

Original Research Article

Patient education in management of diabetes with medical comorbidities: an interventional study in South-eastern India

Pradeep Devarapalli^{1,2*}, Nikita Mehdiratta^{1,3}, Supriya Mamillapalli², Sruthi Akella⁴

¹ICMR-NICPR, Uttar Pradesh, India

²Lalitha Super Specialties Hospital, Guntur, Andhra Pradesh, India

³Pandit Bhagwat Dayal Sharma Post Graduate Institute of Medical Sciences, Haryana, India

⁴JKKK College of Pharmacy, Tamil Nadu, India

Received: 14 November 2018

Revised: 10 December 2018

Accepted: 11 December 2018

*Correspondence:

Dr. Pradeep Devarapalli,

E-mail: pradeepdevarapalli4@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: These days the effective management of diabetes has boundless challenges. Patient involvement is paramount for the successful care of diabetes. The aim of the study was to control medication adherence by providing patient education to the diabetic patients and also evaluating their drug-use, comorbidities, lifestyles and knowledge about diabetes and its management.

Methods: Total 240 diabetic patients of above 18 years of age with comorbidities were included in the study, in which 128 of study group and 112 of control group. Patient's comorbidities, drug-use and also knowledge level about diabetes was also assessed using a questionnaire.

Results: Among the enrolled patients type-1 diabetes patients were 12 (5%) and 228 (95%) were type-2. Most of the patients about 25% were from age group of 40-50 years. The major number of patients has comorbidities of Systemic and coronary artery disease. Later the post counselling of test group, the mean score was 9.860 ± 0.21 which is significant compared to pre-counselling 7.769 ± 0.201 ($p < 0.001$).

Conclusions: The present study revealed that the patients were unaware of the basic concept related to diabetes mellitus. For better control of hyperglycaemia, there is a need for advancement of policies regard of disease education.

Keywords: Diabetes, Medication adherence, Comorbidities, Patient education

INTRODUCTION

It is typical that healthcare professionals and patients alike can be overwhelmed by the need to address comorbid chronic conditions along with the patient's diabetes-specific treatment goals. Ignoring concurrent disease management, however, can lead to ineffective control of diabetes-specific risk factors and may miss opportunities to improve patient's functioning, quality of life, and mortality risk. The number of adults with diabetes in the world is estimated to rise from 135 million

in 1995 to 300 million in the year 2025.^{1,2} There will be a 42% increase, from 51 to 72 million in the developed countries and a 170% increase, from 84 to 228 million in the developing countries. The countries with the largest number of people with diabetes are, and by the year 2025 will be India, China, and the US. Majority of diabetic patients are in the age of 65 years in developed countries and 45-64 years in the developing countries. This pattern will be accentuated by the year 2025, and diabetes will be increasingly concentrated in urban areas. Prevalence of diabetes in adults worldwide was estimated to be 4.0% in 1995 and expected to rise to 5.4% by the year 2025. It is

higher in developed than in developing countries. Suzanne in 2000 had evaluated that the economic benefits and costs associated with diabetes education.³ Twenty-six papers were identified that addressed diabetes self-management training and education. The benefits associated with education on self-management and lifestyle modification for people with diabetes are positive and outweigh the costs associated with the intervention.^{4,5}

Diabetes has been implicated as the underlying cause of 12% of all new cases of legal blindness, over one third new cases of end-stage renal disease (ESRD), and nearly half of non-traumatic lower extremity amputations. Evidence has also shown that people with diabetes are two to four times more likely to die from heart disease or suffer stroke.⁶

Diabetes, if untreated, can lead to various complications such as neuropathy, nephropathy, retinopathy, hyperlipidaemia, diabetic foot ulcers, infections, etc. These complications adversely affect the quality of life of the patient. In 2007 Krzyt had studied that patients with acute ischemic stroke frequently test positive for hyperglycaemia, which is associated with a poor clinical outcome.⁷ The available evidence linking hyperglycaemia to a poor clinical outcome in patients with ischemic stroke. We highlight the pathophysiological mechanisms of hyperglycaemia on acute stroke prognosis tight glycaemic control after stroke. Provide directions on the use of insulin treatment strategies to control hyperglycaemia in this patient group. In 2002 Bajaj has reviewed the management of diabetes mellitus and set up a comprehensive goal of management which included, absence of symptoms, achievement of norm glycaemia, prevention of micro vascular complications, absence of predisposing risk factors, maintenance of ideal body weight, a progressive increase in physical activity, and cessation of smoking.⁸

Studies have confirmed that the complications of diabetes can be reduced by proper control of blood glucose. The proper control is dependent on the patient's adherence to medications, life style modifications, frequent monitoring of blood glucose, etc. and can be influenced by proper education and counselling of the patient.⁹ In 2004 Cramer has studied that the extent to which patients omit doses of medication prescribed for diabetes. Retrospective analysis on the literature search of 1966-2003 showed that adherence to OHA therapy ranged from 36-93% in patients remained on treatment for 6-24 months. Prospective electronic monitoring studies documented that patients took 67-85% of OHA doses as prescribed.¹⁰ In 2005 Weinger has examined psychometric properties of the Self-Care Inventory-Revised (SCR-R), a self-report measure of perceived adherence to diabetes self-care recommendations, among adults with diabetes. Responsiveness analysis showed that SCI-R scores improved with diabetes psycho education.¹¹

The principal task of the health care team is to give each patient knowledge, self-confidence and support.¹² Patients with diabetes and their families provide 95% of their care themselves, and, as a consequence, educational efforts to improve self-management are central components of any effective treatment plan. The role of self-management behaviour is clear even in studies that address relationships between pharmacologic treatment and outcomes at the physiologic level.^{13,14} For example, both the diabetes control and complications trial (DCCT) and the United Kingdom prospective diabetes study, (UKPDS) required patients to adhere to complex and intensive treatments over long periods of time. The primary goals of DM management are to reduce the risk for micro vascular and macro vascular disease complications, to ameliorate symptoms, to reduce mortality, and to improve quality of life. Appropriate care requires goal setting for glycaemia, blood pressure, and lipid levels, regular monitoring for diabetic complications, dietary and exercise modifications, appropriate medications, appropriate self-monitoring of blood glucose (SMBG), and laboratory assessment of the aforementioned parameters. In 2008 Karen Fitzner had Studied the Assessment of Patient Education and Self-Management in Diabetes Disease Management Diabetes affects 7.8% of Americans, nearly 24 million people, and costs \$174 billion yearly.¹⁵ Two case studies were conducted to augment the literature. Better diabetes self-management through diabetes education encourages participation in DM programs and adherence to recommended care in programs offered by DM organizations or those that are provider based. Improved health outcomes and reduced cost can be achieved by blending diabetes education and DM. Additional research needs to identify effective ways to integrate diabetes educators and education into DM and to assess clinical, behavioural, and economic outcomes arising from such programs.¹⁶ In 2015 mensing had designed the national standards for diabetes self-management education (DSME) to define quality diabetes self-management education that can be implemented in diverse settings and will facilitate improvement in health care outcomes.¹⁷ The purpose of the study was review the current standards for their appropriateness, relevancy and scientific basis.

METHODS

A randomized prospective study was conducted in an inpatient setting of a tertiary care hospital. The patients considered were diabetic for at least 2 months of either sex above 18 years of age with co-morbidities. The patients with Pregnancy induced diabetes (or) gestational diabetes were excluded. Intervention was done using a knowledge assessment questionnaire in diabetic patients. Study is conducted at Guntur district of Andhra Pradesh, India from December 2016 to August 2017.

Data collection

The prescriptions were studied using chart review method and required information was collected from the case sheets of individual patients in the designed data collection form. The patients were interviewed to collect all the relevant data regarding patient care. Ethical clearance was obtained from the Institutional Ethics Committee- Lalitha Super Speciality Hospitals, Guntur, A.P.

Intervention

The patients were randomized into control and study group. Total of 240 patients completed the study, out of that 128 were in the study group and 112 were in the control group. To assess the patient’s basic knowledge about diabetes and its complication, risk factors and life style modification, a questionnaire was given which contains 15 scored questions and were closed ended questions yes or no.

The baseline knowledge was measured in both groups. The test group was provided with the written and verbal information about diabetes and its management after taking the baseline knowledge. On an average 10-15 minutes were spending with each patient depending on the education level and understanding capability of the patients. To the control group no information was provided and then same questionnaire was administered again and patient’s knowledge was assessed about diabetes mellitus in both groups. The baseline and final knowledge about diabetes was compared in both control and study group. The Patient information leaflet contained information about diabetic complication, risk factor, dietary and life style modifications that diabetic patients need to be followed. Student unpaired T-test had been used to find the significance of total answers between pre and post intervention.

Statistical analysis

An unpaired t- test was used to analyse the significant difference between the pre counselling and post counselling mean scores of patient knowledge assessment about diabetic disease for both control and test groups. Patient’s knowledge about diabetes and its management were assessed using a knowledge assessment questionnaire. The questionnaire assessed the patient’s basic knowledge about diabetes and its complication, risk factors of high blood sugar and blood pressure levels, and life style modification (exercise and well planned diet).

RESULTS

Results of randomized prospective interventional study included the data of 240 patients in which 92 patients were males and 148 patients were females. Out of 240 patients of age below 30 are 4 patient, 30-40 are 52 patients, 40-50 are 60 patients, 50-60 are 56 patients, 60-

70 are 48 patients and 70-80 are 20 patients. The type-1 diabetes patients were 12 (5%) and 228 (95%) were type-2.

Among 240 patients, duration of diabetes, newly diagnosed-16 patients, less than 1 year - 32 patients, Between 1-4 years 60 patients, between 5-10 years 72 patients, Between 11-19 years 56 patients, More than 20 years 4 patient. Moreover the patient’s body mass index (BMI) shows that 84 patients were underweight (≤ 18.5), whereas 4 patient were obese (≥ 30.0) are (Table 1).

Table.1 Distribution of patients based on body mass index.

BMI	Male	Female	Total	%
Under weight (≤ 18.5)	32	52	84	35
Normal weight (18.5-24.9)	40	80	120	50
Over weight (25.0-25.9)	20	12	32	13.3
Obesity (≥ 30.0)	0	4	4	1.6
Total	92	148	240	100

BMI= Age \times Weight in kgs/ Height in cms

Comorbidities

After the evaluation 240 Patients of diabetes mellitus, major number of patients had coronary artery disease (22.5%), following by patients with systemic hypertension (21.5%). Whereas only 9 patient (3.7%) had tuberculosis (Figure 1).

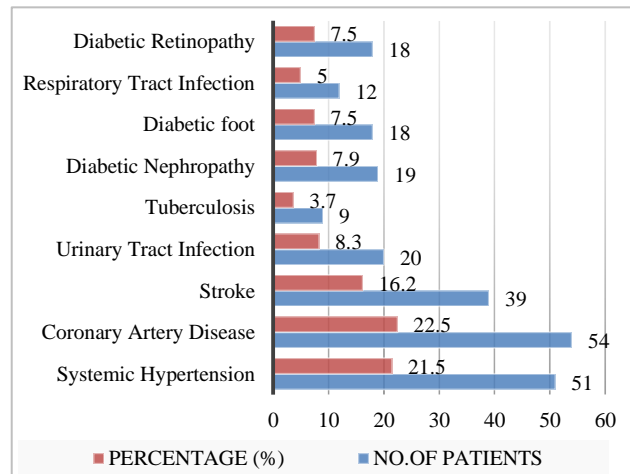


Figure 1: Distribution of diabetic patients based on co-morbidities.

Lifestyl e habits

The life style and habit of patients shows that 38.3% of patients reduced their sugar, but 21.6% were reported that their sugar in take was high even after the diagnosis of diabetes mellitus. In the study about 15% were smokers,

8.3% were past smoker, 21.6% were alcoholic and 11.18% were past alcoholic. About 68.3% reported that are not doing any exercise. Only 11.6% reported that they were having high stress (Table 2).

Table 2: Life style of the patient

S.no	Life style	Number of patients	%
1	Smoker	36	15
	Non-smoker	184	76.6
	Past smoker	20	8.3
2	Alcoholic	52	21.6
	Non-alcoholic	164	68.3
	Past alcoholic	24	10
3	Sugar intake		
	Reduced	92	38.3
	Low	72	30
	Moderate	24	15
4	Vegetarian	92	38.3
	Non-vegetarian	148	68.6
	Stress		
	Low	96	40
5	Moderate	40	16.6
	High	28	11.6
	No	76	31.6
6	Physical activity		
	Yes	76	31.6
	No	164	68.3

Prescribing patterns

The prescribing patterns of different category of anti-diabetic drugs during the study period were found to be as follows. Biguanides (68.3%), sulfonyl ureas (50%), Insulin therapy (20%), and other category of drugs prescribed are anti-hypertensive drugs (58.3%) anti hyperlipidaemic 3%), antibiotics drugs (11.6%), anti-coagulant (16.6%), NSAID (20%), multi vitamins (58.3%), anti-histamine (33.3%) (Table 3).

Table 3: Prescribing patterns of drugs.

No	Category	No. of patients	%
Anti-diabetic drugs			
1	Insulin therapy	12	20
2	Biguanides	41	68.3
3	Sulfonyl urea	30	50
Other Category Drugs			
4	Anti-hypertensive	35	58.3
5	Anti-hyperlipidemic	38	63.3
6	Antibiotics	7	11.6
7	Anti-coagulant	10	16.6
8	NSAIDs	12	20
9	Anti-histamine	20	33.3
10	Multi vitamin	35	58.3

Table 4: Patients knowledge assessment for control and test group based on pre and post intervention studies.

Mean±Sem		T value	P value
Pre	Post		
Control (n=112)			
8.379±0.207	8.041±0.21	1.063	<0.2928
Test (n=128)			
7.769±0.201	9.860±0.21	6.565	≤0.0001

In control group after the post counselling the mean score was 8.379±0.207 which is not significant compared to pre counselling 8.041±0.21 (p<0.2928) and in test group after the post counselling the mean score was 9.860±0.21 which is significant compared to pre counselling 7.769±0.201 (p<0.001) (Table 4).

DISCUSSION

A total of 240 patients were enrolled in the study out of which type-1 diabetes patients were 12 (5%) and 228 (95%) were type-2. Most of the patients about 25% were from age group of 40-50 years. In fact the load of comorbidity will tend to increase in elderly groups and was greater in men compared to women.¹⁸ Major number of patients has comorbidities of systemic hypertension (51), coronary artery disease (54) and stroke (39). outcomes like cognitive decline, blindness, stroke, amputations, and premature death are resulted by increase of serious short- and long-term complications because of compromise adherence to treatment and mental health related comorbidities.¹⁹

Most of the patients did not know the basics of diabetes mellitus like normal blood sugar value, complications of diabetes mellitus, causes of high blood sugar level etc. Risk of diabetes will also be increased with high Basic Metabolic index category and persons with hypertension are more likely to develop diabetes compared with individuals without any comorbidities.²⁰ Conditions like double diabetes also acts as a risk factor for people with type 1 diabetes mellitus in increasing macrovascular and microvascular related comorbidities.²¹ It was observed that the patient education can play major role in the management of diabetes mellitus by which the patients improve their knowledge about causes and symptoms of diabetes, risk of high blood glucose, medications, periodically check-up of blood glucose and life style modification required for management of diabetes. Attaining glycemic goals and the managing of comorbidities will become utmost important, for preventing diabetes complications.²² To sum up, poor knowledge leads to non-adherence to medication therapy, which eventually leads to poor Blood glucose level control in diabetic patients. It is crucial to educate patients and make them aware of the medication adherence complications and other effect of diabetes on other disease state. Patient counselling increased the

knowledge about diabetes and importance of self-care, and lifestyle modifications that can lead to better glycaemic management.

CONCLUSION

Medication adherence and sedentary lifestyle contributes to diabetes associated complications and other comorbidities, which was primarily due to lack of proper knowledge. The present study revealed that the patients were unaware about the basic concept related to diabetes mellitus. For better control of hyperglycaemia, there is a need of advancement of policies regard of disease education. Future studies are necessary to compare the effectiveness of patient counselling of other approaches to control diabetes.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

- John D. Piette, and Eve A. Kerr. The Impact of Comorbid Chronic Conditions on Diabetes Care *Diabetes Care* 2006;29(3):725-31.
- Ben Kligler, Darren Lynch. An integrative approach to the management of type 2 diabetes mellitus. *Integrative Medicine* 2004;2(6):40-50.
- Boren SA, Fitzner KA, Panhalkar PS, Specker JE. Costs and Benefits Associated With Diabetes Education A Review of the Literature. *Diabetes Educ.* 2009;35(1):72-96.
- Dailey GE. Improving oral pharmacologic treatment and management of type 2 diabetes. *Managed Care.* 2004;2:41-9.
- Hirsch IB, Bergenstal RM, Parkin CG, Wright E, Bues JB. A real-world approach to insulin therapy in primary care practice. *Clin Diabetes.* 2005;23(2):78-86.
- Jesudason DR, Dunstan K, Leong D, Wittert GA. Macrovascular risk and diagnostic criteria for type 2 diabetes. *Diabetes Care.* 2003;26(2):485-90.
- Kruyt ND, Biessels GJ, DeVries JH, Roos YB. Hyperglycemia in acute ischemic stroke: pathophysiology and clinical management. *Nature Reviews Neurology.* 2010;6:145-55.
- Bajaj JS. Management of Diabetes Mellitus: principles and practice. *Kuwait Med J.* 2003;34(2):94-105.
- Whitley HP, Fermo JD, Ragucci K, Chumney EC. Assessment of patient knowledge of diabetic goals, self-reported medication adherence, and goal attainment. *Pharm Pract.* 2006;4(4):183-90.
- Cramer JA. A systematic review of adherence with medication for diabetes. *Diabetes care.* 2004;27:1218-24.
- Weinger K, Butler HA, Welch GA, LaGreca AM. Measuring diabetes self-care Inventory: A psychometric analysis of the Self-Care Inventory-Revised with adults. *Diabetes Care.* 2005;28(6):1346-52.
- Cohen FJ, Neslusan CA, Conklin JE, Xue Song. Recent antihyperglycaemia prescribing trends for U.S. privately insured patients with type 2 diabetes. *Diabetes Care.* 2003;26(6):1847-51.
- Kimmel B, Inzucchi SE. Oral agent for Type 2 Diabetes:an update. *Clin Diabetes Care.* 2005;28(6):64-76.
- Liiley SH, Levine GI. Management of hospitalized patients with type 2 diabetes mellitus. *American Family Physician.* 1998;57(5):1079-88.
- Fitzner K, Greenwood D, Payne H, Thomson J, Vukovljak L, McCulloch A, et al. An assessment of patient education and self-management in diabetes disease management—two case studies. *Population health management.* 2008;11(6):329-40.
- Paul Aoun, Albrecht CR, Gambert SR. Diabetes mellitus: Present and future preventive strategies-part 1. *Clinical Geriatrics* 2005;13(6):30-7.
- Mensing C, Boucher J, Cypress M, Katie Weinger, Kathryn M, Barta P, Hosey G, Kopher W, Andra L, Betty L, Mangan M, Norman J, Tanja J, Yauk L, Wisdom K, Adams C. National standards for diabetes self-management education. *Diabetes care* 2005; 28(1):572-9.
- Iglay K, Hannachi H, Joseph Howie P, Xu J, Li X, Engel SS, Moore LM, Rajpathak S. Prevalence and co-prevalence of comorbidities among patients with type 2 diabetes mellitus. *Current medical research and opinion.* 2016;32(7):1243-52.
- Ducat L, Philipson LH, Anderson BJ. The mental health comorbidities of diabetes. *Jama.* 2014;312(7):691-2.
- Leung MY, Carlsson NP, Colditz GA, Chang S. Risk Of Diabetes With Or Without The Presence Of Other Obesity-Related Comorbidities (Hypertension, Stroke And Coronary Heart Disease): National Health And Nutrition Examination Survey, 2007-2010. *Value in Health.* 2015;18(3):151.
- Merger SR, Kerner W, Stadler M, Zeyfang A, Jehle P, Müller-Korbsch M, Holl RW, DPV Initiative, German BMBF Competence Network Diabetes Mellitus. Prevalence and comorbidities of double diabetes. *Diabetes Res Clin Pract.* 2016;119:48-56.
- Pantalone KM, Hobbs TM, Wells BJ, Kong SX, Kattan MW, Bouchard J, Yu C, Sakurada B, Milinovich A, Weng W, Bauman JM. Clinical characteristics, complications, comorbidities and treatment patterns among patients with type 2 diabetes mellitus in a large integrated health system. *BMJ Open Diabetes Res Care.* 2015;3(1):e000093.

Cite this article as: Devarapalli P, Mehdiratta N, Mamillapalli S, Akella S. Patient education in management of diabetes with medical comorbidities: an interventional study in South-eastern India. *Int J Sci Rep* 2019;5(1):24-8.