International Journal of Community Medicine and Public Health
Kudachi H et al. Int J Community Med Public Health. 2020 Aug;7(8):3160-3165
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20203394

Original Research Article

Comparative study of diabetic self-care management "educational intervention among family members on diabetic individuals", in rural field practicing area, a cluster randomization study

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Received: 27 May 2020
Revised: 06 July 2020
Accepted: 07 July 2020

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ABSTRACT

Background: To achieve optimal blood glucose levels educating diabetic patient alone may not be sufficient but the entire family must have access to proven preventive measure. The present study was done to assess the outcome of self-care management practices educational intervention among family member on diabetic individuals.
Methods: This prospective interventional cluster randomization study was conducted in rural field practice area, attached to department of Community medicine of Hassan Institute of Medical Sciences. Clusters were formed among the population based on the sub-centres and four clusters were randomly selected. Two clusters were assigned for family intervention and two clusters with individual intervention.
Results: Consuming 5 or more serving of fruits and vegetables for more than 5 days a week, increased in the FIC after education and the difference in increase was statistically significant ($p<0.02$). Physical activity with specific exercise sessions increase after the intervention and the increase was statistically significant in the FIC ($p<0.08$). Adherence to medication and testing attained statistically significant increase in the FIC. Also washing of foot daily with luke-warm water increase was statistically significant in both the Intervention Clusters ($p<0.0002$). On subsequent follow up there was a significant improvement in BMI of family intervention cluster ($p<0.03$) as compared to individual intervention cluster.
Conclusions: Health education intervention activity at the community involving the supportive members of the family can drive-in to bring about behavioural change in the desired direction.

Keywords: Diabetes mellitus, Family based intervention, Health education, Self-care management

INTRODUCTION

A total of 56 million deaths occurred worldwide during 2012. Of these, 38 million were due to non communicable diseases (NCDs).[1] The leading causes of NCD deaths were cardiovascular diseases (46.2%), cancers (21.7%), respiratory diseases, including asthma and chronic obstructive pulmonary disease (10.7%) and diabetes (4%). However, in India NCDs accounts for 53% deaths. Based on available evidence cardiovascular diseases (24%), chronic respiratory diseases (11%), cancer (06%), and diabetes mellitus (02%), and mental illnesses are the leading cause of mortality in India.[2]

The prevalence of diabetes mellitus is growing rapidly worldwide and is reaching epidemic proportions. It is estimated that there are currently 285 million people with diabetes worldwide and this number is set to increase to 438 million by the year 2030.[3] Diabetes is characterized by a long asymptomatic phase (ranging from 4 to 7 years)

between the actual onset of hyperglycemia and clinical diagnosis which explains the fact that by the time the patient meet the physician and diagnose the condition the complication must have initiated in them as a consequence to poor awareness and lack of regular screening.[4] Sub-optimal treatment, inadequate health education and follow up leads to the poor glycemic control and increase the toll of unnecessary disabilities among the people.[5] It is therefore essential to provide comprehensive services including health education regarding the self-management of the disease to prevent the debilitating complications which in long term reduces the enormous financial burden on the health care system.[6]

Self-care in the form of adherence to diet and exercise, drugs and blood glucose monitoring and foot care, is crucial to reduce complications.[7] Interventions to promote better self-management have reported improvements in blood glucose control and Improved glycemic control is highly advantageous in preventing the long-term complications of and type 2 diabetes as demonstrated by various studies.[8,9]

Diabetes self-management education is teaching people to manage their diabetes has become an important part of the clinical management of diabetes. However the process is often complex, demanding and not given much emphasis at professional level because of the time constraint of clinicians and as a patient to achieve their best possible level of glycemic control requires the utilization of appropriate therapy, appropriate monitoring, and comprehensive instruction in diabetes self-management.[9] Moreover, to follow the comprehensive instruction social support by the care providers at home is required.[10] So, to achieve optimal blood glucose levels we believe that educating diabetic patient alone may not be sufficient. With this background present study was done to assess the outcome of diabetic self-care management educational intervention among family member on diabetic individuals.

METHODS

This prospective interventional cluster randomization study was conducted in rural field practice area, attached to department of Community medicine of Hassan Institute of Medical Sciences during 2017 to 2018. The rural field practice area has a total population of 28,172 and seven sub-canters, each with an average population of 3766. The number of participants to be enrolled in the study and calculated using the formula $n= (z \alpha+z\beta)2\times(SD)\times2/d$ with SD of 4 and d of 1.6 was 98 rounded of to 100. Clusters were formed among the population based on the sub centers and four clusters were randomly selected. Two clusters were assigned for family intervention and two clusters with individual intervention. We recruited 25 known diabetics in the age group 30 to 60 years who were on treatment for more than 2 years and willing to participate in the study in each cluster in consultation with the health workers (axillary nurse midwife and accredited social health activist) of the area. All Pregnant and lactating women, seriously ill diabetic patients with comorbidities like sever deafness, blindness and dementia and bed ridden patients were exclude from the study. After obtaining verbal consent, consecutive diabetic patients were interviewed regarding diabetes self-care practices and related sociodemographic variables.

A structured questionnaire on diabetic self-care practice was modified to this study context and it was translated into the kannada language, pretested, and used.[9,10]

This questionnaire assessed the baseline frequencies which diabetics followed in the last 7 days. Health education for diabetes self-care management was designed considering five domains which included diet, exercise, adherence to medication, adherence to blood sugar testing and foot care. The dietary domain covered a total of three items, namely, consumption of fruits and vegetables (each serving consisting of a bowl accommodation 100 g), frequency of consuming fat-rich foods, and consumption of sugar containing Beverages. The exercise domain covered two items of work-related and leisure-time physical activity (half an hour of activity increasing the heart rate). Adherence to medication and blood sugar testing covered one item each (following prescribed schedule). Similarly, foot care covered three items: washing of foot daily, walking on bare foot, examining for warning sign (loss of sensation and ulcer). Then health education was delivered to all the family members including diabetic individual in the family intervention clusters (FIC) and to the diabetic only in the individual intervention clusters (IIC). In the dietary domain, appropriate self-care was ascertained if the patient had followed the self-care for equal-to or equal-to or more than five days in a week. The exercise domain appropriate self-care was ascertained if the patient had followed the self-care measures for more than five days in a week during leisure-time and work-related physical activity.

Adherence to medication was measured as following prescribed medications on all days in a week and to blood sugar estimation if diabetic patient had checked their blood sugar once in a month. To assess foot care, appropriate response to self-care was ascertained if the patient had followed the self-care measures. And in both study groups follow up was done for repeated administration of health education, once in four months for one-year during study period.

The baseline data collected was compared with the data collected during forth visit among the study participants. Data were entered in Microsoft Excel and analyzed. Descriptive statistics were used for categorical variables. Proportions of patients following selected self-care domains were presented as percentages and compared applying chi square test. The study was approved by the institutional ethics committee.

RESULTS

Our study constituted of subjects in the age group of 35 to 60 years where 76% and 64% were above 51 years of age in both the family intervention clusters and individual intervention cluster. Women constituted 72% and 64% in each of the intervention clusters and majority 64% and 62% were housewife's by occupation with 56% and 70% being educated, also 28% and 34% belonged to lower socioeconomic class in each of the intervention clusters. (Table 1).

Table 1: Distribution of sociodemographic profile of study subjects (n=50).

Variables	FIC	IIC
	N (%)	N (%)
Age in years		
35-40	3 (06)	01 (02)
41-45	3 (06)	06 (12)
46-50	6 (12)	11 (22)
51-55	15 (30)	19 (38)
56-60	23 (46)	13 (26)
Sex		
Male	14 ((28)	18 (36)
Female	36 (72)	32 (64)
Education		
Illiterate	21 (42)	15 (30)
Primary	10 (20)	12 (24)
Secondary	18 (36)	23 (46)
Degree	01 (02)	0 (00)
Occupation		
Farmer	11 (22)	14 (28)
Housewife	32 (64)	31 (62)
Others	7 (14)	05 (10)
Socioeconomic status		
Upper class	04 (08)	03 (06)
Upper middle class	11 (22)	06 (12)
Middle class	21 (42)	24 (48)
Lower middle class	08 (16)	09 (18)
Lower class	06 (12)	08 (16)

FIC: family intervention Cluster; IIC: individual intervention cluster.

Self-care practice

Diet

Before health education there were around 6% and 12% of the study participants in family intervention cluster and individual intervention cluster consuming 5 or more serving of fruits and vegetables for more than 5 days a week, this increased to 22% and 14% in each of the cluster after education at the end of year follow-up and the difference in increase was statistically significant in family intervention cluster ($p<0.02$). Also, consumption of food rich in fat was 18% and 22% in each of the FIC and IIC before the intervention and it decreased to 10% and 16% in each of this groups, respectively. Ninety percent of the participants in both the groups consumed sugar containing beverages for at least 5 days in a week and this did not change much even after the intervention. (Table 2)

Physical activity

Physical activity at work place was appreciated by 62% and 52% of individuals in FIC and IIC before the health education intervention which improved to 78% and 70% in each of the clusters and the improvement was statistically significant (FIC: $p<0.08$, IIC: $p<0.06$). Physical activity with specific exercise sessions were practiced by 22% and 18% of each of the intervention cluster which increase to 38% and 28% after the intervention and the increase was statistically significant in the FIC ($p<0.08$) (Table 2).

Adherence to medication and testing

Adherence to medication was appreciable with 92% and 96% in each of the intervention clusters which increased to 100% in both the intervention cluster and it was statistically significant in FIC ($p<0.04$). Similarly, adherence to testing was 86% and 98% in each of the intervention clusters and this attained statistically significant increase to 98% in the FIC (Table 2).

Foot care

Washing of foot daily with Luke-worm water was practiced by 68% and 76% of individuals in GIC and IIC which was practiced by all after the intervention and the increase was statistically significant in both the intervention clusters ($p<0.0002$). However, change in bare foot walking practice was not appreciated in either of the intervention clusters. But foot examination practice increased from 14% to 36% among FIC and 26% to 30% among IIC (Table 2).

Physical activity with specific exercise sessions were practiced by 22% and 18% of each of the intervention cluster which increase to 38% and 28% after the intervention and the increase was statistically significant in the FIC ($p<0.08$) (Table 2).

Washing of foot daily with luke-warm water was practiced by 68% and 76% of individuals in GIC and IIC which was practiced by all after the intervention and the increase was statistically significant in both the intervention clusters ($p<0.0002$).

Body mass index

BMI was categorized according to WHO BMI classification guidelines. It was found that majority 76% and 84% of the subjects in both the intervention clusters were in pre obese stage, before any intervention. On subsequent follow up there is significant improvement in BMI of family intervention cluster ($p<0.03$) as compared to individual intervention cluster (Table 3).

Table 2: Distribution of study subjects according to the self-care practices (n=50).

Self-care practice	Measurement units	FIC			IIC		
		Base Line	Follow-up	P value	Base Line	Follow-up	P value
		N (%)	N (%)		N (%)	N (%)	
Diet							
Ate five or more servings of fruits and vegetables (in days)	5 to 7	3 (06)	11 (22)	0.02	6 (12)	7 (14)	0.76
	0 to5	47 (94)	39 (78)		44 (88)	43 (86)	
Ate fat rich food (non vegetarian) (in days)	5 to 7	9 (18)	5 (10)	0.24	11 (22)	8 (16)	0.44
	0 to5	41 (82)	45 (90)		39 (78)	42 (84)	
Drank sugar containing Beverages (in days)	5 to 7	5 (10)	2 (4)	0.23	5 (10)	4 (8)	0.72
	0 to5	45 (90)	48 (96)		45 (90)	46 (92)	
Physical activity							
Physical activity at workplace (in days)	5 to 7	31 (62)	39 (78)	0.08	26 (52)	35 (70)	0.06
	0 to5	19 (38)	11 (12)		24 (48)	15 (30)	
Specific exercise session (in days)	5 to 7	11 (22)	19 (38)	0.08	9 (18)	14 (28)	0.2
	0 to5	39 (78)	31 (62)		41 (72)	36 (72)	
Adherence to medication (in days)	5 to 7	46 (92)	50 (100)	0.04	48 (96)	50 (100)	0.15
	0 to5	04 (08)	00 (00)		02 (04)	00 (00)	
Adherence to blood sugar testing	once in a month	43 (86)	49 (98)	0.02	49 (98)	48 (96)	0.5
	once in two month	7 (14)	1 (2)		1 (02)	2 (04)	
Foot Care							
Washing foot daily	Yes	34 (68)	50 (100)	0.0002	38 (76)	50 (100)	0.0002
	No	16 (32)	00 (00)		12 (24)	0 (00)	
Walking on bare foot	Yes	13 (26)	13 (26)	1	16 (32)	13 (26)	0.5
	No	37 (74)	37 (74)		34 (68)	37 (74)	
foot examination for Warning signs	Yes	14 (28)	18 (36)	0.39	13 (26)	15 (30)	0.72
	No	36 (72)	32 (64)		37 (74)	35 (70)	

FIC: family intervention Cluster; IIC: individual intervention cluster.

Table 3: Distribution of study subject according to body mass index (n=50).

BMI	FIC			IIC		
	Baseline	Follow-up	P value	Baseline	Follow-up	P value
	N (%)	N (%)		N (%)	N (%)	
18.5- 24.9	11 (22)	24 (48)	0.03	08 (16)	14 (28)	0.34
25-29.9	35 (70)	25 (50)		41 (82)	35 (70)	
30-34.9	03 (06)	01 (02)		01 (02)	01 (02)	
35-39.9	01 (02)	0 (00)		0 (00)	0 (00)	
>40	0 (00)	0 (00)		0 (00)	0 (00)	

FIC: family intervention Cluster; IIC: individual intervention cluster; BMI: body mass index.

DISCUSSION

The population in the rural health training centre area had diabetics. These diabetics were identified two groups were formed to understand if health education given to all the family member including diabetic had significant impact on self-care practices compared to the health education given to diabetic patient alone. Sommanavur et al in their study found that diabetes and its complications could be controlled by a combination of diet and exercise and Raithatha et al in their study found that 40% were doing regular exercise to achieve good health.[11,12]

Significant difference in self-care components of adherence to specific dietary practices, physical activity and foot care were not followed in the individual group as the family did not support because it is expensive and were not motivated. Moreover, women in the study depended on the male counterpart for their expenses and to move out of homes. Xu et al in their study reported that knowledge, social support, and provider patient communication affects self-care management among diabetics.[13] Which was appreciable in our study where consumption of 5 or more serving of fruits and vegetables for more than 5 days a week, was statistically significant

in family intervention cluster (FIC) ($p<0.02$) and physical activity with specific exercise sessions increased after intervention and the increase was also statistically significant in the FIC ($p<0.08$). Moreover, self-care practices such as dietary practice, physical activity can increase the insulin sensitivity especially among the overweight and obese, whereas foot care can help in early diagnosis of peripheral neuropathy and reduce development of foot ulcers and amputation. Interestingly, it was also found that there was significant improvement in BMI of family intervention cluster ($p<0.03$) as compared to individual intervention cluster. However, washing of foot daily with luke-warm water was practiced by 68% and 76% of individuals in FIC and IIC which was practiced by all after the intervention and the increase was statistically significant in both the intervention clusters ($p<0.0002$).

Adherence to drug prescription and blood sugar testing were appreciable in both the groups except for few who were newly diagnosed to be diabetic, as the patients are reminded about their sugar levels regulated by the easy to use and effective anti-diabetic medications by their respective health care providers during their monthly visits. Hu et al in their study among Hispanics found no significant changes in self-care practices among the family intervention group except the HBA1C.[14] This might be because of better education and socioeconomic structure in the control group whose family members were eager to understand the need among diabetes and might have offered the support much needed by the patients.

Flood et al in their home based diabetes self-management intervention with the attendance of family members in 39% of study participants, observed significant improvement in self-care practice with respect to healthful eating, physical activity of at least 30 minutes, checking feet and adherence to medication as recommended by the physician.[15] Which shows that, it is important family members of a diabetic patient understands the importance of adherence to diet, physical activity and foot care so as to motivate and monitor the diabetics for a better glycemic control, enabling patients to continue with the same or reduced dose of anti-diabetic medication.

Strengths of our study are, it is a cluster randomized study in a community with no loss to follow-up. Secondly health education involving the family members has made others in the family to actively contribute in practicing self-care by the diseased.

Limitations

The study participants were not blinded this could have affected the results as the spillover of information might have influenced the decision of the households. Information given by health provider (treating physician) might have differently influenced the outcome in both the intervention clusters.

CONCLUSION

Health education intervention activity at the community involving the supportive members of the family can drive in to bring out behavioural change in the desired direction which can assist in reducing the burden of clinical disease and its complication at large and add life to diabetic years lived.

ACKNOWLEDGEMENTS

Authors thank all the staff, to patients and family member who participated and shared their views and experiences for this study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Kudachi H, Gonibeedu V, Ramappa S, Muniswamy S. Comparative study of diabetic self-care management "educational intervention among family members on diabetic individuals", in rural field practicing area, a cluster randomization study. Int J Community Med Public Health 2020;7:3160-5.