A Pre-Experimental Study to Assess the Effectiveness of Self-Instructional Module (SIM) on Knowledge Regarding Prevention of Diabetic Ketoacidosis Among Diabetic Patient in Selected Hospital in Bilaspur, Chhattisgarh

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Abstract: **Background:** Diabetic ketoacidosis (DKA) is a state of absolute or relative insulin deficiency aggravated by ensuing hyperglycemia, dehydration, and acidosis-producing derangements in intermediary metabolism. The most common causes are underlying infection, disruption of insulin treatment, and new onset of diabetes. Diabetic ketoacidosis (DKA) is an acute, serious, life-threatening complication of hyperglycemia, ketoacidosis, and ketonuria. It occurs when absolute or relative insulin deficiency prevents the ability of glucose to enter cells for using it as a metabolic fuel. As a result, the liver rapidly breaks down fat into ketones for use as a fuel source. The purpose of the study was to assess the knowledge regarding prevention of diabetic ketoacidosis among diabetic patients in selected Hospital at Bilaspur (C.G.) **Methods:** A descriptive study was undertaken among 60 conveniently selected patients of diabetes with diabetic ketoacidosis in Bilaspur District. Data was collected by using self-structured knowledge questionnaire during the month of January 2024. **Results:** The level of awareness among diabetes patients on how to avoid diabetic ketoacidosis was measured. The findings of study show that knowledge score between pre-test and post- test in which 11 [18.33%] percent shows average knowledge 49 [81.67%] show poor knowledge in Pre-test and 50 [83.34%] show good knowledge 10 [16.66%] show average knowledge in post- test regarding diabetic ketoacidosis among diabetic patients. Hence H-1 was accepted. The total knowledge score was five hundred twenty out of 1800 that is mean 8.66 mean percentage 18 .43 and coefficient of variance 26.78 with standard deviation of 2.32 in pre-test and post-test knowledge score was 1106 out of 1800 that is mean 28.88% mean score percent 61.44% and coefficient of variance 12.91. In relation to association between knowledge score and socio demographic variable there is a significant association between selected socio demographic variable such as education (t=15.99, p<0.05), at the degree of freedom (6) diet (t=3.84, p<0.05) at the degree of freedom (1) were found to be statistically significant. Hence H₂ is accepted. Represents that there was an effectiveness of self -instructional module, significant difference between pre-test & post- test knowledge regarding prevention of diabetic ketoacidosis among diabetic patients calculated value of Z-test is 23.28 is greater than table value 2.00 at 0.05 level of significance. **Conclusions:** Most patients with diabetes are poorly aware of the preventive measures of diabetic ketoacidosis. This study revealed several preventive gaps relating to an appropriate prevention strategy and acute diabetes complications. This research concluded that most patients with diabetes had insufficient knowledge of prevention of diabetic ketoacidosis and its management.

Keywords: **Knowledge Diabetes, Diabetes Ketoacidosis, Self-Instructional Module.**

1. Background of the Study

Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycaemia (Harrison, 2008). Diabetes mellitus is a rapidly growing public health problem. It has acquired an epidemic form and requires immediate attention. King et al. in 1998 had estimated that 300 million people will be affected by diabetes mellitus by the year 2025 but according to the recent WHO report the number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014; while global prevalence of diabetes among adults over 18 years of age has risen from 4.7% in 1980 to 8.5% in 2014 (World Health Organization, 2016).Diabetic ketoacidosis (DKA) is an acute, major, life-threatening complication of diabetes characterized by hyperglycemia, ketoacidosis, and ketouria. It occurs when absolute or relative insulin deficiency inhibits the ability of glucose to enter cells for utilization as metabolic fuel, the result being that the liver rapidly breaks down fat into ketones to employ as a fuel source. The overproduction of ketones ensues, causing them to accumulate in the blood and urine and turn the blood acidic. DKA occurs mainly in patients with type 1 diabetes but it is not uncommon in some patients with type 2 diabetes. Diabetic ketoacidosis (DKA) is a state of absolute or relative insulin deficiency aggravated by ensuing hyperglycemia, dehydration, and acidosis-producing derangements in intermediary metabolism. The most common causes are underlying infection, disruption of insulin treatment, and new onset of diabetes. Diabetic ketoacidosis (DKA) is an acute, serious, life-threatening complication of hyperglycemia, ketoacidosis, and

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ketonuria. It occurs when absolute or relative insulin deficiency prevents the ability of glucose to enter cells for using it as a metabolic fuel. As a result, the liver rapidly breaks down fat into ketones for use as a fuel source. The overproduction of ketones occurs, causing them to build up in the blood and urine and causing the blood to be acidic. DKA occurs primarily in type 1 diabetes patients, although it is not unusual in some type 2 diabetes patients. The insidious rise in polydipsia and polyuria are the most prominent early symptoms of DKA. Besides, other symptoms such as Malaise, generalized weakness, fatigue ability, nausea and vomiting, diffuse abdominal pain and decreased appetite are also seen. Patients and their families have been the object of self-treatment and the administrators of their care. The health care team were the guides who set the stage, efforts when the targets were not reached, rather than being the only diabetes health care team to initiate treatment, patients and parents were encouraged to evaluate their data, recognize patterns, resolve diet and activity issues, and do so based on real blood glucose results. The most common emergency case when having a patient diagnosed with diabetes mellitus is Diabetic ketoacidosis (DKA). Surprisingly, it's more often when we see these patients suffering from DKA type 1 diabetes patients. However, type 2 diabetes patients are never spared from the susceptibility of suffering from this unfortunate emergency. Otherwise, it was noticeable that type 2 DM patients are having a DKA were under the effect of certain situations such as post-operation, trauma or accident, or infectious diseases. DKA is reported to be responsible for more than 100,000 hospital admissions per year in the US and accounts for 4% - 9% of all hospital discharge summaries among patients with diabetes. Alhowaish (2013) has estimated more than 500% acceleration in the expenses incurred for healthcare and treatment of diabetes since 2000 and costed the healthcare budget of Saudi Arabia roughly 25 billion used exclusively for the management of diabetes. Diabetic ketoacidosis diagnosis is basically under few conditions, first of all, we need the patient's plasma glucose concentration to be above 250 mg per dL (usually elevated above this number), and the bicarbonate level to be or less than 18 mEq per L, and the pH level is 7.30 or less. The main course of treatment for DKA is intravenous insulin and fluid replacement therapy, and obviously with precise checkup and monitoring of the potassium levels. To reach the full level of treatment, it is required to educate patients to prevent the recurrence of such a case. For example, a study by Alwan *et al.* (2017) that studied the awareness about diabetes mellitus among attendees of primary health care centres, Makkah, Saudi Arabia has reported that the main sources for information about diabetes were mass media (57.4%), health sector (29.9%) and educational sector (10.6%) and concluded a satisfactory level of knowledge about regarding risk factors, symptoms, and risks of diabetes but not aware of the diabetes associated secondary associated secondary complications. The concluded study that the instructional model programme was effective in increasing the knowledge regarding diabetic ketoacidosis among diabetic patients.

2. Methods

A descriptive study was undertaken on 60 Convenient selected diabetic ketoacidosis among diabetes patients in Bilaspur District. Data was collected by using self-structured knowledge questionnaire from December 2023 to January 2024. Before the data collection, the willing consent from participant was taken in their understanding language. Those who were diagnosed with diabetes mellitus and diabetic ketoacidosis were included in the study. A questionnaire was created in the most commonly spoken Hindi and Chhattisgarhi languages in the area. Participation was voluntary at the report. Participants answered the questionnaire themselves anonymously.

A tool was derived through several steps of item generation, reduction, pilot testing of the tool and validating of the tool. The content validity was determined after the opinion of 10 experts in the field of medical - surgical nursing and one statistician. Tool validation included measurement of inter – observer reliability; and content related validity. The tool was later revised by English - language expert and then translated into Hindi language by language experts without altering the tools meaning.

The data collection period was for four weeks. Data were collected every day from 19-12- 2023 to 05-01-2024. The study was accepted by the research committee prior permission was obtained from principle of Govt. College of Nursing Bilaspur (C.G.) and Dr. Anil Gupta, Civil Surgeon District Hospital Bilaspur Chhattisgarh. The findings were summarized by concentration and percentages categorically. The program used in the study was SPSS software version 23 and $P < 0.005$ is regarded as a degree of significance. The questionnaire consisted of parts for acquiring demographic information and relevant questions related to the knowledge regarding prevention of diabetic ketoacidosis. A home - based analytical guide for knowledge and prevention of diabetic ketoacidosis was given. To accomplish the objective of study, the investigator collected data from 60 diabetes patients by a self - prepared questionnaire including 30 questions based on prevention of diabetic ketoacidosis. Each correct answer carried 1 mark and 0 was given for the wrong response. Knowledge was graded from poor to good knowledge based on scores. Based on the total number of correct responses the degree of knowledge was classified as Poor (1-10), Average (11-20) and good (21-30). Statistical Analysis Descriptive and inferential statistics was used for analysis of data. The basic characteristics of the data were defined in descriptive statistics in a sample, and inferential statistics were used to draw inferences from our data to more general conditions. A percentage-wise distribution of diabetic ketoacidosis patient's demographic characteristics was determined. The data were organized under Distribution of study subject according to socio demographic variables by using frequency and percentage. Comparison of pre-test and post-test knowledge score using mean score percentage, standard deviation and coefficients of variance. Criteria wise analysis related to pre -test and post- test knowledge is scores by frequency and percentage. Evaluation of data related to effectiveness of Self-Instructional Module regarding Diabetic

Ketoacidosis among Diabetic patients using Z- test. Chi- Square analysis for association between the pre-test knowledge with socio demographic variable. By using Guttman Split Half method of reliability, it is found to be 0.89 for knowledge and hence tool is reliable and valid. An appropriate sample was taken from the research 60 diabetic patient on age group 18 to 60 years above District Hospital Bilaspur Chhattisgarh. The data was gathered to identify sample characteristics such as Age, Gender, Education, Occupation, Income, Religion, Diet, Marital Status, Personal Behaviour. and Source of Information.

3. Results

Distribution of diabetic patients according to their age in years shows that 15 [25%] belong to age group 41-50,13 [22%] belongs to age group between 31-40 years, 13 [22%] belongs to age group above 60 years, 11 [18%] belong to age group between 51-60 years & 8 [13%] belong to age group between 18-30 years.

Distribution of patients according to their gender among that diabetic patient the findings revealed that majority of subject 32 [53%] were female and 28 [47%] were male, & 0% were transgender respectively.

Distribution of diabetic ketoacidosis patients according to their educational qualifications shows that education among that diabetic patients the findings revealed that majority of subject 50% were graduate, 28.33% were higher secondary, 18%were primary education, and 3.33% were illiterate.

Distribution of diabetic ketoacidosis patients according to their occupation among that diabetic patient the findings revealed that majority of subject 2 [3.33%] were student, 20 [33.33%] were house wife, 23 [35%] were self-employee, and 17 [28.33%] were Govt. employee.

Distribution of diabetic ketoacidosis patients according to their income among that diabetic patients the findings revealed that majority of the subject 3.33%were below 10000/- ,41.66% were 10000-20000/- and 55%were above 20000/- income monthly.

Distribution of diabetic ketoacidosis patients according to their diet among that diabetic patient the findings revealed that majority of the diabetic patients 24 [40%] vegetarian and 36 [60%] were non vegetarian.

Distribution of diabetic ketoacidosis patients according to their religion among that diabetic patients the findings revealed that majority of the diabetic patients (47) 8.33% were Hindu,

Table 1
Chi-Square analysis for association between the pre-test knowledge with selected socio demographic variables

S.No.	Socio-demographic value	Poor	Average	Good	Chi-square	Df	Table value at 0.05	Interference
1.	**Age (in year)**							
	18-30	7	1	0	2.991	8	15.51	Not Significant
	31-40	13	0	0				
	41-50	15	0	0				
	51-60	11	0	0				
	Above 60	12	1					
2.	**Gender**							
	Male	26	2	0	1.309	2	5.99	Not Significant
	Female	32	0	0				
3.	**Education**							
	Illiterate	1	1	0	22.2	6	15.09	Significant
	Primary	9	2	0				
	Secondary	14	3	0				
	Graduate	25	5	0				
4.	**Occupation**							
	Student	2	0	0	1.371	2	5.09	Not Significant
	House Wife	19	1	0				
	Self-employee	21	0	0				
	Govt. Employee	17	0	0				
5.	**Income**							
	<10,000	2	0	0	0.0453	4	9.49	Not Significant
	10,000-20,000	25	1	0				
	>20,000	32	1	0				
6.	Religion Hindu	45	2	0				
	Muslims	8	0	0		6	12.59	Not significant
	Christian	5	0	0	0.142			
	Others	0	0	0				
	Diet	20	4	0	5.114	1	3.84	Significant
7.	Vegetarian							
	Nonvegetarian	29	7	0				
8.	**Marital Status**	51	1	0	2.492	1	3.84	Not significant
	Married							
	Unmarried	7	1	0				
9.	**Personal Behavior**	10	0	0				
	Smoking				.083	4	9.49	Not significant
	Smoking &Alcohol	1	0	0				
	None of These	49	2	0				
10.	**Source of Information**							
	Family Members	0	0	0				
	Advertisement	13	0	0				Not significant
	Medical Personal	31	2	0	0.787	6	12.59	
	Friends	14	0	0				

Table 2

S.No.	Score	Pre-Test		Post-Test	
		Frequency (N)	Percentage %	Frequency (N)	Percentage%
1	Poor	49	81.67%	0	0%
2	Average	11	18.33%	10	16.66%
3	Good	0	0%	50	83.34%
Total		60	100%	60	100%

(8) 13.33 % were Muslims, (5) 8.33% were Christian and 0% were others.

Distribution of diabetic ketoacidosis patients according to their marital status among that diabetic patients the findings revealed that majority of the diabetic patients 52(86.66%) were Married and 8 (13.33%) Unmarried.

Distribution of diabetic ketoacidosis patients according to their personal behaviour among that diabetic patient the findings revealed that majority of the diabetic patients (10) 16.66% where smoking (1) 1.67% where smoking and alcohol and (49) 81.67% none of these.

Distribution of diabetic ketoacidosis patients according to their source of information among the diabetic patients 13 [21.67] source of knowledge through advertisement, 14 [23.33%] were from friends, and 33 [55%] were from health workers. In assessment of patients, the level of knowledge score between pre -test and post- test in which 11 [18.33%] percent shows average knowledge 49 [81.67%] show poor knowledge in Pre-test and 50 [83.34%] show good knowledge 10 [16.66%] show average knowledge in post- test regarding diabetic ketoacidosis among diabetic patients. Assessment of knowledge regarding diabetic ketoacidosis between pretest and post-test knowledge score was 520 out of 1800 that is mean 8.66 mean score percentage 18.43 and coefficient of variance 26.78 with standard deviation of 2.32 in pre –test and in post-test the knowledge score was 1106 out of 1800 this means 28.88% mean score percentage 61.44% an coefficient of variance 12.91. The above result signifies that there has been a consistent increase in post-test when compared to pre-test. Represent that there was significant difference between the pre-test and post-test knowledge score self-instructional modules as calculated value 23.80, (df59) was greater than table value 2.00 at0.005 level of significance.

Association between selected socio demographic variables with pre-test knowledge regarding prevention of diabetic ketoacidosis among diabetic patients using -chi square test Finding related to education: The present study revealed that the calculated value 22.2 which is greater than the table value of chi-square 15.99at 0.05 level of significant there was significant association between level of knowledge and education of diabetic patients. *Hence H_2 hypothesis was accepted. Finding related to diet:* The present study revealed that the calculated value 5.114 which is greater than the table value of chi-square 3.84 at 0.05 level of significant there was significant association between level of knowledge and diet of diabetic patients. In relation to association between knowledge score and socio demographic variable there is a significant association between selected socio demographic variable such as education (t=15.99, p<0.05), at the degree of freedom (6) diet (t=3.84, p<0.05) at the degree of freedom (1) were found to be statistically significant. and inferred as there is significant association between selected socio demographic variable education and diet with pre-test knowledge score of diabetic patients.
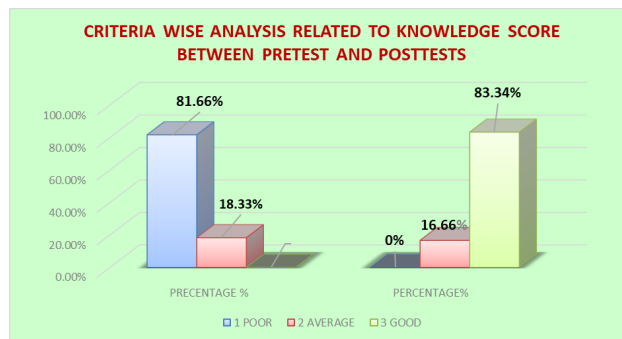

Fig. 1.

4. Discussion

The study was conducted to determine the level of knowledge of DKA among diabetic patients in the Riyadh population, according to previous research. 150 samples have been obtained for analysis. The findings of the study indicate that 58 (38.67 %) participants had poor awareness of complications, 101 (67.34 %) had poor management knowledge, 9 (6.0 %) participants had good knowledge, 57 (38 %) participants had poor risk factor knowledge, and 45 (30 %) of participants had good awareness. The bulk of the respondents had a low level of understanding. A connection exists between having a first - degree relative with diabetic mellitus and the level of DKA awareness [17].

In my present analysis, the overall outcome was found to be low with questions about DKA awareness. In terms of priorities and theoretical basis, the results of the analysis were discussed. The assessment of knowledge regarding diabetic ketoacidosis between pre-test and post-test knowledge of total mean scores were in pre-test 8.66 and post-test 18.43 and total mean percentage score were in pre-test 28.88% and post-test 61.44% .The criteria wise analysis of knowledge level of diabetic patient in pre-test where 29 (58%) of the sample had average knowledge 14.28% had poor knowledge while in post-test 23(46%) had good knowledge 27 (54%) had average knowledge on Diabetic Ketoacidosis. Lack of information about DKA was seen among diabetes patients. In this research, diet and educational status was significant.

5. Conclusion

Most patients with diabetes are poorly aware of the preventive measures of diabetic ketoacidosis. This study revealed several preventive gaps relating to an appropriate prevention strategy and acute diabetes complications. This

research concluded that most patients with diabetes had insufficient knowledge of the diabetic ketoacidosis and its management. Small sample size is a limitation of this study.

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