneous tissue and prevention of intramuscular damage and fat hypertrophy [17].Diabetics on insulin need to be knowledgeable about their disease and insulin therapy, and have the ability and positive attitude to self-manage their insulin injections to overcome barriers to insulin injections and achieve good glycemic control[18]..

2. METHODS

The community based cross sectional research design was adapted to evaluate the self care practice on insulin usage & administration among 100 diabetic individuals at kondanchery village recruited by convenient sampling. Patients with Type I and Type II diabetes who had been taking insulin therapy for at least 12 months and self-administering insulin injection and were at least 30 years old and above were included in the study population. Participants also had to be willing to participate. Participants who had just received a diagnosis of diabetes and/or a prescription for insulin injection therapy, who did not speak Tamil or English, critically sick patients, and patients who were unconscious were excluded. Diabetic Individuals were provided written informed permission after being fully briefed about the study. Before beginning the study, official approval from the village authorities and the institutional ethics committee were acquired. Information was kept confidential, and subjects' anonymity was upheld. It was made sure that the study wouldn't have any negative effects on the partcipants. Age, gender, occupation, educational level, residence, occupation, income, family history, duration of having diabetes mellitus, duration of taking insulin, frequency of taking insulin injections, and preferred site for self-administration of insulin injection were all collected through a structured interview. Checklists were used to evaluate the participants' use of insulin, and 20 observational checklist (demonstration) approaches connected to insulin self-administration procedures were used to evaluate practice abilities. Diabetic patients are requested to demonstrate the injection method during a home visit. The scorings were classified as correct, incorrect, and skipped and given scores of 2, 1, and 0, respectively, based on the checklist. Practice test results were divided into three categories: inadequate (0–5), intermediate/moderate (6–10), and adequate (11–20). Using SPSS 20 version, descriptive and inferential statistics were used to evaluate the obtained data. Findings were presented as tables or graphs, as appropriate.

During a scheduled visit, each patient filled out the Injection Technique.

3. RESULTS AND DISCUSSION

**SECTIONA: Sociodemographic Characteristics of the Participants**

Most diabetic patients (39%) were between the ages of 51 and 60; 61 (61%) were men; 70 (70%) were Hindus; 54 (54%) had only completed their primary education; 44 (44%) were employed on a daily basis; 58 (58%) were married; 70 (70%) belonged to the middle class; 74 (74%) were members of nuclear families; 78 (78%) were living in rural areas; and 77 (77%) were not vegetarian.

Regarding the frequency and percentage distribution of clinical variables, the majority of diabetic patients were 66 (66%) without a family history of the disease, 59 (59%) with type

II diabetes, 56 (56%) with the condition for 3 to 5 years, 51 (51%) using insulin for 0 to 1 year, 80 (80%) using a syringe as an insulin delivery device, 62 (62%) self-administering insulin, and 47 (47%) using injections of insulin twice daily.

SECTIONB: Assessment of Level of Self-care Practice on Insulin Usage and Administration Techniques.

Figure 1: Frequency and percentage distribution of self-care practice on insulin administration among diabetic patients.
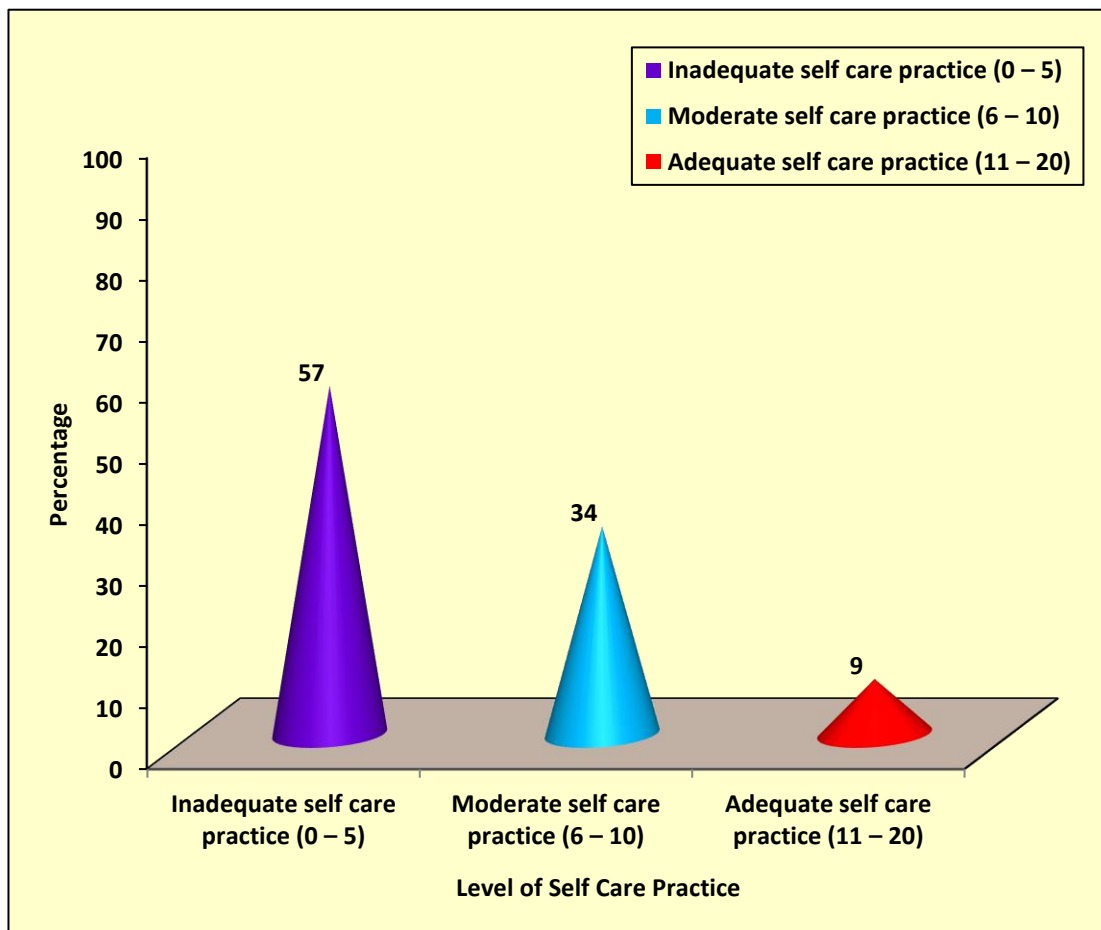
According to Figure 1 above, 57 (57%) of diabetes patients did not practice adequate insulin self-care, 34 (34%) practice moderately adequate insulin self-care, and 9 (9%) practice adequate insulin self-care. Present Study results was supported byan study conducted by Shafi, Parveen, Hussain M, et al. in 2020 to evaluate the practice of self-insulin administration among diabetic patients, it was discovered that 40% of patients administrated insulin correctly and 60% of patients incorrectly administrated the insulin [19]. Another study conducted by Vishnu (2020) found that none of the subjects had good practice, just 26.0% had fairly enough practice, and 74.0% had insufficient practice [20].

Table 1: Frequency and percentage distribution of insulin usage errors among diabetic patients.

N= 100

Insulin Usage Errors	Done		Not Done	
	F	%	F	%
Do you observe the insulin physical characteristics before use insulin Injection	41	41.0	59	59.0
Do you store of insulin at fridge	45	45.0	55	55.0
Keep vial at room temperature at least for 15 mins before insulin administration	33	33.0	67	67.0
Do you refer the physician order before insulin administration	42	42.0	58	58.0
Do you wash your hands before handling the insulin injection	58	58.0	42	42.0
Do you take out the air bubbles inside the syringe before injection	30	30.0	70	70.0
Do you choose the appropriate site for injection	34	34.0	66	66.0
Do you disinfect the injection site	25	25.0	75	75.0
Do you inject the recommended dose	30	30.0	70	70.0
Do you correctly do the skin fold for injection	39	39.0	61	61.0
Do you introduce the needle at 45 degree	19	19.9	81	81.0
Do you wait for 5sec before removing the needle from the skin	21	21.0	79	79.0
Do you pinch the skin without massaging when you remove the needle	12	12.0	88	88.0
Do you massage the site after insulin administration	44	44.0	56	56.0
Are you avoiding injection on scar or navi	33	33.0	67	67.0
Are you using the same syringe for insulin administration	37	37.0	63	63.0
Do you frequently changes the skin site for insulin injection	18	18.0	82	82.0
Do you Dispose the used needles or syringe in a safety box	25	25.0	75	75.0
Do you check the insulin expiry date before insulin use	32	32.0	68	68.0
Do you eat food soon after the insulin injection	55	55.0	45	45.0

The table 1 demonstrates that the majority of diabetes mellitus, before taking insulin injection, 59 (59%) had not noticed the physical properties of insulin, 67 (67%) maintained vial at room temperature for at least 15 minutes prior to administering insulin, while 55 (55%) did not keep insulin in the refrigerator. 58 (58%) had not sought a physical examination before to administering insulin and had cleansed their hands before doing so. Prior to injection, 70 (70%) had neglected to remove the air bubbles from the syringe, 70 (70%) had not injected the necessary dose, 66 (66%) had not selected an acceptable place for injection, and 75 (75%) had not cleaned the injection site. 61 (61%), who improperly performed the skin fold for the injection 81 (81%), who hadn't inserted the needle at a 45-degree angle, 79 (79%) had not waited five seconds before removing the needle from the skin, 88 (88%) had not pinched the skin without massaging when they removed the needle, 45 (56%) had not massaged the site after administering the insulin, 57 (67%) had not avoided administering the insulin to a scar or navi, 63 (63%) had not used the same syringe for administering the insulin, 82 (82%) had not frequently changed the skin site for insulin injection.

According to a study by Fego, Yasin, and Aga, more than half of the participants (157/80.1%) washed their hands before self-injecting insulin, while 153 (78%) washed their hands after doing so. Regarding site rotation, the majority of respondents (121/61.7%) had established orders from their health care providers. Regarding the location of injection, 128 responders (65.3%) injected insulin subcutaneously near the umbilicus on the belly, while the remaining 29 (14.5%) did it on the upper thigh. One hundred ninety-one respondents (97.4%) reuse the needle for injection more than once, and 186 respondents (95%) recap the needle when the injection is finished. The majority of them178 (90.8%) recap by supporting the syringe in the hand and replacing the cap with a straight action of the thumb and fingers, and just 17 (8.6%) of them recap by replacing the needle. Before injecting, 178 of the respondents (90.8%) evacuated the air bubble from the insulin syringe [18].

In a study conducted in 2021, 71.8% of patients often injected at the same place of injection, and approximately half of the patients did not administer insulin adequately at 45-degree angle. [17].Similar findings from previous research confirmed that the most typical injection technique errors were found to be improper mixing or rolling 56 (49.1%), 107 (93.4%), and failure to check the expiration date of the insulin. 64 people (56.1%) failed to properly dispose of the needle. In this study, 62 participants (54.4%) did not inject insulin at a 90-degree angle. [21-23]

SECTION C: Association of level of self care practice on insulin administration with selected demographic and clinical variables.

It demonstrates that only two demographic factors: Education (χ^2=28.969, p=0.0001) and residence (χ^2=25.801, p=0.0001) had statistically significant associations with the extent to which diabetic patients practised self-care on administration (p<0.001 level, respectively), while the other demographic factors had not. Regarding the clinical factors, there was no statistically significant correlation between the degree of self-care used by diabetic patients.

This result was in contrast with the study results [12] which indicated a significant relationship between the practice of patients with education qualification (p < 0.05).

4. CONCLUSION

Diabetes & Insulin Self Administration education must be imparted by physicians by counselling patients at each follow up visit while physicians, nurses & other healthcare provider themselves should be enriched with more knowledge.

Based on the results of the diabetic patients in the study, it was determined that self-administration methods of insulin injection are insufficient and that insulin consumption requires close supervision. Patients did not learn critical skills for administering insulin, nevertheless. This study emphasizes the necessity of ongoing public health education in order to improve patients' proficiency levels with regard to insulin administration and usage methods. Health practitioners must educate patients about diabetes and insulin self-administration at each subsequent appointment.

REFERENCES

[1] Yosef, T. (2019). Knowledge and attitude on insulin self-administration among type 1 diabetic patients at Metu Karl referral hospital, Ethiopia. *Journal of Diabetes Research*, *2019*.

[2] Veras-Estévez, B. A., & Chapman, H. J. (2018). Strengthening national health priorities for Diabetes prevention and management. *MEDICC review*, *20*, 5-5.

[3] Care, D. (2010). Jan: 33 Suppl. 1: S62-S69.". *Diagnosis and classification of diabetes mellitus." American Diabetes Association*.

[4] World Health Organization. (2016). *Global report on diabetes*. World Health Organization.

[5] Atlas, D. (2019). IDF diabetes atlas. *International Diabetes Federation (9th editio). Retrieved from http://www. idf. org/about-diabetes/facts-figures*.

[6] World Health Organization. (2019). Classification of diabetes mellitus.

[7] Sunny, A., Mateti, U. V., Kellarai, A., Shetty, S., Rafikahmed, S. R., Sirimalla, S., &Madhusoodanan, A. (2021). Knowledge, attitude, and practice on insulin administration among diabetic patients and their caregivers–Cross-sectional study. *Clinical Epidemiology and Global Health*, *12*, 100860.

[8] Mariye, T., Girmay, A., Birhanu, T., Tasew, H., Teklay, G., Baraki, Z., ... &Bezabeh, G. (2019). Adherence to insulin therapy and associated factors among patients with diabetes mellitus in public hospitals of Central Zone of Tigray, Ethiopia, 2018: a cross-sectional study. *The Pan African Medical Journal*, *33*.

[9] Gawand, K. S., Gawali, U. P., &Kesari, H. V. (2016). A study to assess knowledge, attitude and practice concerning insulin use in adult patients with diabetes mellitus in tertiary care centre. *Indian Journal of Medical Research and Pharmaceutical Sciences*, *3*(9), 36-40.

[10] Gerensea, H., Moges, A., Shumiyee, B., Abrha, F., Yesuf, M., Birihan, T., ... &Getahun, Z. Knowledge and attitude on insulin self administration among type one diabetic patients in Mekele hospital, Tigray, Ethiopia. Advances in Surgical Sciences. 2015; 3 (5): 32-36.

[11] Netere, A. K., Ashete, E., Gebreyohannes, E. A., &Belachew, S. A. (2020). Evaluations of knowledge, skills and practices of insulin storage and injection handling techniques of patients in Ethiopian primary hospitals.

[12] Sunny, A., Mateti, U. V., Kellarai, A., Shetty, S., Rafikahmed, S. R., Sirimalla, S., &Madhusoodanan, A. (2021). Knowledge, attitude, and practice on insulin administration among diabetic patients and their caregivers–Cross-sectional study. *Clinical Epidemiology and Global Health*, *12*, 100860.

[13] Chrvala, C. A., Sherr, D., &Lipman, R. D. (2016). Diabetes self-management education for adults with type 2 diabetes mellitus: a systematic review of the effect on glycemic control. *Patient education and counseling*, *99*(6), 926-943.

[14] Gupta, M., Verma, S., & Agarwal, S. (2021). Knowledge, attitude, and practices of insulin use among type 1 diabetes patients in North India–A cross-sectional study. *Eastern Journal of Medical Sciences*, 9-12.

[15] Karara, M. W., Otieno, F. C., Okalebo, F. A., Lamos, E., &Kibwage, I. O. (2016). Determinants of insulin-related knowledge among healthcare providers at a county referral hospital in Kenya. *African Journal of Pharmacology and Therapeutics*, *5*(2).

[16] shfaq U, Saif S, Raza AA, Zaidi SH, Musharraf U, et al. (2020) Insulin Usage Errors and Effectiveness of Health-care Providers' Intervention Regarding Self-Insulin Administration among Diabetic Patients Presenting in Services Hospital, Lahore. Endocrinol Diabetes Res 6:1.

[17] Nasir, B. B., Buseir, M. S., & Muhammed, O. S. (2021). Knowledge, attitude and practice towards insulin self-administration and associated factors among diabetic patients at Zewditu Memorial Hospital, Ethiopia. *Plos one*, *16*(2), e0246741.

[18] Fego, M. W., Yasin, J. T., & Aga, G. M. (2021). Knowledge, Attitude and Practice Towards Insulin-Self Administration Among Diabetic Patients Attending Bedele Hospital, Southwest Ethiopia, 2019/2020. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, *14*, 1919.

[19] Shafi I, Parveen K, Hussain M, et al. Knowledge and practice on self-insulin administration among diabetic patients in tertiary care hospital Lahore. J Intensive Crit Care Nurs. 2020;3(3):1-7

[20] Effectiveness of Intervention On Self Administration of Insulin Among Clients with Diabetes Mellitus at Selected Hospitals in Varanasi, Uttar Pradesh N. Vishnu Research Scholar, Department of Nursing, Shri Venkateshwara University, Amroha, India

[21] Forough, A. S., &Esfahani, P. R. (2017). Impact of pharmacist intervention on appropriate insulin pen use in older patients with type 2 diabetes mellitus in a rural area in Iran. *Journal of research in pharmacy practice*, *6*(2), 114.

[22] Patil, M., Sahoo, J., Kamalanathan, S., Selviambigapathy, J., Balachandran, K., Kumar, R., ... &Ajmal, K. (2017). Assessment of insulin injection techniques among diabetes patients in a tertiary care centre. *Diabetes & Metabolic Syndrome: Clinical Research &Reviews*, *11*, S53-S56.

[23] Ahmad, S., Osman, M. T., Jaffar, A., Rashid, M. R. A., Hassan, M. R., &Supian, Z. A. (2016). Education of correct insulin injection technique amongst diabetic patients: outcome study from Malaysia. *International Journal of Medical Research & Health Sciences*.