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Mobile Phone-Based Education and Counseling to Reduce Stress Among Patients with Diabetes Mellitus Attending a Tertiary Care Hospital of India

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ABSTRACT

Background: Stress among diabetic patients is much more as compared to normal individuals. A delayed recognition of stress undoubtedly worsens the prognosis for survival for many diabetic patients. Hence, this study was planned to develop an intervention model for the reduction of stress among diabetic patients and to evaluate the developed intervention model in the proposed group.

Methods: This study was conducted in endocrinology outpatient department of a tertiary care hospital. Starting at random, the patients were allocated to control group and test group. Controls were given printed educational materials. Test group were counseled with intense lifestyle education using both printed materials and computers; they were contacted by telephones by the investigator every 3 weeks for 3 months and SMS were sent every week containing some educational tips.

Results: Mean age was 54 ± 11.5 years overall ranging from 30 years to 80 years. About two-third of participants were males with similar distribution in both the groups (intervention = 66%, control = 64%). Half (50%) of the participants lived in joint families, followed by nuclear families (40%). Most (83%) were married and with either graduate or above graduate education (n = 39%). No significant difference was observed in socio-demographic characteristics among both control and intervention groups ($P > 0.05$). The average stress scores were similar (18.9) at baseline for control and intervention arms. At 3-month follow-up, however, these scores reduced to 17.05 in the intervention arm while they increased to 20.7 in the control arm. At 3 months follow-up, higher proportion of stress reduction was seen in the intervention group.

Conclusions: Intervention in the form of intensive lifestyle education and phone calls and SMS significantly decrease their stress score. Mobile-based education has great potential to improve their mental status and increase patient-provider communication, and to decrease stress.

Keywords: Mobile phone-based education, SMS, stress

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INTRODUCTION

Diabetes mellitus (DM) is a global epidemic in the new millennium. The World Health Organization (WHO) has observed an apparent epidemic of diabetes that is strongly related to lifestyle and economic change to exceed 200 million over the next decade; mostly with type 2 DM, and all are at risk of the development of complications.[1]

Diabetes and its complications pose a major threat to public health resources, and WHO has projected the maximum increase in diabetes would occur in India.[2]

It is estimated that the prevalence of diabetes will rise to 5.5% in 2025 as compared to 4% in year 1995.[2] The total direct cost for diabetes management has doubled from 1998 to 2005.[3] Therefore, prevention is important both on monetary and human matters. There is an increasing amount of evidence that the patient education is the most effective way to lessen the complications of diabetes and its management.[4]

Recently mobile phones as a new delivery system can provide medical recommendations and prescriptions at the appropriate time and to accommodate for patients' behavioral changes.[5] Mobile-based education and counseling is an important way of encouraging better provider-patient communication and will undoubtedly increase its application for improving health status of patients with chronic diseases. Stress among diabetic patients is much more as compared to normal individuals. A delayed recognition of stress undoubtedly worsens the prognosis for survival for many diabetic patients. An attempt was made among diabetic patients for reduction stress attending a tertiary care hospital with following objectives:

1. To develop an intervention model for the reduction of stress among diabetic patients
2. To evaluate the developed intervention model in the proposed group.

METHODS

It was a randomized controlled trial conducted over a period of 6 months that is, October 1, 2012 to March 31, 2013 after clearance by institutional ethics committee. The diabetic patients who attended the endocrinology outpatient department (OPD) of a tertiary care hospital of India, during November 2012 were included in the study. Patients aged 30 years and above, and on treatment for diabetes for at least 3 months, were included in the study. Patients having gestational diabetes and major psychiatric disorders were excluded both from the study and control group as these have been identified as potential confounding factors. The prospect of this study was for reducing stress and which require patient compliance and co-operation, so these two groups were excluded.

On an average, 5–6 respondents were interviewed per day; endocrinology OPDs are held 5 days a week. Considering the time and feasibility of the study, 100 subjects were included in the study (calculated through convenience sampling, i.e. 4 weeks × 5 days × 5–6 subjects per day = 100). Starting at random, 50 patients were allocated to test group and 50 patients to control the group.

The study subjects were interviewed using a predesigned, pretested, and semi-structured questionnaire. The stress score adapted in the questionnaire was Cohen's Perceived Stress Scale, which contains 10-item about the feelings and thoughts during the past month. Each item was rated on a 5-point scale ranging from never (0) to almost always (4). Positively worded items are reverse scored, and the ratings are summed, with higher scores indicating more perceived stress. Scores around 13 were considered average, and the patients were divided accordingly.[6]

The prospect of this study for the reduction of stress among diabetic patients was explained to the participants. Collection of data were done in a friendly atmosphere after obtaining informed consent. Starting at random, the patients were allocated to control group and test group. Controls were given printed educational materials. Test group were counseled with intense lifestyle education using both printed materials and computers. Then an SMS containing some educational tips to decrease stress was sent every week to test group. They were contacted by phone calls by the investigator in every 3 weeks for 3 months by telephone by investigator and asked about their stress and counseled if required. All patients were motivated by investigator with the help of an endocrinologist to come for follow-up at 3 months.

The information thus collected were processed and analyzed using SPSS v20.0 software (IBM Corp., Armonk, NY) and wherever necessary through manual calculation. Independent *t*-test was done for comparison of continuous data between control and intervention groups, and Chi-square test was for categorical data between these groups.

RESULTS

The study included 100 patients aged 30 years and above, and on treatment for diabetes for at least 3 months, was included in the study. They were divided into the control group and intervention group and followed-up at 3 months. After 3 months, total 55 patients (control = 21, intervention = 34) came for follow-up. It became difficult to track the patients for follow-up. Data so obtained were analyzed and interpreted accordingly [Table 1].

Mean age was 54 years (standard deviation = 11.5) overall ranging from 30 years to 80 years. About two-third of participants were males with similar distribution in both the groups (intervention = 66%, control = 64%). Half (50%) of the participants lived in joint families

followed by nuclear families (40%). Most (83%) were married and with either graduate or above graduate education (n = 39%). No significant difference was observed in socio-demographic characteristics among both control and intervention groups [Table 2].

Self-reported stress was assessed among DM patients. At baseline, about 78% had higher than average stress scores meaning high stress while only 1% had the least stress score of much less than average with similar distributions throughout the scores. At 3 months follow-up, this proportion was reduced to less than half (46%) for higher than average stress scores; higher proportion of reduction was seen in the intervention group [Figure 1].

The average stress scores were similar (18.9) at baseline for control and intervention arms. At 3 months follow-up, however, these scores reduced to 17.05 in the intervention arm while they increased to 20.7 in the control arm [Figure 2].

The error bar shows a significant difference of perceived stress scores between control and intervention group at follow-up.

DISCUSSION

It was observed in our study, at baseline, 78% had higher than average stress scores. The average stress scores were

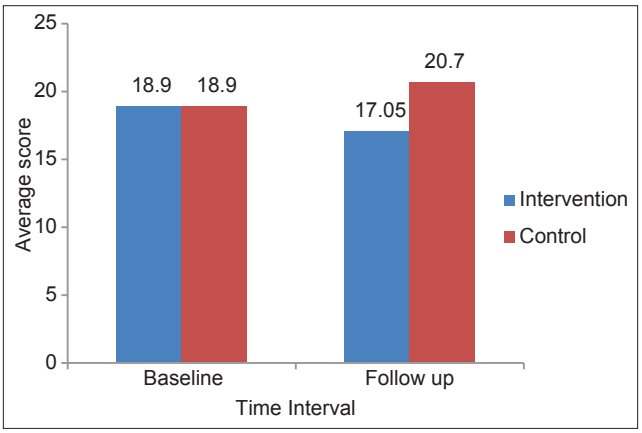

Figure 1: Perceived stress scores after 3 months

Table 1: Socio-demographic data among study population

Variables	Control group	Intervention group	*P*
Age	56±10	52±12	0.073
Sex (%)			
Male	33 (66)	32 (64)	0.833
Female	17 (34)	18 (36)	
Education (%)			
Graduates or more	15 (30)	24 (48)	0.065
Less than graduates	35 (70)	26 (52)	
Marital status (%)			
Married	41 (82)	42 (84)	0.79
Single including divorcee, widow	9 (18)	8 (16)	
Type of family (%)			
Joint	25 (50)	32 (64)	0.157
Nuclear including broken	25 (50)	18 (36)	

Age – Independent *t*-test; Sex, education, marital status, type of family – Chi-square test

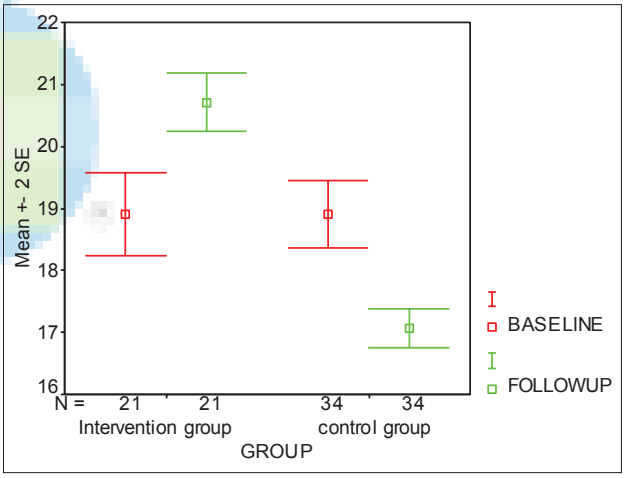

Figure 2: Error bar showing differences in perceived stress scores

Table 2: Perceived stress scores at baseline

Perceived stress score baseline	Overall (n=100) (%)	Control (n=50) (%)	Intervention (n=50) (%)	Significance
Much lower than average	1 (1)	1 (2)	0	0.70
Slightly lower than average	6 (6)	4 (8)	2 (4)	
Average	12 (12)	6 (12)	9 (18)	
Slightly higher than average	46 (46)	22 (44)	24 (48)	
Much higher than average	32 (32)	17 (34)	15 (30)	
Perceived stress score follow-up	**Overall (n=55) (%)**	**Control (n=21) (%)**	**Intervention (n=34) (%)**	**Significance**
Much lower than average	0 (0)	0 (0)	0 (0)	0.001
Slightly lower than average	3 (5.5)	0 (0)	3 (8.8)	
Average	6 (10.9)	0 (0)	6 (17.6)	
Slightly higher than average	30 (54.5)	9 (42.9)	21 (61.8)	
Much higher than average	16 (29.1)	12 (57.1)	4 (11.8)	

Chi-square test

similar (18.9) at baseline for control and intervention arms. At 3 months follow-up, this proportion was reduced to 46% for higher than average stress scores; higher proportions seen in the intervention group. At 3 months follow-up, however, these scores reduced to 17.05 in the intervention arm while these increased to 20.7 in the control arm. This clearly indicates that talking with health personnel and getting some health messages has an impact in reducing stress among patients.

In a study by Zolfaghari *et al.* among 77 Iranian patients with Type 2 diabetes, telephone interventions were applied by the researcher for 3 months. SMS group that received message daily for 12 weeks and telephone follow-up group were contacted twice weekly in 1st month and then once weekly for second and 3rd month. This study suggests both telephone follow-up intervention and using SMS of personal cellular phone improved glycated hemoglobin levels remarkably after 3 months in type 2 diabetic patients.[7]

Nundy *et al.* pilot-tested the mobile phone-based intervention on 18 black adults with Type 2 diabetes for 4 weeks, followed by in-depth, individual interviews with each participant. Based on the interviews, the constant, daily communications reduced denial of diabetes and reinforced the importance of self-management. They responded positively to questions about self-management and their confidence increased in self-care.[8]

Intensive lifestyle education and counseling about stress management along with constant touch with patients by phone calls and SMS reminders is definitely helpful in reducing their stress.

CONCLUSIONS

In patients with DM, increasing stress is of great concern as it increases complications. Intervention in the form of intensive lifestyle education and phone calls and SMS by the health provider significantly decrease their stress score. Mobile-based education by the health provider has great potential to improve their mental status and increase patient-provider communication, and to decrease stress.

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