

ORIGINAL ARTICLE

Lifestyle, dietary and treatment adherence pattern of uncontrolled diabetics in coastal Karnataka, India

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Abstract

Background: Diabetes Mellitus shows a rising trend in India, driven by a combination of factors like sedentary lifestyle, unhealthy diet and tobacco use. The cornerstone for interventions to reduce this is lifestyle modification. **Aim & Objective:** This study aims to determine lifestyle behaviours among uncontrolled diabetics in rural South India. **Settings and Design:** This is a pilot study conducted as part of a community trial which enrolled uncontrolled diabetics (Glycosylated haemoglobin, HbA1C of 7% or more) selected from baseline survey of 2 RBS readings. **Methods and Material:** The sociodemographic details, lifestyle habits and treatment adherence of eligible participants were recorded with a validated questionnaire. **Statistical analysis used:** Data was compared among 2 groups of poor glycaemic control using Chi square test. **Results:** There was no significant association of age or gender with HbA1C levels. Majority were non-smokers, non-alcoholics and did not exercise. Higher proportions of those with hospital admissions, longer duration of disease and less frequent check-ups had poor control; but these were not statistically significant. Dietary control was inadequate. However, there were no significant association of dietary habits with poor control. **Conclusions:** Although overall adherence to medication and follow up was satisfactory, lifestyle modification is not being sufficiently followed.

Keywords

Lifestyle; Glycaemic Control; Rural; Diabetes; Surveys and Questionnaires; Tobacco Use

Introduction

Around 41 million people (71% of deaths) die globally due to Noncommunicable diseases each year. 15 million deaths due to NCDs occur between 30-69 years, of which 85% premature deaths occur in the low- and middle-income countries, including India. The most common NCD deaths are due to cardiovascular diseases, followed by cancers, respiratory diseases and Diabetes Mellitus. (1) There are four shared risk factors that increase the risk which include tobacco use, physical inactivity, harmful use of alcohol and unhealthy diet. Therefore, one of the

cornerstones for interventions to reduce the burden of NCDs is lifestyle modification. (1,2)

Lifestyle management encompasses several measures like diabetes self-management education (DSME) and self-management support (DSMS). It is important for both the care providers and the patients to focus on assessment of lifestyle in the initial comprehensive evaluation. Each person with diabetes should engage actively in education, self-management and planning in nutrition including development of individualized eating plan. Similarly, body weight management is important especially for diabetics who are either overweight or obese. Smoking heightens the risk of CVDs in DM and smoking cessation is associated

with amelioration of metabolic parameters along with reduction of blood pressure. (3, 4)

Aims & Objectives

1. To assess the lifestyle pattern including exercise and food habits of uncontrolled diabetics of village.
2. To determine the pattern of health check-up and adherence to medications among them

Material & Methods

This is part of a larger study which was a community trial to reduce the burden of Non communicable diseases (hypertension and diabetes) in Karnataka. The intention was to introduce life style modification and physical activity intervention and compare it with control village.

As this was a baseline profile of a larger community intervention trial, the sample size was calculated depending on the hypothesis that planned lifestyle modification with regular drug intake can lead to a reduction of Hb1Ac expected at 0.6% with standard deviation of around 0.1-0.2%. Thus, the sample size was calculated to be 30 in each village. In this publication, we restrict ourselves to the baseline data among the uncontrolled diabetics to understand the interplay of the lifestyle and other factors among them. The eligible population of 2 villages enrolled with an average distance of 12 kms in coastal Karnataka was included.

The enrolment was done for all the patients, irrespective of age, diagnosed with Type 2 Diabetes Mellitus who were on treatment but with Hb1Ac more than 7%, selected from a baseline survey of 2 RBS readings (average was considered). The exclusion criteria were participants with malignant hypertension, secondary hypertension, pregnancy or patients with severe disability, participants who are confused or comatose and unable to follow instructions. 67 study subjects who fit our selection criteria were selected by systematic random sampling using the family folders maintained in the subcentres.

The baseline perception, food habits, treatment adherence, hospital stay etc. of the eligible participants were recorded using a semi-structured and validated questionnaire after obtained informed consent as well as ethical clearance from the institutional ethics committee.

Statistical analysis- Mean HbA1C levels with standard deviation was recorded and paired t test was used for comparisons between groups. Frequency of food intake, and physical activity was compared for control of diabetes (HbA1C levels) using Chi square test.

Results

Sociodemographic and health care details

Out of the 67 subjects, 32 (47.8%) had HbA1C between 7-9 whereas 35 (52.2%) had 10 and above. Majority were between 41 to 60 yrs (55.2%), females (71.6%), performed no exercise (88%), were non-smokers (97%), did not consume alcohol (97%), had hospital admissions in the past (92.5%), had regular monthly check-ups (53.7%), did

not miss tablets (76.2%), have had the disease since <5 yrs (61.2%) and did not have any complications (82.1%).

The high uncontrolled diabetics (Hb1Ac 10 and above) is seen particularly of age 41 to 60 years (56.7%) and the higher proportion is also among females (56.2%). However, there was no significant association of age or gender with HbA1C levels. (Table 1)

Significantly higher proportion of those performed exercise (87.5%) had high HbA1C of 10 or more, compared to those who did not exercise (47.5%). But uncontrolled diabetes in general is associated with no exercise. (Table 2)

Higher proportions of those with history of hospital admissions had higher uncontrolled diabetes (54.8%), but most had lesser than 2 days of admission. Similarly, higher proportion of those with >5 yrs disease (68.5%) and with history of complications (58.4%) were high uncontrolled diabetics with HbA1C of 10 or more; but none of these differences were seen to be statistically significant. The frequency of check-ups also differed wherein none of the patients with HbA1C > 10% had monthly check-ups whereas comparatively higher proportion of those with lower HbA1c had check-ups on a monthly basis, but this was again not statistically significant. (Table 3)

The food intake was haphazard and most with high sweet (100%) or sugar intake (55.6%) as extra intake (which is again excess carbohydrate intake) were seen to have higher glycaemic levels (HbA1C 10 and above). Hence, the higher uncontrolled diabetics ate both sugar and sweets excessively and never followed dietary restrictions. Salt restriction (79% consuming less than 2 spoons) was the only aspect followed by the majority. Also, fructose eating was low (overall only 32.8% had fruit consumption of 1 or more). However, there were no significant difference in the proportion of any of the dietary habits between the 2 groups of poor glycaemic control. (Table 4)

Discussion

Overall, out of those with uncontrolled diabetes which involved our study population, more than half had high HbA1C (10 and above). This proportion of uncontrolled diabetes having very poor glycaemic control was higher compared to another study wherein only 4% had HbA1C > 10% (5) and another study wherein only 24% subjects had a HbA1C above 8%. (6) A study in Kerala however, found up to 45% of subjects with HbA1C >9%. (7)

In the current study, higher proportion of females had poorer glycaemic control (Hb1Ac 10 and above) compared to males. This is in contrast with the study done in Kerala wherein females showed better control of their diabetes than males. (7) However, in the current study, gender or age were not found significant determinants for poor glycaemic control similar to other studies done in elsewhere in India. (8, 9, 10)

The proportion of diabetics who performed exercise was low (12%) in our study. This was similar to other studies

among diabetics which found high proportion (56%) of urban diabetics to be physically inactive. (11) However, community-based studies in general adult populations in rural areas have found the level of physical inactivity to be lower. (12, 13)

Overall prevalence of smoking and alcohol was low in the population. Proportion of smoking and alcohol use was higher among the high uncontrolled diabetics with HbA1C levels more than 10 in our study though not statistically significant. Similarly, positive association between smoking and diabetes have been found in community-based studies among diabetics. (8, 14)

In our study, overall, 76% were compliant to medications and gave no history of missing tablets. This is similar to the compliance rate seen in another study among diabetics in rural Tamil Nadu and Bangalore. (6, 15) However, although our study did not find association between compliance to medications with glycaemic control, the study in rural Tamil Nadu found that increase in compliance rate has been associated with better glycaemic control. (6) In our study we found that higher proportions of those with longer duration of disease had very high uncontrolled diabetes (HbA1 C 10 or more) compared to those with <5 years disease or those who are newly diagnosed but this was not statistically significant. This could be due to the fact that in our study, we have compared the proportions between the subcategories of those diabetics who have high HbA1C (7-9 and 10 or more) but not compared it with those who have achieved good glycaemic control. Similar to our study, longer diabetes duration has also been found to be associated with uncontrolled glycemia in other studies. (5, 6, 8, 10)

With respect to diet, overall, only 33% had fruit consumption of 1 or more per week. Similar to this, other studies have found that only small proportion of diabetic subjects had satisfactory dietary practice including consumption of 5 fruit/ vegetable servings per week (8) and unsatisfactory diet including less frequent fruit consumption has been shown to be associated with poor glycaemic control in several studies. (8, 14) Up to 56% were consuming salt rich foods like pickle/ papad, but only 21% consuming more than 2 spoons of salt per day. High Hb A1C of 10 or more was found in those who ate both sugar and sweets. However, we did not find statistical association between salt restriction or excessive sweet consumption with poor glycaemic control. Following the recommended diet plan by taking a salt restricted diet and no consumption or occasional consumption of sweets has been seen to be associated with better glycaemic control in other studies as well. (14, 15, 16)

Conclusion

Out of the uncontrolled diabetics, the high proportion of those with HbA1C of 10 or more is worrisome, and in addition majority of them are not following lifestyle

modifications including exercise or healthy eating plan. However, it is those components of healthy eating which were not practiced which needs to be specifically addressed; like decreasing the consumption of sweets or added sugars and increasing the consumption of fruits. Furthermore, the low proportion of the rural diabetics who are either smoking or consuming alcohol is encouraging. With respect to components of treatment and follow up, better practices are seen with majority of the subjects being adherent to medications and coming for monthly check-ups.

Recommendation

Based on the current study we recommend that lifestyle interventions among uncontrolled diabetics in rural areas should focus on dietary modifications more than other components. Also, we recommend further studies, probably population based interventional trials in larger sample to explore the type and mode of intervention in the form of dietary advice tailored to the rural diabetic population.

Limitation of the study

One of the limitations of the study is that the generalizability of the findings has to be interpreted cautiously keeping in mind that, this is a baseline pilot study among only the uncontrolled diabetics and we have not compared with the general population or with those diabetics who have achieved good glycaemic control.

Relevance of the study

Rural diabetics have different patterns of lifestyle compared to their urban counterparts. Low levels of smoking and alcohol is seen; hence the focus needs to be on addressing the unhealthy patterns of diet among them. This study sheds light on this, to increase focus on particular aspect of lifestyle management.

Authors Contribution

All authors have contributed equally.

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Tables

TABLE 1 AGE & GENDER DISTRIBUTION OF DIABETICS BASED ON HB1AC AT BASELINE (ORIGINAL)

HbA1C	7-9	%	10 and above	%	Total	p value
Age Group						
Up to 40	3	42.8	4	57.2	7 (10.5%)	0.782
41-60	16	43.2	21	56.7	37 (55.2%)	
61-80	13	56.5	10	43.5	23 (34.3%)	
Gender						
Male	11	57.9	8	42.1	19 (28.4%)	0.296
Female	21	43.8	27	56.2	48 (71.6%)	

TABLE 2 LIFESTYLE PATTERN OF DIABETICS BASED ON HB1AC (ORIGINAL)

HbA1C	7-9	%	10 and above	%	Total	P value
Exercise						
Yes	1	12.5	7	87.5	8 (11.9%)	0.033
No	31	52.5	28	47.5	59 (88.1%)	
Hours/week						
Up to 3	1	25	4	75	5 (62.5%)	0.407
>3	0	0	3	100	3 (37.5%)	
Smoking						
Yes	0	0	2	100	2 (3%)	0.169
No	32	49.2	33	50.8	65 (97%)	
Cigarettes/day						
Up to 2	0	0	2	100	2	1
3 or more	0	0	0	0	0	
Alcohol						
Yes	0	0	2	100	2 (3%)	0.163
No	32	49.2	33	50.8	65 (97%)	
Alcohol ml/week						
Up to 60	0	0	2	100	2	1
>60	0	0	0	0	0	

TABLE 3 HEALTH CHECKUP & TREATMENT ADHERENCE OF DIABETICS BASED ON HB1AC (ORIGINAL)

Hb1Ac	7-9	%	10 and above	%	Total	P value
Frequency of checkup						
Monthly	22	61.1	14	38.9	36 (53.7%)	0.112
Once in 6 months	10	52.6	9	46.4	19 (28.4%)	
Yearly	0	0	12	100	12 (17.9%)	
Hospital admission						
Yes	28	45.2	34	54.8	62 (92.5%)	0.133
No	4	80	1	20	5 (7.5%)	
No of days of admission						

<2	26	50	26	50	52 (84%)	0.08
2 or more	2	20	8	80	10 (16%)	
Missing tablets						
Yes	8	50	8	50	16 (23.8%)	0.837
No	24	47.1	27	52.9	51 (76.2%)	
Years since DM						
1st time	5	71.4	2	28.6	7 (10.5%)	0.152
<5 y	21	52.5	20	47.5	41 (61.2%)	
>5 y	6	31.5	13	68.5	19 (28.3%)	
Complications						
Yes	5	41.6	7	58.4	12 (17.9%)	0.64
No	27	49	28	51	55 (82.1%)	

TABLE 4 DIETARY PATTERN OF DIABETICS BASED ON HB1AC (ORIGINAL)

HbA1c	7-9	%	10 and above	%	Total	P value
Servings per week						
Pickles/ papad						
Yes	7	43.75	9	56.25	16 (23.9%)	0.712
No	25	49.01	26	50.99	51 (76.1%)	
Cooked grains/day						
Up to 5 bowls	19	55.88	15	44.22	34 (50.7%)	0.176
>5 bowls	13	39.39	20	60.61	33 (49.3%)	
Vegetables/day						
Up to 2 bowls	17	48.57	18	51.43	35 (52.2%)	0.89
>2 bowls	15	46.88	17	53.22	32 (47.8%)	
Fruits						
<1	18	40	27	60	45 (67.2%)	0.068
1 or more	14	63.63	8	36.37	22 (32.8%)	
Milk/day						
Up to 500mL	32	49.23	33	50.77	65 (97%)	0.169
>500mL	0	0	2	100	2 (3%)	
Nuts/legumes per week						
Up to 2 bowls	25	51	24	49	49 (73.1%)	0.378
>2 bowls	7	38.9	11	61.1	18 (26.9%)	
Sweets/day						
Up to 1	32	49.2	33	50.8	65 (97%)	0.169
>1	0	0	2	100	2 (3%)	
Oil spoons/day						
Up to 2	27	54	23	46	50 (74.6%)	0.079
>2	5	29.4	12	70.6	17 (25.4%)	
Sugar spoons/day						
Up to 2	28	48.2	30	51.8	58 (86.6%)	0.83
>2	4	44.4	5	55.6	9 (13.4%)	
Salt spoons						
Up to 2	27	50.9	26	49.1	53 (79.1%)	0.31
>2	5	35.7	9	64.3	14 (20.9%)	
Meat/week						
Not taking	0	0	0	0	0	0.99
Up to 5 bowls	17	48.5	18	51.5	35 (52.2%)	
>5 bowls	15	46.8	17	53.2	32 (47.8%)	