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Original Article

Pharmacology Section

Effect of Pharmacist Mediated Counselling on Knowledge, Attitude and Practice (KAP), Health Related Quality of Life (HR-QoL) and Glycaemic Control in Diabetic Patients on Insulin Therapy

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ABSTRACT

Introduction: Education of the patients regarding KAP management has shown to improve patient outcomes in various health care settings across the world.

Aim: To assess the impact of patient counselling by the pharmacist on KAP, Health related Quality of life and glycaemic control.

Materials and Methods: A prospective observational study was conducted in hospitalised patients of various departments of the tertiary care hospital during the period of November 2016 to April 2017. Patient counselling was given by pharmacist at baseline visit and first follow-up (after three months). Patients were followed for six months with first follow-up at third month and with second follow-up at sixth month and KAP and HR-QoL were assessed using WHO-BREF QoL and KAP questionnaire respectively in all visits. Similarly, glycaemic control (HbA1C) values were noted at each visit.

Results: A total of 50 patients were recruited in the study. KAP score at baseline visit, follow up-1 and follow up-2 were found to be 87.92±7.82, 117.47±6.98 and 119.9±5.30 respectively. Data analysis indicated that KAP score was improved at follow up-1 ($p<0.001$) and follow up-2 ($p<0.001$). HR-QoL has been significantly improved in all the domains during follow-ups. However, more degree of significance was observed in Domain 2 (psychological) and Domain 4 (environmental). HbA1C levels at baseline visit, follow up-1 and follow up-2 were found to be 9.1±1.65, 8.27±2.79 and 7.66±1.719 respectively. HbA1C levels were significantly decreased at follow up-1 ($p<0.05$) and follow up-2 ($p<0.001$).

Conclusion: The study results support that pharmacist mediated patient counselling could remarkably influence on knowledge, attitude and practice and in turn patient's quality of life and glycaemic control.

Keywords: Diabetes Mellitus (DM), Glycaemic control, HbA1C, Insulin therapy, Patient counselling

INTRODUCTION

Diabetes mellitus is an important global health issue as the number of people with diabetes is rising every year, particularly of type 2 diabetes [1]. Diabetes mellitus would be the seventh leading cause of death in 2030 as per WHO projections [2]. The recent evidence from literature indicates that pharmacists are increasingly considered as a part of the health care system [3]. Pharmacist is considered as an integral part of multidisciplinary diabetes care team and pharmacists have a paramount role in providing care and education for patients [4]. The results of Iran based study had shown beneficial outcomes by pharmacist intervention in diabetes management [5]. Moreover, an Indian community based study demonstrated the positive impact of pharmacists counselling on clinical outcomes of glycaemic control and quality of life in Indian diabetic population [6]. A meta-analysis evaluating the effect of pharmacist intervention on glycaemic control in diabetic patients revealed that there was statistical and clinical significant association between pharmacist intervention and improvement in glycaemic control [7].

The aim of this study was to evaluate the impact of a pharmacist mediated patient counselling on KAP, Quality Of Life (QOL) and glycaemic control in diabetic patients on insulin therapy.

MATERIALS AND METHODS

Study Site and Duration

A prospective observational study was carried out for a period of six months (November 2016 to April 2017) in patients admitted to Dr. Pinnamaneni Siddhartha Institute of Medical Sciences and Research Foundation, a tertiary care teaching hospital at Chinaoutpalli, Gannavaram Mandal, Krishna district, Andhra Pradesh (India).

Ethical Consideration

The study protocol (Number: PG/160/2017) was approved by Institutional Ethics Committee of Dr. Pinnamaneni Siddhartha Institute of Medical Sciences and Research Foundation (Dr. PSIMS and RF) which was registered with CDSCO (Reg. No: ECR/804/Inst/AP/2016). All the participants were informed about the study details and informed consent was obtained before the initiation of study.

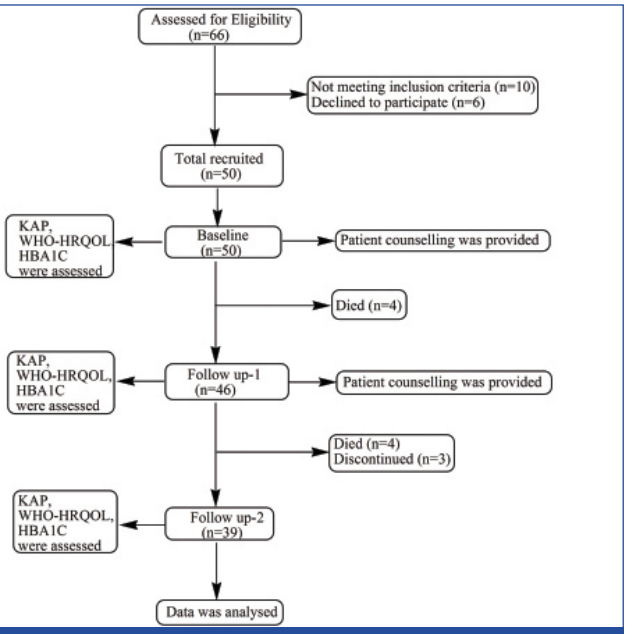
Experimental Design

A total of 66 patients were assessed for eligibility. A total of 50 patients who met the inclusion criteria were recruited into the study (recruited patients who visited to our hospital in first one week of initiation of the study). Experimental design is shown in a flow chart as per STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines [Table/Fig-1].

Study Procedure

Patient counselling: Counseling was provided to the patients regarding the disease and its potential complications, different options of treatment which include oral hypoglycaemics/tablets and insulin, about insulin and types of insulin, mixing technique of insulin before administration, administration of insulin, rotation of site of injection, educating about injecting technique, storage of vials, hypoglycaemia and its effects, preventive measures for

hypoglycaemic attacks, treating hypoglycaemic attacks, about HbA1c, about tests which are to be done to prevent from diabetic complications and the frequency at which the tests should be performed, importance of the regularity of tests, about importance of diabetic foot care, dietary modifications and lifestyle changes. Counseling sessions were conducted at the patient's bed-side and counselling was given to the patient along with their attendant. Each session lasted for about 10 minutes and the counselling was provided by well trained student pharmacists {VI Pharm.D (Doctor of Pharmacy) VI year Interns}. These patients did not had any kind of exposure on patient counselling prior the study. Patient counselling was provided at baseline visit, first follow-up and second follow-up.



[Table/Fig-1]: Experimental design (STROBE flow chart).
KAP: Knowledge attitude and practice; WHO: World health organization; HRQOL: Health related quality of life; HbA1C: Glycated haemoglobin; STROBE: Strengthening the reporting of observational studies in epidemiology

Inclusion criteria: i) Diabetic patients with age greater than 18-year-old; ii) Diabetic patients who were admitted as in-patients in various departments of the hospital in the study duration; iii) Diabetic patients (Either Type I or Type II) who were on insulin therapy; vi) Diabetic patients whose records of their blood tests from the day of enrollment were available in the clinical database.

Exclusion criteria: i) Patients were excluded from the study if they are not willing to participate; ii) Patients who were critically ill and pregnant women; iii) Patients who were using only oral hypoglycaemics.

Assessment of HR-QoL

HR-QoL score was measured using a validated english version of the 26-item World Health Organization QOL BREF (WHOQoL-BREF). Four domains are defined for the WHO-QoL-BREF, based on its 24 items: *Domain 1*, physical health, is on activities of daily living, dependence on medicinal substances and medical aids, energy and fatigue, mobility, pain and discomfort, sleep and rest, and work capacity. *Domain 2*, psychological health, includes bodily image and appearance, negative feelings, positive feelings, self-esteem, spirituality, religion, personal beliefs, thinking, learning, memory, and concentration. *Domain 3*, social relationships, covers personal relationships, social support, and sexual activity. *Domain 4*, environment, assesses financial resources, freedom, physical safety and security, health and social care (accessibility and quality), home environment, opportunities for acquiring new information and skills, participation in and opportunities for recreation and leisure activities etc.

The questionnaire was administered at baseline visit, first follow-up and second follow-up to measure the quality of life. In questionnaire, each answered question was given a score of 1-5 and the total score was calculated for each respondent as a percentage. The raw score of each domain was then transferred to standardised score of 0 to 100. The higher scores indicate the better quality of life of patients. The obtained data were subjected to statistical analysis [8].

Assessment of KAP

KAP questionnaire for diabetic patients on insulin therapy was previously used by Choudhury SD et al., [9]. However, in our study, KAP Questionnaire was used following incorporation of scoring system in order to assess KAP. The scoring system was designed such that lower score reflect lower level of KAP while high scores indicate high level of KAP. The modified KAP questionnaire was administered to study patients at baseline visit, first follow-up and second follow-up. The KAP questionnaire consists of two parts. Part I consists of 23 questions pertaining to knowledge and attitude [Table/Fig-2a]. Part II consists of 22 questions with regard to practice [Table/Fig-2b]. Part II was administered only to current insulin users. This questionnaire was administered to the baseline visit, before patient counselling and at first follow-up and second follow-up.

Questions	% response			
	Categories of response (score of response)	1st visit (%)	1st follow-up (%)	2nd follow-up (%)
What do you understand by diabetes?	Good idea (3)	10	50	70
	Moderate idea (2)	20	35	20
	Poor idea (1)	70	15	10
What are the complications of diabetes?	Good idea (3)	04	48	50
	Moderate idea (2)	28	40	40
	Poor idea (1)	38	12	10
Do you know why insulin is prescribed for diabetes?	Yes (3)	10	62	70
	Partly (2)	20	18	15
	No (1)	70	20	15
Do you think insulin can cure diabetes?	Yes (3)	34	8.7	3
	Not sure (2)	28	4.3	5
	No (1)	38	87	92
Do you think insulin is habit forming?	Yes (1)	42	89.1	0
	Not sure (2)	28	8.7	10
	No (3)	30	2.2	90
Do you believe insulin is the last resort for treatment of diabetes?	Yes (1)	46	8.7	5
	Not sure (2)	38	4.3	5
	No (3)	16	87	90
Do you think insulin can cause harm?	Yes (1)	8	0	0
	Not sure (2)	42	8.7	5
	No (3)	50	91.3	95
Do you think bitter condiments can be used to control blood sugar?	Yes (3)	82.6	68	70
	Not sure (2)	0	14	10
	No (1)	13.4	18	20
Do you believe in any other substitutes for insulin?	Yes (1)	38	4.3	3
	Not sure (2)	38	45.7	27
	No (3)	24	50	70
Do you think insulin can be stopped once blood sugar levels normalised?	Yes (1)	32	4	5
	Not sure (2)	26	9	5
	No (3)	42	87	90
Do you feel that once insulin is started diet and exercise become less important?	Yes (1)	14	3.7	0
	Partly (2)	11	5	6
	No (3)	75	91.3	94
Are you aware that there are different types of insulin?	Yes (3)	13	60	72
	Partly (2)	15	25	25
	No (1)	62	15	3

Are you aware that there are different types of insulin delivery devices?	Yes (3)	2	71.7	80
	Partly (2)	8	24	18
	No (1)	88	2	2
Are you aware that insulin is mandatory for some diabetes?	Yes (3)	12	78.3	85
	Not sure (2)	2	15.2	10
	No (1)	86	7.5	5
Are you aware that even if insulin is not mandatory in a diabetic patient, it may still be required during certain stressful conditions?	Yes (3)	2	65	72
	Partly (2)	6	15	20
	No (1)	92	20	8
Are you aware of HbA1c (a test for assessing long term blood sugar control)?	Yes (3)	10	80	88
	Partly (2)	0	12	10
	No (1)	90	8	2
Do you believe insulin use could be against your religious practice at any point?	Yes (1)	4	0	0
	Partly (2)	6	0	0
	No (3)	90	100	100
Do/did your family members encourage you regarding insulin use?	Yes (3)	86	100	100
	Partly (2)	6	0	0
	No (1)	8	0	0
Are you confident about self administration of insulin?	Yes (3)	90	92	95
	Partly (2)	6	5	5
	No (1)	4	3	0
Given the chance would you stop insulin?	Yes (1)	50	17.4	10
	Partly (2)	20	6.5	5
	No (3)	30	76	85
Would you ask your physician/health care professional in case you have any queries regarding insulin use?	Yes (3)	44	76.1	82
	Not sure (2)	4	17.6	13
	No (1)	52	6.3	5
Apart from your doctor, how else do you think you can get information regarding diabetes and insulin use?	Books/periodicals (2)	4	0	0
	Television (2)	10	4.3	3
	Internet (2)	0	0	0
	Other sources (2)	2	95.7	97
	Not interested to get information (1)	84	0	0
If you have been advised insulin but currently not using it, why is that so?	Dislikes injection in general (1)	3	2	1
	Financial problem (2)	5	5	5
	Fear of hypoglycaemia (1)	2	0	0
	Insulin is the last resort in diabetes (1)	0	0	0
	Insulin is habit forming (1)	0	0	0
	Others (still using) (3)	90	93	94

[Table/Fig-2a]: Percentage responses of Knowledge and Attitude Questionnaire (KAP-Part I) survey obtained from study population.

Questions	% response			
	Categories of response	1st visit (%)	1st follow-up (%)	2nd follow-up (%)
Where do you inject insulin?	Upper arm (1)	34	5	3
	Thigh (2)	20	10	7
	Abdomen (3)	46	85	90
Do you rotate sights?	Usually (3)	65	90	97.8
	Sometimes (2)	25	7	2.2
	No (1)	10	3	0
Do you clean the injection site with spirit before hand?	Usually (3)	40	78	82.6
	Sometimes (2)	4	12	17.4
	No (1)	56	10	0
After introducing the syringe, do you withdraw it partly to look for presence of blood?	Usually (3)	84	90	97
	Sometimes (2)	0	7	3
	No (1)	16	3	0
When do you take insulin in relation to your meals?	Before meals (3)	90	100	100
	After meals (2)	10	0	0
	Not fixed (1)	0	0	0
Where do you keep your insulin?	Refrigerator (3)	72	80.4	87
	At room temperature (2)	26	17.6	13
	Not fixed (1)	2	2	0
Do you use a glucometer?	Regularly (3)	14	30	48
	Infrequently (2)	8	10.9	20
	No (1)	78	50.1	32
Do you get fasting/ postprandial blood sugar checked by a laboratory?	Meticulously (3)	10	25	25
	Regularly (2)	56	63	70
	Infrequently (1)	34	12	5
Do you get HbA1c checked by a laboratory?	Meticulously (3)	0	4	4.4
	Regularly (2)	2	70	82.6
	Infrequently (1)	98	26	13
Do you miss insulin doses?	Often (1)	0	0	0
	Sometimes (2)	12	10	0
	Infrequently (2)	10	5	0
	Rarely (3)	78	85	100
Do you skip food after taking insulin?	Often (1)	2	0	0
	Infrequently (2)	10	5	2.9
	No (3)	88	95	97.1
Do you visit an eye specialist in relation to your diabetes?	Regularly (3)	10	13	32
	Infrequently (2)	16	60.9	53
	No (1)	74	26.1	15
Do you get other pathological tests done in relation to diabetes?	Regularly (3)	8	25	37
	Infrequently (2)	14	37	56.5
	No (1)	78	38	6.5
Do you read package insert supplied along with insulin?	Regularly (3)	6	6	15
	Infrequently (2)	16	52.2	60
	No (1)	78	41.3	25
How else do you gather information regarding the insulin that you use?	Book/periodicals (3)	6	15	15
	Internet (3)	0	0	0
	Other sources (3)	6	60	80
	Not interested (1)	88	25	5
Can you mention some symptoms of hypoglycaemia?	Most (3)	2	55	71.7
	Few (2)	70	30	28.3
	None (1)	28	15	0
Do you experience symptoms of hypoglycaemia?	Sometimes (1)	30	20	13
	Infrequently (2)	62	75	82.6
	No (3)	8	5	4.4
Have you ever been hospitalised for insulin related hypoglycaemia?	More than once (1)	6	3.5	2
	Once (2)	14	10	8
	No (3)	80	83	90
Do you carry simple carbohydrates (e.g., glucose, sugar) with you while travelling?	Usually (3)	34	58	92
	Sometimes (2)	6	25	5.2
	No (1)	60	17	2.8

Do you take any other medications for diabetes without informing the physician who prescribed your insulin?	Usually (1)	0	0	0
	Sometimes (2)	6	0	0
	No (3)	94	100	100
Do you self adjust your dose of insulin without consulting your physician?	Sometimes (1)	12.2	2.8	0
	Infrequently (2)	0	2.2	2.2
	No (3)	87.8	95	97.8
Do you carry a tag identifying yourself as a diabetic patient?	Usually (3)	0	0	0
	Sometimes (2)	0	0	0
	No (1)	100	100	100

[Table/Fig-2b]: Percentage responses of Knowledge and Attitude Questionnaire (KAP-Part II) survey obtained from study population.
Scoring system used for each response is only used for calculating KAP score shown in Table/Fig-4.

Clinical Outcome

The primary outcome was to assess the impact of a pharmacist mediated patient counselling on KAP, Health Related Quality Of Life (HR-QoL). The secondary outcome was to assess glycaemic control in diabetic patients on insulin therapy.

STATISTICAL ANALYSIS

Continuous variables were presented as Mean±Standard deviation (mean±SD) and categorical variables were expressed as percentage counts. Data obtained from the WHO-QoL-BREF and KAP questionnaires were analysed using the Wilcoxon signed ranked test and t-test. For all analyses, *p<0.05, **p<0.01 and ***p<0.001 were regarded as statistically significant. Data was analysed using statistical tool of Graph pad prism version 5.0.

RESULTS

Demographics

The frequency of male patients was higher in the study population. The highest number of patients was in the age group of 55-60 years followed by 60-65 years. The data of demographics is shown in [Table/Fig-3].

Gender	Frequency (%)
Male	28 (56%)
Female	22 (44%)
Age (in years)	
30-35	4 (8%)
35-40	5 (10%)
40-45	7 (14%)
45-50	5 (10%)
50-55	7 (14%)
55-60	11 (22%)
60-65	7 (14%)
65-70	3 (6%)
70-75	1(2%)

[Table/Fig-3]: Frequency distribution of demographics of study population.

KAP

KAP score at baseline visit, follow up-1 and follow up-2 were found to be 87.92±7.82, 117.47±6.98 and 119.9±5.30 respectively. Data analysis indicated that KAP score significantly improved at follow up-1 (p<0.001) and follow up-2 (p<0.001). The results indicate that patient counselling provided at baseline visit, has significantly (p<0.001) improved KAP score at follow up 1 and patient counselling provided at baseline visit, and follow-up 1 has also significantly (p<0.001) improved KAP score at follow up-2 [Table/Fig-4].

	Before patient counselling	After patient counselling	
Outcomes	**Baseline (n=50)**	**Follow up 1 (n=46)**	**Follow up 2 (n=39)**
QoL-DOMAIN 1 (Physical health)	55.44±13.93	62.43±10.99*	60.36±12.99
QoL-DOMAIN 2 (Psychological)	43.2±18.81	56.57±14.50***	57.77±12.99***
QoL-DOMAIN 3 (Social relationships)	65.36±16.57	71.23±12.79	73.13±12.20*
QoL-DOMAIN 4 (Environment)	55.58±14.98	65.89±12.82***	69.65±11.08***
KAP Score	87.92±7.82	117.47±6.98***	119.9±5.30***
HbA1C (%)	9.1±1.65	8.27±2.79*	7.66±1.719***

[Table/Fig-4]: Data of HR-QoL, KAP and HbA1C score at baseline, follow up-1 and follow up-2.
Data is represented in Mean±Standard deviation. KAP: Knowledge, attitude and practice; HbA1C: Glycated haemoglobin

HR-QoL

The quality of life of the patients was measured by using the WHO-BREF QoL questionnaire during each visit. WHO-BREF QoL questionnaire was administered to measure the quality of life of the enrolled patients. An increase in the QoL score indicates an improvement in QOL. Although it is a generic instrument, studies have demonstrated its sensitivity in patients with diabetes. In the first follow-up and second follow-up, there was significant improvement in the QoL (p<0.001) when compared with baseline visit [Table/Fig-4].

Domain 1 (Physical Health)

Domain 1 consists of activities of daily living, dependence on medicinal substances and medical aids, energy and fatigue, mobility, pain and discomfort, sleep and rest, work capacity. Domain 1 score at baseline visit, follow up-1 and follow up-2 were found to be 55.44±13.93, 62.43±10.99, 60.36±12.99 respectively. Comparative analysis was made between the groups in the Domain 1 at baseline visit, follow up-1 and follow up-2. Statistical significance was observed (p<0.05) between baseline visit and follow-up-1. This could be attributed to the fact that an increased understanding of their disease management improved adherence and thus, related in improvement in their QoL [Table/Fig-4].

Domain 2 (Psychological)

Domain 2 consists of bodily image and appearance, negative feelings, positive feelings, self-esteem, spirituality/religion/personal beliefs, thinking, learning, memory and concentration. Domain 2 score at baseline visit, follow up-1 and follow up-2 were found to be 43.2±18.81, 56.57±14.50, 57.77±12.99 respectively. Comparative analysis was made between the groups in the Domain 2 at baseline visit, first follow-up and second follow-up. Significance was observed between the groups (p<0.001). The improvement seen in the intervention group patients could be due to the impact of education provided about their disease and life-style modifications. It is probable that education provided by the pharmacist helped the patients to understand their condition and their disease state and thus, improved their QoL [Table/Fig-4].

Domain 3 (Social Relationships)

Domain 3 consists of personal relationships, social support, and sexual activity. Domain 3 score at baseline visit, follow up-1 and follow up-2 were found to be 65.36±16.57, 71.23±12.79, 73.13±12.20 respectively. Comparative analysis was made between the groups in the Domain 3 at baseline visit, follow-up and second follow-up which showed statistical significance (p<0.05) between baseline visit and second follow-up. This may be due to the fact that social relationship is influenced by patient's disease and depends upon each individual's reaction [Table/Fig-4].

Domain 4 (Environment)

Domain 4 consists of financial resources, freedom, physical safety and security, Health and social care: accessibility and quality, home environment, opportunities for acquiring new information and skills, participation in and opportunities for recreation/leisure activities, physical environment (pollution/noise/traffic/climate) transport. Domain 4 score at baseline visit, follow up-1 and follow up-2 were found to be 55.58±14.98, 65.89±12.82, 69.65±11.08 respectively. Comparative analysis showed significance at first, first follow-up and second follow up ($p<0.001$) [Table/Fig-4].

HbA1C

HbA1C levels at baseline visit, follow up-1 and follow up-2 were found to be 9.1±1.65, 8.27±2.79, 7.66±1.719 respectively. Data analysis indicated that HbA1C levels were significantly decreased at follow up-1 ($p<0.05$) and follow up-2 ($p<0.001$). The results indicate that patient counselling provided at baseline visit, has significantly ($p<0.001$) improved glycaemic control at follow up-1 and patient counselling provided at baseline visit and follow up-1 has also significantly ($p<0.001$) improved glycaemic control at follow up-2 [Table/Fig-4].

DISCUSSION

Patient's knowledge, attitude and beliefs have been shown to affect their medication taking behaviour. An understanding of the cause of diabetes and the changes in habits is required to control blood glucose which also helps to improve treatment outcomes. Medication adherence is essential to achieve better therapeutic outcomes in chronic and asymptomatic diseases like diabetes mellitus. The possibility of hypoglycaemia and its common symptoms are known to only few patients. Although many patients give importance to timely intake of meals and medicines, the attitude toward other parameters like self-monitoring of blood glucose, keeping toffee or candies for an emergency situation and avoiding excessive exercises is largely lacking. With regard to practice the situation is even worse.

A KAP questionnaire has various questions based on knowledge, attitude and practice which were used to study the patient's awareness in the respective aspects. The knowledge, attitude and practice of the patients were analysed and statistically significant difference was observed between the KAP scores of baseline, first follow-up and second follow-up.

At baseline visit, 70% of the patients had poor awareness in the areas of disease, its complications, insulin types and its importance. Similarly, 90% of patients were unaware of HbA1C. A 50% of the patients admitted that they would stop insulin when given a chance. A total of 10% patients had discontinued insulin due to financial problems and fear of injections. However, 90% were confident about self-administration of insulin but had lack of knowledge on importance of rotating sites and its administration techniques. Results revealed that 40% of patients were poorly aware of hypoglycaemic symptoms and failed to carry simple carbohydrates while travelling. None of the patients were carrying a tag identifying themselves as diabetic patient.

During the first follow-up, there was improvement in the KAP of the patients. A 75% of the patients were able to speak about diabetes, dietary changes done and foot care. An 80% were aware of importance of insulin and HbA1C. A total of 85% of patients had practiced better insulin administration and rotation of sites. A 65% had their laboratory tests done regularly. A total of 70% of patients effectively managed their hypoglycaemic attacks and carried glucose candy when travelling. However, some patients were still unaware of the complications and importance of regular tests. About 25% of the patients were still prone to hypoglycaemic attacks which could be attributed to their busy life style and forgetfulness. Patients were given counselling at first follow-up, this time intensifying the areas on which the patients were lacking awareness.

At second follow-up around 85% of patients had good knowledge on the disease care and its complications with good practice of dietary and life style changes. 90% were aware of insulin techniques and HbA1C and practiced better. A total of 70% of patients had regular tests done. An 80% managed their hypoglycaemia. Pharmacist mediated patient counselling had an impact on the knowledge, attitude and practice of patients on disease management [8].

In the first and second follow-up, there was a significant increase in QoL scores in comparison to baseline. It could possibly be due to the fact that patient education has influenced in a proper glycaemic control. A number of studies suggest that, pharmacists can play an important role in improving the health and quality of life in patients with chronic illnesses.

The results of glycaemic control in our study is compatible with other findings. A randomised controlled trial reported significant reduction of 0.6% in the intervention group after six months of pharmacist intervention [11]. Another study with 6 month pharmacist intervention reported 0.8% reduction of HbA1c values in the intervention group [12]. A prospective six month study produced 1.9% decrease in HbA1c levels from the baseline to the end of the study period [13]. A study conducted by Shareef and colleagues reported that clinical pharmacist intervention through patient education and medication counselling make a significant influence in medication adherence and glycaemic control in the patients with diabetes mellitus [14].

LIMITATION

The study was conducted on a limited sample size as duration of the study was six months. In our study, duration of diabetes mellitus and presence of diabetic complications have not been considered in the inclusion criteria of the patients. These factors could be confounding factors for the study results. Future studies shall overcome these limitations.

CONCLUSION

Health education plays a very crucial role in prevention and control of diabetes and its complications. Diabetes and its complications can largely be prevented if appropriate and timely measures are taken. Since there is a gap between knowledge, attitudes and practices among diabetics, patient education plays a paramount role in the maintenance of glycaemic control. The study results support that pharmacist mediated patient counselling could remarkably influence the knowledge, attitude and practice and also improves patient's quality of life and glycaemic control.

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