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Original Article

Assessing Knowledge and Practice of Self-Administration of Insulin among Diabetes Mellitus Patients: Implications for Enhanced Diabetes Care

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ABSTRACT

Background: Type II diabetes mellitus poses substantial management challenges, and self-administered insulin management is crucial in diabetes care. Nonetheless, numerous patients encounter difficulties in insulin administration. This study sought to assess knowledge and practice of self-administering insulin in diabetes mellitus patients, as well as examine associations with socio-demographic factors. **Materials and Methods:** A quantitative descriptive research design was employed, and 300 patients were selected through non-probability convenient sampling. Data collection utilized self-structured and validated questionnaires and checklists. Ethical approval was obtained from the Sumandeep Vidyapeeth Institutional Ethical Committee under reference number: BNPG181D19021. **Results:** The findings indicated that the participants had differing levels of knowledge and practical application. Among them, 72.33% (*n*=217) displayed a moderate level of knowledge, while 27.66% (*n*=83) demonstrated adequate level of knowledge. In terms of their practical skills, 77% (*n*=231) exhibited an average level of practice, while 11.67% (*n*=35) and 4.33% (*n*=13) displayed good and excellent practice, respectively. Notably, no significant correlation was found between knowledge and practice scores (knowledge mean: 10.88±0.5017, practice mean: 2.13±0.5749). Five demographic variables were associated with knowledge scores, while six variables were linked to practice scores. **Conclusion:** This study reveals a deficiency in both knowledge and practice regarding insulin self-administration. Addressing this issue requires a focus on improving patient education and practice. Physicians and trained nurses should play a pivotal role in providing insulin self-administration education during hospital follow-up visits. These findings underscore the necessity for targeted interventions to enhance diabetes care and patient outcomes.

Keywords: Associated nursing education, Administrative nursing research, Practice, Knowledge, Diabetes mellitus, Insulin.

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INTRODUCTION

The term 'diabetes' finds its origins in ancient Egyptian civilization, where it was first used to describe a condition characterized by weight loss and excessive urination. In Greek, the word 'diabetes' translates to 'to pass over', while 'mellitus', derived from Latin, means 'honey' or 'sweetness', referring to the sugary nature of the condition. Recent research indicates a projected increase in the prevalence of diabetes mellitus, with an estimated 6.4% rise expected by the year 2025.[1,2] According to the World Health Organization more than 422 million individuals worldwide affected by Diabetes Mellitus (DM).[3] It is a chronic metabolic disorder with significant global impact. Understanding its types, etiology, epidemiology, clinical manifestations, diagnosis, and management strategies is crucial for healthcare professionals and researchers.[4,5]

Insulin injection is deemed essential for individuals with type I diabetes mellitus and often becomes necessary as type II diabetes mellitus progresses. A significant proportion of type II diabetes mellitus patients eventually require insulin for blood glucose control. Hence, evaluating their knowledge and practice regarding insulin injection, even if they are not currently using this medication, is deemed important to identify potential gaps in understanding. It is a prevalent and challenging health condition that requires diligent management to prevent complications and improve patient outcomes. Self-administered insulin management plays a pivotal role in diabetes care, empowering patients to actively participate in their treatment.

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However, achieving optimal insulin self-administration can be hindered by various factors.[6] Therefore, understanding the level of knowledge and practice regarding insulin self-administration among diabetes mellitus patients is crucial for developing targeted interventions and tailored educational strategies. This study aims to evaluate the knowledge and practice of insulin self-administration, analyze associations with socio-demographic variables, and explore potential correlations between knowledge and practice scores. By identifying areas of improvement, healthcare providers can implement effective measures to enhance diabetes care and empower patients in their self-management journey.

Knowledge about the disease plays a crucial role in preventing and diagnosing diabetes mellitus. Research papers have shown that providing substantial education about diabetes mellitus to the general population leads to a significant improvement in disease-related knowledge. Heightening knowledge, especially related to self-management, is particularly beneficial for individuals with diabetes mellitus.[7,8]

Effective self-control and self-management of diabetes mellitus contribute to the overall well-being of patients. Education is a fundamental component of self-management in insulin therapy. Teaching patients about the self-administration of insulin fosters self-confidence. Nurses have the responsibility of instructing patients in insulin self-injection as soon as the need for insulin has been determined. This instruction can be delivered through written or verbal guidance and demonstration techniques, helping patients better manage their condition.[9,10] Nonetheless, numerous patients encounter difficulties in insulin administration. Hence, the present study is planned to assess knowledge and practice of self-administering insulin in diabetes mellitus patients, as well as examine associations with socio-demographic factors.

MATERIALS AND METHODS

In this study, a non-experimental descriptive research design was employed, utilizing a convenient sampling technique. A total of 300 participants were chosen from both out-patients and in-patients attending a tertiary care Dhiraj hospital located in Vadodara, Gujarat, India. The research project received ethical approval from Sumandeep Vidyapeeth Institutional Ethical Committee; Approval number: BNPG181D19021 and informed written consent was obtained from all study participants prior to data collection.

The study included patients diagnosed with DM who had been self-administering insulin for a duration exceeding three months and who expressed their willingness to participate. Participants with severe complications of diabetes mellitus, gestational and juvenile diabetes, medical professionals, and those under the age of 18 were excluded from the study as shown in Figure 1.

Data collection was conducted through the administration of twenty structured questionnaires to assess the participants' knowledge scores. Additionally, a modified four-point practice checklist, comprising 18 statements, was employed to gauge the level of practice score concerning self-administration of insulin. This approach ensured a comprehensive assessment of participants' knowledge and practical skills related to insulin self-administration. The data obtained were analysed employing both descriptive and inferential statistical analyses.

RESULTS

A significant portion of the study participants, specifically 44.67% (134), fell within the age range of 51 to 60 years, and in terms of gender, a majority (80%, i.e., 240) were male. Regarding educational background, 52.33% (157) of the participants had completed primary education. In terms of employment, 33.0% (99) of the participants were unemployed. When considering the duration of DM, a substantial 88.0% (264) of the participants reported having had DM for a duration ranging from 0 to 5 years. Impressively, a significant 87.33% (262) of the participants possessed knowledge related to DM. Interestingly, 51% (151) of them had a specific source of knowledge about DM. Additionally, a noteworthy finding was that the majority (86.67%, i.e., 240) of the study participants had a history of diabetes mellitus, emphasizing the prevalence of the condition among this group.

Table 1 illustrates the distribution of knowledge scores and practice scores among diabetes mellitus patients. A significant majority, accounting for 72.33% (217), exhibited a moderate level of knowledge. Moreover, 27.66% (83) of the participants exhibited a satisfactory level of knowledge, and upon reviewing their practice scores among diabetes mellitus patients, 4.33% (13) of them displayed an excellent practice score, with an additional 11.67% (35) demonstrating a good practice score. The majority, comprising 77.0% (231) of patients, showed an average practice score, and 7.0% (21) of patients had a poor practice score.

Table 2 explores the association between knowledge scores and specific demographic variables. It's worth highlighting that among these demographic factors, the education was the only one found to have a significant association with knowledge scores. Conversely, all other demographic variables were deemed non-significant in relation to knowledge scores.

Table 3 delves into the relationship between practice scores and specific demographic variables. It's important to note that significant demographic variables that displayed an association with practice scores encompassed education, occupation, and the source of knowledge. Conversely, the remaining demographic variables were determined to be non-significant concerning practice scores.

Table 4 indicates that there was no observed correlation between knowledge scores and practice scores related to self-administration of insulin among Diabetes Mellitus (DM) patients.

DISCUSSION

Diabetes presents a growing health concern in India, leading to significant complications such as neuropathy, nephropathy, retinopathy, coronary artery diseases, stroke, and peripheral vascular diseases. The treatment of diabetes mellitus encompasses the use of antidiabetic medications and insulin therapy, combined with lifestyle adjustments like maintaining a balanced diet and engaging in regular exercise.[11,12] Various factors contribute to the challenges in achieving therapeutic goals, including patients' reluctance to adhere to treatment regimens. Despite the evident therapeutic benefits and advantages of insulin therapy, many patients are hesitant to initiate such treatment due to concerns about pain and the social stigma associated with using syringes.[12]

Understanding, consideration and coordination are essential when implementing insulin therapy for individuals with type I and type II diabetes mellitus, as well as those responsible for

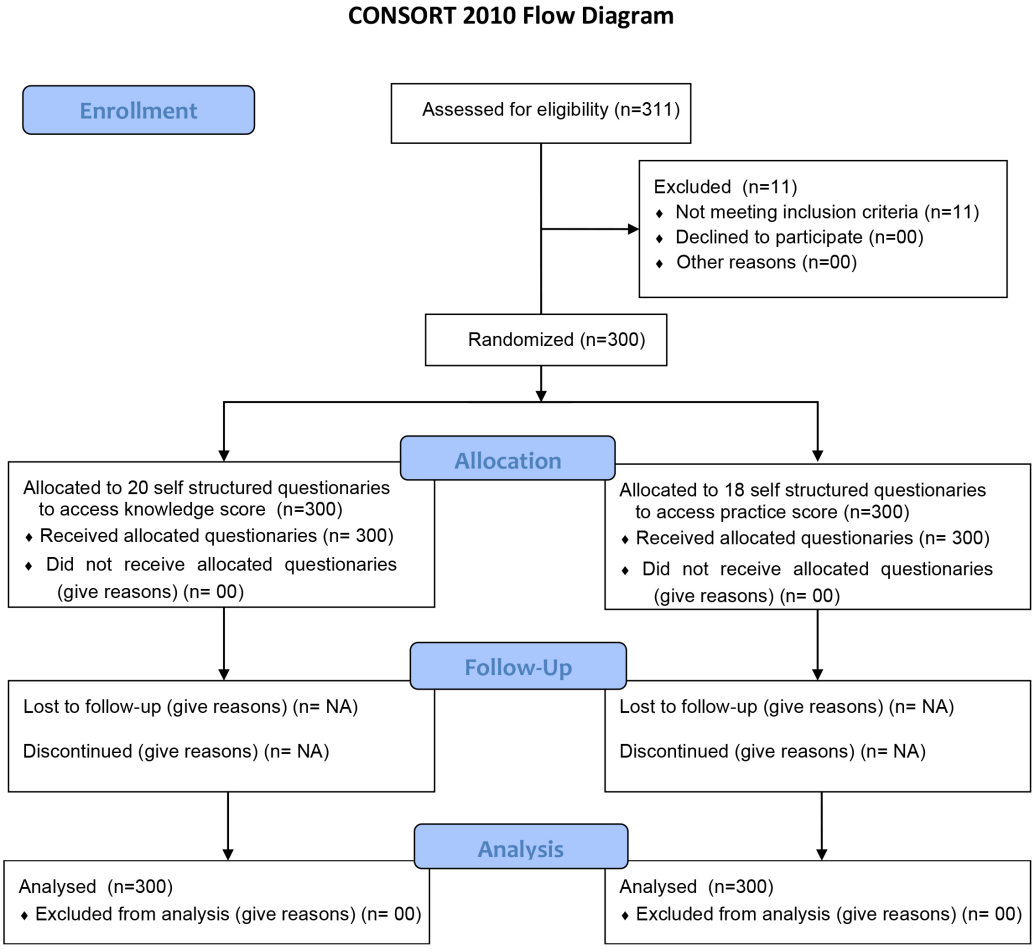

Figure 1: Method of Population Selection.

Table 1: The distribution of knowledge scores and practice scores among diabetes mellitus patients concerning self-administration of insulin.

Knowledge score	Frequency (*n*=300)	Percentage	Mean±SD
Moderate	217	72.33%	10.88±0.5017
Adequate	83	27.66%	
Practice score			
Poor	21	7.00%	2.13±0.5749
Average	231	77.00%	
Good	35	11.67%	
Excellent	13	4.33%	

Table 2: Association between the knowledge score with their selected demographic variables.

Variable	Frequency (*n*=300) *n* (%)	Level of knowledge (*n*=300)		Chi-square	*p*-Value[b]
		Moderate (*n*=217) *n* (%)	Adequate (*n*=83) *n* (%)		
Age					
18-30 years	13 (4.33)	10 (4.61)	3 (2.49)	1.683	0.640
31-50 years	91 (30.33)	66 (30.41)	25 (20.75)		
51-60 years	134 (44.67)	100 (46.08)	34 (28.22)		
61-70 years	62 (20.67)	41 (18.89)	21 (17.43)		
Gender					
Male	240 (80)	175 (80.65)	65 (53.95)	0.204	0.651
Female	60 (20)	42 (19.35)	18 (14.94)		
Education					
No formal education	32 (10.67)	15 (6.91)	17 (14.11)	12.66	0.005
Primary education	157 (52.33)	115 (53)	42 (34.86)		
Higher secondary education	83 (27.67)	66 (30.41)	17 (14.11)		
Under education	28 (9.33)	21 (9.68)	7 (5.81)		
Occupation					
Agriculture	73 (24.33)	54 (24.88)	19 (15.77)	6.46	0.167
Home maker/ house wife/Unemployed	99 (33)	67 (30.88)	32 (26.56)		
Government employee	33 (11)	27 (12.44)	6 (4.98)		
Private employee	52 (17.33)	42 (19.35)	10 (8.3)		
Retired	43 (14.33)	27 (12.44)	16 (13.28)		
Duration of DM[a]					
0-5 Years	264 (88)	192 (88.48)	72 (59.76)	0.5707	0.751
6-10 Years	34 (11.33)	24 (11.06)	10 (8.3)		
Above 10 Years	2 (0.67)	1 (0.46)	1 (0.83)		
Knowledge of DM[a]					
Yes	262 (87.33)	186 (85.71)	76 (63.08)	1.8586	0.172
No	38 (12.67)	31 (14.29)	7 (5.81)		
Source of knowledge					
Society and friends	108 (36)	77 (35.48)	31 (25.73)	1.323	0.710
Family members	151 (50.33)	110 (50.69)	41 (34.03)		
Mass media	28 (9.33)	22 (10.14)	6 (4.98)		
Any other	13 (4.33)	8 (3.69)	5 (4.15)		
Family history					
Have history of DM[a]	240 (80)	174 (80.18)	66 (54.78)	0.0167	0.897
Not Have history of DM[a]	60 (20)	43 (19.82)	17 (14.11)		

[a]DM: Diabetes mellitus.[b]*p* value is considered significant at$p<0.05$ on Chi-square test.

Table 3: Association between practice scores with their selected demographic variables.

Variable	Frequency (*n*=300) *n* (%)	Level of Practice				Chi –square	*p*-Value [b]
		Excellent (*n*=13) *n* (%)	Good (*n*=35) *n* (%)	Average (*n*=231) *n* (%)	Poor (*n*=21) *n* (%)		
Age							
18-30 years	13 (4.33)	1 (7.69)	2 (5.71)	9 (3.9)	1 (4.76)	8.294	0.504
31-50 years	91 (30.33)	4 (30.77)	17 (48.57)	65 (28.14)	5 (23.8)		
51-60 years	134 (44.67)	6 (46.15)	12 (38.29)	105 (45.45)	11 (52.38)		
61-70 years	62 (20.67)	2 (15.38)	4 (11.43)	52 (22.51)	4 (19.05)		
Gender							
Male	240 (80)	9 (69.23)	29 (82.86)	188 (81.39)	14 (66.67)	3.7313	0.291
Female	60 (20)	4 (30.77)	6 (17.14)	43 (18.61)	7 (33.33)		
Education							
No formal education	30 (10)	1 (7.69)	2 (5.71)	24 (10.39)	3 (14.29)	63.46	0.00001
Primary education	149 (49.67)	7 (53.85)	5 (14.29)	132 (57.14)	5 (23.81)		
Higher secondary education	93 (31)	3 (23.08)	14 (40)	64 (27.71)	12 (57.14)		
Under education	28 (9.33)	2 (15.38)	14 (40)	11 (4.76)	1 (4.76)		
Occupation							
Agriculture	73 (24.33)	1 (7.69)	6 (14.14)	60 (25.97)	6 (28.57)	29.13	0.003
Home maker/house wife/Unemployed	99 (33)	6 (46.15)	4 (11.43)	80 (34.63)	9 (42.86)		
Government employee	33 (11)	1 (7.69)	9 (25.71)	22 (9.52)	1 (4.76)		
Private employee	51 (17)	2 (15.38)	13 (37.14)	34 (14.72)	2 (9.52)		
Retired	44 (14.67)	3 (23.08)	3 (8.57)	35 (15.15)	3 (14.29)		
Duration of DM[a]							
0-5 Years	261 (87)	10 (76.92)	33 (94.29)	201 (87.01)	17 (80.95)	8.37	0.211
6-10 Years	34 (11.33)	2 (15.38)	1 (2.86)	28 (12.12)	3 (14.29)		
Above 10 Years	5 (1.67)	1 (7.69)	1 (2.86)	2 (0.87)	1 (4.76)		
Knowledge of DM[a]							
Yes	262 (87.33)	12 (92.31)	32 (91.43)	198 (85.71)	20 (95.24)	2.55	0.466
No	38 (12.67)	1 (7.69)	3 (8.57)	33 (14.29)	1 (4.76)		
Source of knowledge							
Society and friends	100 (33.33)	5 (38.46)	10 (28.57)	77 (33.33)	8 (38.1)	37.33	0.00002
Family members	153 (51)	6 (46.15)	12 (34.29)	130 (56.28)	5 (23.81)		
Mass media	39 (13)	1 (7.69)	12 (34.29)	21 (9.09)	5 (23.81)		
Any other	8 (2.67)	1 (7.69)	1 (2.86)	3 (1.3)	3 (14.29)		
Family history							
Have history of DM[a]	240 (80)	10 (76.92)	31 (88.57)	182 (78.79)	17 (80.95)	1.908	0.591
Not have history of DM[a]	60 (20)	3 (23.08)	4 (11.43)	49 (21.21)	4 (19.05)		

[a]DM: Diabetes mellitus.[b]*p* value is considered significant at$p<0.05$ on Chi square test.

Table 4: Correlation between knowledge score and practice score of self-administration of insulin.

Karl Pearson's correlation coefficient (r)				
Mean of knowledge score	**Mean of practice score**	**Total no. of sample**	**Correlation coefficient**	**Inference**
10.88	2.1333	300	-0.004	No correlation (0.002- 0.30)

their diabetes care. It's important to recognize that there is no one-size-fits-all approach to insulin therapy. The dosage of insulin varies depending on the individual's blood glucose levels and the specific types of insulin used. Consequently, insulin therapy must be personalized to align with the individual's lifestyle and address specific diabetic complications.

The findings from the current study disclosed that, when considering demographic variables *viz.* age, gender, occupation, duration of DM, source of knowledge and family history etc. were found to be not significant influencing knowledge scores. However, education showed a significant association. Regarding practice scores and demographic variables, significant associations were observed with education, occupation and source of knowledge. Age, gender, duration of DM, knowledge regarding DM, family history, however, did not exhibit a significant relationship. It is noteworthy that there was no apparent correlation between knowledge scores with practice scores in the context of self-administration of insulin among diabetes mellitus patients. This implies that an enhancement in knowledge scores is likely to result in improved practices among diabetes mellitus patients when it comes to self-administering insulin.

It is worth mentioning that a similar research study conducted by Workneh Fego M and colleagues (2021) reported that patients of Bedele Hospital, Southwest Ethiopia demonstrated a good understanding of insulin self-administration, exhibited proficient practices, and maintained a positive attitude toward the process. Nevertheless, the study highlighted the need for further strategies to attain the highest level of patient care.[13] Additionally, Sunny A *et al.* (2021) identified a statistically significant positive correlation between knowledge and practice.[14] Nasir BB *et al.* (2021) findings indicated that patients exhibited suboptimal knowledge and attitudes concerning insulin self-administration, and instances of malpractice were reported. Consequently, it is imperative to rectify these deficiencies through regular patient education and hands-on demonstration of insulin injection during each hospital visit.[15]

The sampling method employed in this study carries a notable risk of sampling bias, which could lead to results that may not precisely depict the relationship between knowledge and practice. Despite this limitation, the study can serve as a valuable pilot study for future research within the same population, offering a foundation for more accurate results in subsequent studies. Another constraint of our research was the predominantly low level of education (primarily primary education) and unemployment within the study's population. Given that both of these factors significantly influence medication usage among individuals, it is plausible that the practice scores might skew towards the average and poorer side. Moreover, the study predominantly comprised a male population, representing a potential limitation, as it hinders a proper comparison between both genders. To reveal the actual gender-based differences in the population, further research is needed with an equal distribution of samples among both genders. The study's duration and site constraints also raise the possibility that the enrolled population may differ from other hospital populations, making it challenging to comprehensively address population diversity.

CONCLUSION

In summary, our study indicates a lack of significant correlation between knowledge and practice in the context of insulin self-administration among diabetes mellitus patients. This underscores the critical need to focus on bolstering both knowledge and practical skills to promote improved self-administration of insulin. To address this imperative, healthcare professionals, particularly doctors and nurses, should play a pivotal role in educating patients during routine hospital follow-up visits. Delivering essential education and foundational knowledge on insulin self-administration can be instrumental in positively influencing the practice behaviours of individuals with diabetes mellitus. These efforts aim to enhance patient empowerment and adherence to effective insulin management strategies, ultimately contributing to better outcomes in diabetes care.

LIMITATIONS

The sampling method employed in this study carries a notable risk of sampling bias, which could lead to results that may not precisely depict the relationship between knowledge and practice. Despite this limitation, the study can serve as a valuable pilot study for future research within the same population, offering a foundation for more accurate results in subsequent studies. Another constraint of our research was the predominantly low level of education (primarily primary education) and unemployment within the study's population. Given that both of these factors significantly influence medication usage among individuals, it is plausible that the practice scores might skew towards the average and poorer side. Moreover, the study predominantly comprised a male population, representing a potential limitation, as it hinders a proper comparison between both genders.

FUTURE DIRECTIONS

To reveal the actual gender-based differences in the population, further research is needed with an equal distribution of samples among both genders. The study's duration and site constraints also raise the possibility that the enrolled population may differ from other hospital populations, making it challenging to comprehensively address population diversity.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

DM: Diabetes Mellitus.

ETHICAL STATEMENT

Official ethical permission was obtained from the Sumandeep Vidyapeeth Institutional Ethical Committee with reference number BNPG181D19021. Informed consent was diligently obtained from all study participants, with a guarantee of anonymity and confidentiality maintained throughout the research process.

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