Dietary Habits and Drug Pattern Associated with Type 2 Diabetes Mellitus among Urban Population of Eluru City: A Cross-Sectional Study

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Abstract

Background: Diabetes mellitus is a highly prevalent and growing chronic disease affecting an estimated 415 million people globally in 2015, and is predicted to affect 642 million people by 2040. India has more than 69 million people with T2DM, and these numbers are expected to rise to 140 million by 2040. Diet constitutes a crucial aspect of the overall management of diabetes, which may involve diet alone, diet with oral hypoglycemic drugs, or diet with insulin. **Objectives:** 1. To identify the various dietary habits in relation to type 2 diabetes mellitus among adults in urban population of Eluru. 2. To study the drug pattern in diabetic individuals of the study population. **Materials and method:** This was a community based cross-sectional study conducted in the urban area of Eluru for a period of one year among 454 adults 30 years and above age group. The data was collected using a pretested semi-structured questionnaire by interview method. Results were analyzed and necessary statistical tests were applied. **Results:** Out of 454 study population 96 were diabetic individuals showing the prevalence of diabetes as 21.1%. Prevalence of diabetes was high (28.1%) among study subjects who were consuming rice as their staple diet ($p<0.05$). There was a statistical significant association ($p<0.05$) found between germinating seeds consumption and diabetes mellitus. **Conclusion:** Diabetic individuals should be encouraged to adhere to the strict dietary advice. All the individuals were advised to add the germinating seeds to their daily consuming diet. Simple dietary modifications like avoidance of junk foods will prevent or delay the onset of type 2 diabetes mellitus.

Key words: *Diabetes Mellitus, Dietary Habits, Drug Pattern, Urban*

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Background

Diabetes mellitus is a highly prevalent and growing chronic disease affecting an estimated 415 million people globally in 2015, and is predicted to affect 642 million people by 2040. Globally, diabetes accounted for 4.9 million deaths in 2014. India has more than 69 million people with T2DM, and these numbers are expected

to rise to 140 million by 2040, and an almost half of them remain undiagnosed.[1] Over the past three decades, diabetes has become a major cause for morbidity and mortality affecting the youth and middle aged and this is alarming as this could have adverse effects on the nation's economy.[2] Moreover, Asian Indians have one of the highest incidence rates of pre-diabetes and diabetes among all major ethnic groups, and the conversion from pre-diabetes to diabetes occurs more rapidly in this population.[3]

In recent decades, with nutritional transitions, men and women around the globe have experienced excess body weight gain due to changes in dietary patterns and decreased physical activity levels accompanied by increased diabetes incidence and mortality.[4] Dietary Habits are the habitual decisions of individuals or group of people regarding what foods they eat. Proper dietary choices require the consumption of vitamins, minerals, carbohydrates, proteins and fats. Dietary habits and choices play a significant role in human health.[5] Along with urbanization and economic growth, many countries have experienced dietary changes favoring increased caloric consumption.[6] Economic growth and environmental transitions have led to drastic changes in food production, processing, and distribution systems and have increased the accessibility of unhealthful foods.[7]

Another characteristic of nutrition transition is increased refinement of grain products. Milling and processing whole grains to produce refined grains such as polished white rice and refined wheat flour reduce the nutritional content of grains, including their fiber, micronutrients, and phytochemicals.[8] Diet is one of the major factors now linked to a wide range of diseases including diabetes. The amount and type of food consumed is a fundamental determinant of human health. Diet constitutes a crucial aspect of the overall management of diabetes, which may involve diet alone, diet with oral hypoglycemic drugs, or diet with insulin.[9] There is a need to find out the lifestyle factors like dietary habits associated with diabetes mellitus to halt its progression in the community.

Objectives

1. To identify the various dietary habits in relation to type 2 diabetes mellitus among adults in urban population of Eluru.

2. To study the drug pattern in diabetic individuals of the study population.

Materials and Methods

This was a community based cross-sectional study conducted in the urban health centre area of Alluri Sitarama Raju Academy of Medical Sciences (ASRAM), Eluru for a period of one year from May 2013 to April 2014 among adults 30 years and above age group. This urban health centre area has 2487 households with 11,065 population which was divided into 6 areas i.e Ashoknagar, Ameenapeta, Yetigattu, Mothevari thota, Harijana peta and Pathebad. There were 4536 individuals 30 years and above age group in the urban health centre area.

Sample size calculated was 454 individuals 30 years and above age group in the urban health centre area using formula $N=4PQ / L^2$ with P equal to 19.5 per cent taken from ADEPS study[10] with allowable error (L) equal to 20%. 412 was the sample size estimated which is added with another 10% sample to make the sample more representative. Systematic random sampling method was used for the collection of sample in this study. The data was collected using a pretested semi-structured questionnaire. A pilot study was conducted and tested for the appropriateness of study questionnaire and the actual study was started after making necessary corrections and advises in it. Importance of the study was explained and an informed consent was taken from all the study participants before data collection and the study was approved by Institutional Ethics Committee. The data was collected by interview method.

Pregnant women, actually ill subjects and who are not willing to give consent were excluded from the study. All data collected was entered and analyzed using the Microsoft Office Excel 2007 and necessary statistical tests like simple proportions and chi square tests were applied for the categorical analysis of variables. $P \leq 0.05$ was considered as statistically significant.

Results

Table 1: Dietary habits in relation to Diabetes Mellitus in the study population

Dietary habits	DM present n (%)	DM absent n (%)	Total N (100%)	p-value
Food habits				
Vegetarian	6 (16.7)	30 (83.3)	36 (7.9)	0.493 ns
Mixed vegetarian	90 (21.5)	328 (78.5)	418 (92.1)	
Staple diet				
Rice	75 (28.1)	192 (71.9)	267 (58.8)	<0.0001 s
Wheat	1 (11.1)	8 (88.9)	9 (2)	
Mixed	20 (11.2)	158 (88.8)	178 (39.2)	
Germinating seeds intake				
Yes	8 (10.8)	66 (89.2)	74 (16.3)	0.017 s
No	88 (23.2)	292 (76.8)	380 (83.7)	
Preference of oil				
Yes	82 (24)	260 (76)	342 (75.3)	0.01 s
No	14 (1.3)	98 (99.7)	112 (24.7)	
Per capita oil consumption per month				
<0.5 kg	1 (5.6)	17 (94.4)	18 (3.9)	0.43 ns
0.5 – 0.75 kg	50 (21.6)	181 (78.4)	231 (50.9)	
0.75 – 1 kg	28 (22)	99 (78)	127 (28)	
>1 kg	17 (21.8)	61 (78.2)	78 (17.2)	
Frequency of food intake per day				
< 2 times	14 (15.6)	76 (84.4)	90 (19.8)	0.002 s
3 times	55 (18.8)	237 (81.2)	292 (64.3)	
4 times	21 (38.9)	33 (61.1)	54 (11.9)	
> 5 times	6 (33.3)	12 (66.7)	18 (4)	
Leafy vegetables per week				
Never	3 (20)	12 (80)	15 (3.3)	0.47 ns
1 - 3 times	92 (21.6)	334 (78.4)	426 (93.8)	
>3times	1 (7.7)	12 (92.3)	13 (2.9)	
Chicken or Meat intake per week				
Never	6 (16.7)	30 (83.3)	36 (7.9)	0.31 ns
1 - 3 times	83 (20.9)	314 (79.1)	397 (87.5)	
>3times	7 (33.3)	14 (66.7)	21 (4.6)	
Junk food consumption per week				
Never	5 (11.4)	39 (88.6)	44 (9.7)	< 0.0001 s
1 - 3 times	21 (8.9)	215 (91.1)	236 (52)	
>3times	70 (40.2)	104 (92.3)	174 (38.3)	
DM-Diabetes Mellitus; p-probability; n-number; s-significant; ns-non-significant				

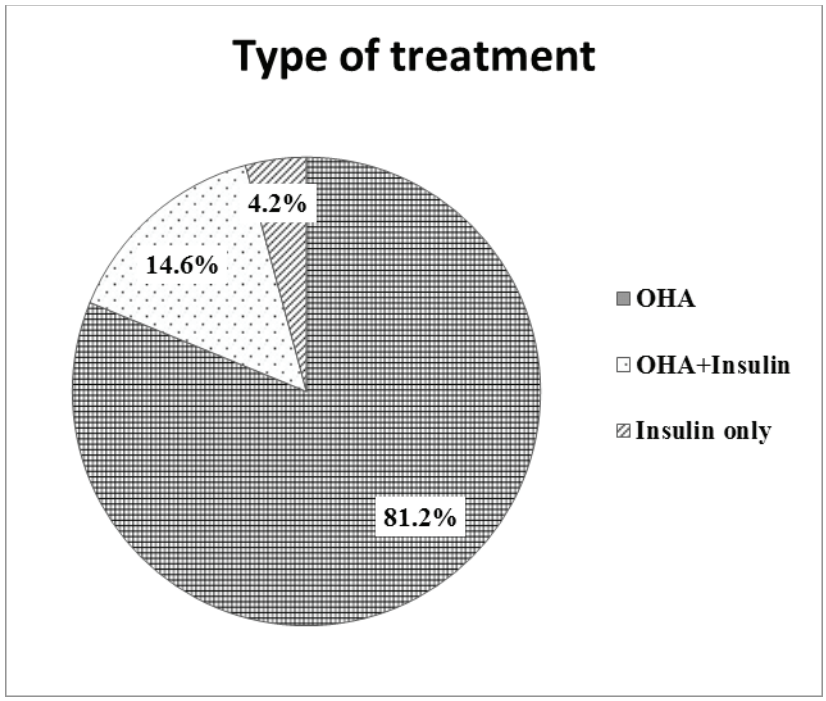

Figure 1: Distribution of diabetic individuals by the type of drug treatment

Figure 1 shows that 81.2% of the diabetic subjects were taking oral hypoglycemic drugs (OHA), 4.2% were completely dependant on insulin alone and 14.6% were taking combination of both oral hypoglycemic drugs and insulin.

Discussion

In the present study, out of 454 study population 96 were diabetic individuals showing the prevalence of diabetes as 21.1%. In the present study 48.9 percent of the study population were males and 51.1 percent were females. Majority of the study subjects belongs to 41 to 50 years age group i.e 33.5%. In the present study, 21.5% of prevalence of diabetes was seen among mixed vegetarians and 16.7% were from vegetarians and the association was not statistically significant ($p>0.05$). 28.1% prevalence of diabetes was observed in the individuals whose staple diet is rice and only 11.2% was seen among mixed diet intake persons and the association was significant ($P<0.0001$). This finding was correlated with the Ferreira SR et al.[11] which observed that high amount of carbohydrate diet and deleterious dietary pattern associated with diabetes mellitus.

In the present study the prevalence of diabetes was 24% among the study population who are having preference of oil in their diet. There was 1.3% prevalence of diabetes in the study population who did not prefer oil in their diet. There was a significant association ($p<0.05$) found between preference of oil in diet and diabetes. The prevalence of diabetes was 23% among the study population who are having per capita consumption of more than one kg of oil per month and it was 5.6% among who are consuming less than 0.5 kg per month. There was no statistical significant association ($p>0.05$) found between quantity of oil consumption and diabetes mellitus. This finding was contrary to the study done by Perry IJ[12] which revealed the direct relation with amount of oil consumption and diabetes.

The prevalence of diabetes was 23.2% among the study population who are not consuming germinating seeds and it was 10.8% in the study subjects who were taking germinating seeds and there was an association ($p=0.017$). This was in accordance with the study done by Villegas R et al.[13] in the Shanghai Women which showed an inverse association between legumes intake and type 2 diabetes mellitus. In the present study the prevalence of diabetes was 21.6% in the study population who are consuming leafy vegetables one to three times per week and it was 20% in the study population who are not consuming leafy vegetables and there was no

association. Similar findings are seen in the study done by Montonen J et al.[14]

Majority of the study population that is 64.3% were taking small and large quantities of food 3 times a day. The prevalence of diabetes was 38.9% among study subjects who were taking small and large quantities of food 4 times a day. There was an association between frequency of food intake and diabetes (p=0.002). In the present study prevalence of diabetes was 33.3% in the study population who were consuming chicken or meat more than 3 times per week and there was no association. Where as in a study by Van Dam R et al.[15] showed that frequent consumption of processed meat was associated with a higher risk for type 2 diabetes (RR 1.46, CI 1.14 –1.86 for ≥5/week vs. <1/month, P for trend <0.0001). Whereas Da Silva MS et al [16] in a study among French-canadian population showed that dairy intake is inversely associated with glycaemia.

In the present study prevalence of diabetes was high that is 40.2% in the study population who were taking junk food more than three times per week and there was a significant association (p<0.0001). This was in accordance with the study done by Gittelsohn J et al.[17] which found that high consumption of junk foods was associated with substantial increase in risk for diabetes. Van Dam R et al.[18] in a study among U.S men found that the western dietary pattern score was associated with an increased risk for type 2 diabetes (P<0.001). CUPS[19] revealed that the 'fast food culture' which has overwhelmed our cities and towns is also a major driver of the diabetes epidemic. The 'fast foods' that are fat and calorie rich and a majority of the immigrants in Indian cities depend on these unhealthy 'junk' foods, this may be a major factor in the rising prevalence of diabetes and cardiovascular diseases in urban slums. In the present study 81.2% of the diabetic patients were taking oral hypoglycemic drugs, 4.2% were completely dependant on insulin alone and 14.6% were taking combination of both oral hypoglycemic drugs and insulin. Study done by Yusuff KB et al.[20] in Nigeria depicted 70.3% of patients were on combination therapy and it highlighted the necessity of intensive control of blood glucose level.

The beneficial effect of the dietary pattern on diabetes mellitus and glucose metabolism in general and traditional food pattern was associated with a significant reduction in the risk of developing type-2 diabetes. The composition of diet is one of the best known dietary patterns for its beneficial effects on human health that may act beneficially against the development of type-2 diabetes, including reduced oxidative stress and insulin resistance.[9]

Conclusion

The present study was conducted among 454 urban population of Eluru in which the prevalence of diabetes was 28.1% among study subjects who were consuming rice as their staple diet and there was a statistical significant association (p<0.05) found in relation to diabetes mellitus. There was a statistical significant association (p<0.05) found between junk food consumption and diabetes mellitus. Diabetic individuals should be encouraged to adhere to the strict dietary advice. All the individuals were advised to add the germinating seeds to their daily consuming diet. Simple dietary modifications like avoidance of junk foods will prevent or delay the onset of type 2 diabetes mellitus. Regular monitoring of blood glucose levels and dietary counseling sessions especially for diabetic individuals should be conducted at the community level.

Ethical Clearance: taken from Institutional Ethics Committee

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Conflict of Interest: None

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