

The Effect of Health Education on Improving the Knowledge and Self-Management Practices of Type 2 diabetic Adults

Shamya.K¹, Prema.L²

¹(Food and Nutrition Department, Faculty of Science, University of Kerala, India)

²(Home Science Department, Kerala Agricultural University, India)

*Corresponding Author: Shamya.K

ABSTRACT:

Introduction: Health Education is an integral part of the diabetes management.

Methodology: An Education Programme on management of type 2 diabetes was conducted in India among 50 diabetics without any complications of disease. The quantitative research technique was employed for this study with a pre validated questionnaire of KAP and the face to face interview technique. Health Education was conducted once in a month for 3 months and KAP scores were tested each time. The HbA1C level and, BMI of each participant were also checked before and after the education.

Results: The retention levels of Knowledge after the education were comparatively high (16.8). The Attitude of the patient remains almost the same in all the three stages of assessment (67). Most of the patients changed their Practice after the education programme but maximum retention was observed during the first month (13.6). There existed a positive correlation with HbA1c before and after the education ($p=0.001$). Similarly Education helped 30% of the diabetics to maintain their body weight into ideal.

Conclusion: This study revealed that Education Programme succeeded in improving the over all knowledge level of the patient and can slightly able to control the BMI and HbA1C level of the participants.

Keywords: Knowledge, Attitude, Practice, HbA1c, BMI

I. INTRODUCTION

Health education is considered to be essential in the overall care of patients with type 2 diabetes mellitus (T2DM); systematic health education integrates individual education not only during hospitalization but also extended care outside of a hospital [1]. According to ADA guidelines effective management of diabetes comprises suitable diet, adequate exercise, regular monitoring and sufficient medication. Over and above this self-management education on the above aspect is also recognized as the most important component for the management of type 2 diabetes [2]. Many studies conducted elsewhere in the world have shown that the knowledge and awareness about the disease can have a positive influence on attitude and practices of patients that could lead to better management of diabetes and eventually good quality of life. A patient when involved in self-management of the disease through guidance, education and awareness programs becomes more compliant toward life style changes and drug therapy which help both the practitioner and patient to achieve the treatment goals. However, a gap between knowledge, attitude and practice exists in type 2 diabetes management that does not allow patients and healthcare professionals to implement life style changes that could reduce the morbidity and mortality associated with diabetes [3].

Health literacy is an integral part of the diabetes management. Patients with a good knowledge of diabetes and its complications seek proper treatment and care and take charge of their health. There is strong evidence that individuals who are educated and diligent with their diabetes self-care achieve better and durable diabetic control [4, 5]. A study conducted in Middle East evaluated the Knowledge, Attitude, Practice (KAP) and psychological status of adult Qatari patients with type 2 diabetes mellitus to study the role of these factors on the ability of the patients to manage their diabetes and to achieve desirable health outcomes, and the study found significant differences in the Attitude and Knowledge between educational levels and therefore, they

concluded that providing education and other support programs to diabetics could be more effective if the KAP of the patients are understood before conducting these programs [6].

However, a lot of studies have shown that many patients did not have the appropriate knowledge of diabetes, increasing their knowledge and awareness about such diseases will help in reducing the morbidity and mortality of such diseases [7]. Another research study demonstrated that certain misconceptions about diabetes and its treatment were associated with poor glycemic control [8]. Similarly, a recent qualitative study supported that patients who highly adhered to their diabetic medications may still have insufficient knowledge about their daily self-management practices [9]. Hence health education plays an important role in disease control, particularly for chronic conditions like diabetes [10].

Self-care and good health practices can improve the duration and quality of life of diabetic patients. Slight modifications in the life style related to smoking habits, nutrition, physical activity can enable diabetic patients to live a normal life [11]. Effective management of disease is associated with KAP of diabetic patients regarding their life style practices. If patients are given proper education and guidance towards diabetes it will make a significant improvement in life style which will be helpful for good glycemic control. KAP studies in diabetics could be helpful for minimizing the consequences of the disease [1,12]. The main aim of the present study is to assess the effect of health education on the glycemic control, weight management and retention of KAP level of type 2 diabetics after three months frequent Education Programme.

II. RESEARCH METHODS

2.1 Research design

A Diabetic Health Education programme on the nutritional and lifestyle management of type 2 diabetes was conducted in the Malabar region of Kerala state in South India. 50 sedentary working diabetics (25 males and 25 females) without any other complications of diseases, and who were receiving drug therapy only for diabetes were eligible for inclusion in the study. Children, pregnant women, mentally incompetent and patients not willing to participate were excluded from the study. Adult Diabetics within the age group of 40-70 were taken for the study using purposive random sampling method. HbA1c and BMI of each participant were checked before and after the Health Education Programme. The quantitative research technique was employed for the study with a pre validated questionnaire and a face to face interview technique. A Health Education Programme was conducted once in a month for 3 months. Lecture cum discussion method was adopted (each 2 hours class section) for imparting health education. Informative diabetic diet booklets regarding the general guidelines of diabetes management dietary instructions sample menus and diabetic food exchange list suitable to the Kerala region were distributed to each participant after the education section. The tool used for the study was a pre validated questionnaire with 3 sets of Knowledge, Attitude and Practice related questions. These questionnaires were found in the analysis of reliability and test retest instruments: kappa co-efficient varied from 0.62 to 0.96 to knowledge statements and from 0.68 to 0.74 to attitude statements and from 0.72 to 0.78 to practice statements which indicate a moderate level of reliability for all questions.

KAP scores of each patient were assessed using a dichotomous scale and 5-point Likert scale. Each positive response was scored as 1 and each negative response as 0 (dichotomous scale used for Knowledge and Practice questions). Patients with excellent knowledge and practice get maximum score of 20 for each. The Attitude of each patient was assessed using a 5-point Likert scale from 1 strongly disagree to 5 strongly agree. Diabetics with maximum positive attitudes will get score 100. The Knowledge of each patient was assessed in four stages, before education programme, immediately after education programme, after first month and third month respectively. At the same time Attitude and Practice of the patients were checked only three times. Because it would usually take time to change the attitude and practice of the diabetics. The overall changes in the HbA1C level and, BMI of each participant were also checked before and after the Education Programme.

2.2 Statistical Analysis

Data management and analysis were conducted using SPSS 21.0 (Statistical Package for Social Science). The main methods adopted were Correlation matrix to investigate the dependence between multiple variables at the same time, Regression Analysis, Mean and standard deviations were computed whereas categorical variables are presented as numbers or percentages. The Chi square test was used to find out the association between categorical variables. Differences between the groups were evaluated by one-way analysis of variance (ANOVA) and post-hoc multiple comparison tests.

III. RESULTS AND DISCUSSION

3.1 Evaluation of Health Education Programme using KAP scores

Table1. Distribution of Diabetics Based On KAP Scores

Stages of Assessment	Mean Score	No	Std. Dev
Knowledge			
Before trial	13	50	2.7
immediately after trial	16.8	50	2.07
After1 month	15.2	50	2.04
Afterc3 month	14.9	50	2.31
Attitude			
Before trial	67	50	8.43
After1 month	66.8	50	7.08
Afterc3 month	67	50	6.4
Practice			
Before trial	11.9	50	2.82
After1 month	13.6	50	2.8
Afterc3 month	13.1	50	3.09

Results of the study illustrated that the mean score value of the initial assessment before the Health Education Programme was poor compared to each stage of assessment. This indicates that the basic awareness of the patients regarding their disease condition was poor. The education programme improved the knowledge level of the diabetic patients and they made slight changes in the daily practice also, but Attitude of the patients remained stable throughout the study.

The retention level of knowledge immediately after the education programmes was comparatively high (mean score 16.8). However, after one month the retention became 15.2 and then 14.9 after three months. The Attitude of the patient remains almost the same in all the three stages of assessment (mean score 67). Most of the patients changed their practice after the counselling programme but maximum retention was observed during the first month (mean score 13.6). Effective management of disease is associated with Knowledge, Attitude and Practice of diabetic patients regarding their life style practices. If the patients are given proper education and guidance towards diabetes it will make a significant improvement in life style which will be helpful for good glycemic control. Education to diabetic patients would be more effective if we know the baseline KAP of the disease. KAP studies in diabetics could be helpful for minimizing the consequences of the disease [13].

Table2. Regression Analysis to Predict Attitude with Knowledge Level

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson	
.528 ^a	0.279	0.264	6.10012	2.044	
ANOVA^a					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	690.612	1	690.612	18.559	<0.001 ^b
Residual	1786.153	48	37.212		
Total	2476.765	49			
Coefficients^a					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	40.32	6.232		6.47	<0.001
KNOWLEDGE	1.778	0.413	0.528	4.308	<0.001
a. Dependent Variable: ATTITUDE					
b. Predictors: (Constant), KNOWLEDGE					

Table 2 describes a strong relationship between Knowledge and Attitude (52.8%). Predictability of the variable Attitude was possible with respect to Knowledge level of the patient because the model has 2.7%

accuracy. ANOVA test revealed a strong association between dependent variable Attitude and Knowledge level (P value = <0.001). Prediction was done with regression analysis using the formula $Y=a+bx$ gives
 $Attitude = 40.320 + Knowledge * 1.778$

Table3. Correlation tests to assess Knowledge Attitude and Practice

KNOWLEDGE	Before trial	immediate retention	After 1month	After 3month
Before trial	1			
immediate retention	0.822	1		
After 1month	0.829	0.875	1	
After 3month	0.741	0.75	0.845	1
ATTITUDE	Before trial		After 1month	After 3month
Before trial	1			
After 1month	0.923		1	
After 3month	0.912		0.935	1
PRACTICE	Before trial		After 1month	After 3month
Before trial		1		
After 1month	0.81		1	
After 3month	0.733		0.905	1
	$\pm .279$	critical value .05 (two-tail)		
	$\pm .361$	critical value .01 (two-tail)		

Table 3 describes which pair had the highest correlation when compared to the different stages of KAP retention. When compared to the Knowledge at initial stage before Education Programme had 82.2% relationship with immediate retention 82.9% relation with retention after 1month and gradually relation decreased to 74.1% after 3 months. Knowledge gained immediately after the trial had 87.5% relationship with knowledge after 1 month and 75% relationship with Knowledge after 3 months. Knowledge after 1 month had 84.5% relationship when conducted after 3 months.

3.2 Evaluation of the Health Education Programme using BMI and HbA1c

A slight change in the glycemc profile of the participants was observed after the completion of 3 months Education Programme. Initially the mean value of HbA1c was 8.5% with standard deviation 1.34 but after the 3 months' Education Programme the value changed to 8.1% with standard deviation of 1.26. The reduction noted was also found to be statistically significant. Diabetes education has an impact on diabetes treatment. Benefits of diabetes education are mainly observed in terms of patient self-care and metabolic control of diabetes. However, studies that would clearly demonstrate the impact of education on pharmaceutical adherence, satisfaction with treatment, and quality of life in type 2 diabetes patients are still lacking [14]. According to ADA guidance glycosylated hemoglobin (A1C) is the best measure of glycemc level over the previous 3 months. Lowering hemoglobin A1C to below or around 7% has been shown to reduce microvascular complications of diabetes and if implemented soon after the diagnosis of diabetes, is associated with long-term reduction in micro vascular disease. The ADA recommends a goal of A1C, less than 7% for people with DM [15].

Table4. Distribution of Diabetics Based on HbA1c before and after Education Programme

Correlations				Correlations with control variable				
variable		BeforeHbA1c	After HbA1c	Control Variables			Before HbA1c	After HbA1c
Before HbA1c	Pearson Correlation	1	.960**	Age	Before HbA1c	Correlation	1<0.001	0.958
	Sig.		<0.001			Sig	<0.001	
	N	50	50					
After HbA1c	Pearson Correlation	.960**	1	Age	After HbA1c	Correlation	0.958	1<0.001
	Sig.	<0.001				Sig	<0.001	
	N	50	50					

**. Correlation is significant at the 0.01 level (2-tailed).

There existed a positive correlation with HbA1c value before and after the Education Programme. Pearson's correlation was found to be 0.960 being highly significant at 0.01 level. A detailed correlation analysis by controlling variables such as age that can influence HbA1c value was again tested and it was statistically proved that age has no role in controlling HbA1c level. In other words, any age group can control HbA1c of the type 2 diabetes properly if they follow instructions correctly. According to International Diabetes Federation (IDF) guideline the measurement of HbA1c values have become the standard in glycemic control and estimates that HbA1c <7.0%, or even better HbA1c <6.5%, lowers the risk of diabetic complications [16]. A large and prospective study showed that the reduction of HbA1c for 1% is followed by reduction of overall deaths from diabetes for 21%, micro vascular complications for 37% and myocardial infarctions for 14% [17].

The ANOVA test that was done recognized that strong statistical significance existed for mean scores distributed with respect to HbA1c before and after Education Programme. An attempt was made to understand the most affected range of HbA1c in before and after Education Programme. For this purpose, a statistical procedure called Tukey Honestly Significant Difference (HSD) test for multiple comparisons was again done. The result of the analysis is shown in table 5.

Table 5. Multiple comparison of HbA1C using Tukey HSD

Multiple Comparisons with Tukey HSD						
Dependent Variable	HbA1c range	HbA1c range	Mean Difference (I-J)	Std. Error	Sig.	
Before HbA1c	<7%	7-8%	-0.2666	0.3438	0.72	
		>8%	-2.6074*	0.5726	<0.001	
	7-8%	<7%	0.2666	0.3438	0.72	
		>8%	-2.3408*	0.5563	<0.001	
	>8%	<7%	2.6074*	0.5726	<0.001	
		7-8%	2.3408*	0.5563	<0.001	
	After HbA1c	<7%	7-8%	-0.1609	0.316	0.867
			>8%	-2.5463*	0.5263	<0.001
7-8%		<7%	0.1609	0.316	0.867	
		>8%	-2.3854*	0.5113	<0.001	
>8%		<7%	2.5463*	0.5263	<0.001	
		7-8%	2.3854*	0.5113	<0.001	

*. The mean difference is significant at the 0.05 level.

The results revealed that though the Education Programme can influence all categories of the patients, the most significant reduction of HbA1c was observed among poorly controlled Type 2 diabetic patients with HbA1c >8%. The result was statistically significant at 0.05 levels.

A study of 200 patients confirmed the positive impact of organized diabetes education on all quality of life aspects in patients with type 2 diabetes (physical functioning, physical limitations in functioning, pain, overall health, vitality, social functioning, emotional limitations in functioning, self-reported mental health) [18]. Similar results were observed in another study of imparting diabetes education to 53 diabetic patients, found significantly better quality of life after the education than before (19.38 vs 23.13, $p = 0.001$) [19].

3.2.1 Life style pattern and weight management practices of Diabetic Adults

It was also noted that more than half of the participants were obese (58%) followed by overweight (30%) and ideal weight (12%) respectively. Details of the lifestyle habits of the patients, as revealed that 38 % of the respondents opined that they were in the habit of doing exercise regularly. Habits of smoking and alcohol intake were found to be very less among participants (4 % were alcoholic and 2 % were smokers). Among the patients who were regularly doing exercise were found to be free of smoking or drinking habits.

Table6. Influence of Education Programme on HbA1c and BMI

HbA1c	Education Programme			
	Before		After	
	No	%	No	%
good (<7%)	6	12	10	20
Moderate (7-8%)	17	34	16	32
poor (>8%)	27	54	24	48
BMI				
Ideal body weight	11	22	15	30
overweight	19	38	17	34
obese	10	20	8	16

Table 6 reveals that the overall impact of the 3 months Educational Programme was effective. Education is a vital component of the treatment of no communicable disease like diabetes. Literature data indicate that as few as 5% of patients who receive regular education are unable or unwilling to comply with treatment. Patients who are not properly educated develop diabetes more often, and patients who received no education are up to 4 times more likely to develop diabetes complications [20]. An Australian randomized controlled trial reported a strong association between lifestyle modifications and reduction in waist circumference, body mass index, and blood glucose level. However, these factors still remain challenges for developing countries like India [21, 22]. Another Research shows that long term education for chronically ill patients brings about benefits including a lower body weight, a lower blood pressure, and lower treatment costs. [23,24].

In the present study the majority of the diabetics (12% to 20%) attained a good glycemic control (HbA1c <7%). As a result poorly controlled HbA1c level (>8%) gradually decreased from 54% to 48%. Similarly patients with obese reduced to 20% to 16% and overweight reduced to 38% to 34% respectively. Moreover these Education Programme helped 30% of the diabetic patients to maintain their body weight into ideal.

IV. CONCLUSION

This study revealed that the 3 months Health Education Programme succeeded in improving the overall knowledge level of the patient and many diabetes patients were ready to change their dietary practices at least for one month. However the majority of the patients failed to change these attitude and practices after 3 months. This may be due to the lack of continuous health education. But still this Education Programme can be slightly able to control the BMI and HbA1C level of the participants. Quantitative data regarding the BMI and HbA1c values justifies this truth. This reveals the fact that Education plays an important role in maintaining the good glycemic control and ideal body weight. Therefore, every step in educating and creating awareness will improve overall wellbeing and prolong the life span of the diabetic patients. Hence there is a definite need to empower patients with right information at every available opportunity and create awareness on self-care management with the emphasis on lifestyle modification and dietary changes.

REFERENCES

- [1]. K Jaiswal, N. Moghe, M. Mehta, K. Khaladkar, and L. Vaishnao, Knowledge, attitude & practices of type II diabetes mellitus patients in a tertiary care teaching institute of central India, J Diabetes Metab Disord Control, 6(1) 2019,1-4.
- [2]. American Diabetes Association, Position statement: standards in diabetes care. Diabetes Care, 33: 2010 S11-61.
- [3]. G M. Serrano, S. Jacob, Engaging and empowering patients to manage their type 2 diabetes, part I: a knowledge, attitude, and practice gap? Adv. Ther. 27 (6), 2010, 321-333. <http://dx.doi.org/10.1007/s12325-010-0034-5>.
- [4]. M.A Powers, J Bardsley, J, M Cypress, Diabetes self-management education and support in type 2 diabetes: a joint position statement of the American Diabetes Association, the American Association of Diabetes Educators, and the academy of nutrition and dietetics. J Acad Nutr Diet. ;115(8), 2015, 1323-1334.
- [5]. P.K Rani, R Raman, S Subramani, G Perumal, G Kumaramanickavel and T Sharma, Knowledge of diabetes and diabetic retinopathy among rural populations in India, and the influence of knowledge of diabetic retinopathy on attitude and practice. Rural Remote Health. 8(3), 2008,838

- [6]. N Kheir and W Greer, Knowledge, attitude and practices of Qatari patients with type 2 diabetes mellitus, *Int. J. Pharm. Pract.* 19 (3), 2011, 185–191.
- [7]. H.I Okonta , B.J Ikombele, G.A Ogunbanjo, Knowledge, Attitude and Practice Regarding Lifestyle Modification in Type 2 Diabetic Patients, *Afr J Prim Health Care Fam Med.* Dec 9;6(1),2014 E1-6. doi: 10.4102/phcfmv6i1.655.
- [8]. D. M. Mann, D. Poniaman, H. Leventhal, and E. A. Halm, “Misconceptions about diabetes and its management among low-income minorities with diabetes,” *Diabetes Care*, vol. 32, no. 4, 2009, pp. 591–593.
- [9]. E. M. Mikhael, M. A. Hassali, S. A. Hussain, and N. Shawky, “Self-management knowledge and practice of type 2 diabetes mellitus patients in Baghdad, Iraq: a qualitative study,” *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, vol. 12, 2019, pp. 1–17, 2019.
- [10]. S. P. S. Chawla, S. Kaur, A. Bharti et al., “Impact of health education on knowledge, attitude, practices and glycemic control in type 2 diabetes mellitus,” *Journal of Family Medicine and Primary Care*, vol. 8, no. 1, 2019, pp. 261–268
- [11]. X Xitao, L Qiang, Impact of cigarette smoking in type 2 diabetes development. *ActaPharmacol. Sin.* (30), 2009, 784–787
- [12]. J. D. Solanki, N. S. Sheth, C. J. Shah, and H. B. Mehta, “Knowledge, attitude, and practice of urban Gujarati type 2 diabetics: prevalence and impact on disease control,” *Journal of Education Health Promotion*, vol. 6, no. 1, 2017, p. 35.
- [13]. K Jaiswal, N Moghe, M.C Mehta, Knowledge, attitude & practices of type II diabetes mellitus patients in a tertiary care teaching institute of central India. *J Diabetes Metab Disord Control*,6(1), 2019,1–4. DOI: 10.15406/jdmdc.2019.06.00172
- [14]. N Świątoniowska , K Sarzyn, A.C Szyman, J.P Beata, The role of education in type 2 diabetes treatment, *Diabetes Research and Clinical Practice* , 151,May 2019,pg 237-246. DOI: 10.1016/j.diabres.2019.04.004
- [15]. American Diabetes Association. Standards of Medical Care in Diabetes. *Diabetes care*. Jan;3(supplements 1) 2013
- [16]. IDF, Clinical, guidelines Task Force. Global guideline for type 2 diabetes. Brussels: International Diabetes Federation ,2015.
- [17]. I.M Stratton, A.I Adler,H.A Neil, Association of glycaemia with macro vascular and microvascular complications of type 2 diabetes (UKPDS 35) *BMJ.*,321, 2000, 405–421.
- [18]. A Chudiak, K Lomper,B.P Jankowska and I Uchmanowicz ,The impact of diabetes education on the assessment of the quality of life of patients type 2 diabetes.*Nurs Probl* 23(1),2015,1-6.
- [19]. K A Burakowska, K Adamska, K, Skuratowicz, Effect of education level on diabetes control and quality of life in insulin treated type 2 diabetic patients,*Diabet Prakty*,11(2),2010, 46-53.
- [20]. L Siminerio, J Zgibor, F X Solano, Implementing the chronic care model for improvements in diabetes practice and outcomes in primary care: The University of Pittsburgh Medical center experience, *Clin Diabetes* 22(2), 2004;54-58
- [21]. S M Moore, E.A Hardie, N JHackworth, C R Critchley, M Kyrios, S A Buzwell, Can the onset of type 2 diabetes be delayed by a group-based lifestyle intervention? A randomised control trial,*Psychol. Health*, 26, 2011,485–499. doi: 10.1080/08870440903548749
- [22]. C.R Critchley, E A Hardie, S M Moore, Examining the psychological pathways to behavior change in a group-based lifestyle program to prevent type 2 diabetes. *Diabetes Care*. 35, 2012,699–705. doi: 10.2337/dc11-1183.
- [23]. L M Belalcazar , D M Reboussin, S M Haffner , The Look AHEAD Research Group: a 1 year lifestyle intervention for weight loss in individuals with type 2 diabetes reduces high C- reactive protein levels and identifies metabolic predictors of change: from the Look AHEAD (Action of Health in Diabetes) study. *Diabetes care*;33,20102297-303
- [24]. M A Salinero ECS Pau, F J Arrieta F.J, Effectiveness of PRECEDE model for health education on changes and level of control of HbA1c, blood pressure, lipids and BMI in patients with type 2 diabetes mellitus. *BMC publ Kealth*, 11, 2011,267.

***Corresponding Author: Shamyak**

¹(Food and Nutrition Department, Faculty of Science, University of Kerala, India)