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Original Research Article

An epidemiological study on diabetes and its determinants among urban slum women of Rajkot city, Gujarat

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ABSTRACT

Background: India has the maximum number of diabetic patients in the world and this had given the country the dubious distinction of being the "diabetic capital" of the world. It is evident that the urban poor living in slums and slum like areas adopt a more urbanized lifestyle which places them at a higher risk for non-communicable diseases and have poor access to healthcare, partly related to their poor purchasing ability. Women slum dwellers are particularly vulnerable to negative health outcomes. The study was conducted with objectives to assess prevalence, determine factors and know treatment and control status.
Methods: This is a cross sectional study conducted among 405 slum women of age 35 years or more in Rajkot city. Interview, anthropometric measurements and selective clinical examinations i.e., blood sugar estimation were done for all participants.
Results: In present study, total 64 (15.80%) women were diagnosed with diabetes. A statistically significant association was found between body mass index, remaining busy in household work, walking, practicing healthy habits, parental history, sibling history and diabetes. Out of 64 women who were diagnosed with diabetes, about half i.e., 36 (56.25%) were aware of their diabetic status. Out of those aware, 29 (80.66%) were on treatment. Among those on treatment, about half i.e., 16 (55.17%) had their blood sugar under control.
Conclusions: Studied population high prevalence and inadequate control of diabetes.

Keywords: Diabetes, Slum, Women, Control status

INTRODUCTION

WHO have identified that most non-communicable diseases (NCDs) are the result of four particular lifestyle related behavioural risk factors like tobacco use, physical inactivity, unhealthy diet, and the harmful use of alcohol that lead to four key metabolic/physiological changes e.g., raised blood pressure, overweight/obesity, raised blood glucose and raised cholesterol levels.[1]

In developing countries, an estimated 863 million people live in slums, areas characterized by poor quality or informal housing, unhealthy living conditions, poverty, and marginalization from the formal health sector. Because slum dwellers represent about one third of the urban population of low- and middle-income countries, addressing intra-urban health inequities is an important challenge faced by cities in the developing world.[2] Slums are characterized by urbanization, a lack of urban planning, overcrowding, and exclusion from social, health, and other services.[3]

NCDs are the leading cause of death for women worldwide. They cause 65% of all female deaths, amounting to 18 million deaths each year.[4] Over 300

million people worldwide have diabetes, and approximately half of these are women. The health toll diabetes takes on women is significant, particularly in terms of diabetes-related complications such as heart disease. Women with type 2 diabetes are less likely than men to receive measures for prevention and control of cardiovascular disease.[5]

Objectives

Hence, this study was conducted to assess the prevalence of diabetes, determine factors responsible and know the status of awareness, treatment and control of diabetes among study participants diagnosed with diabetes

METHODS

This study was conducted in Rajkot city which is divided into 3 zones, central, east and west in which there are total 18 wards. Study was conducted during June 2016 to March 2017. Assuming 50% of slum women to be having diabetes, thus considering prevalence to be 50%, with 95% confidence interval and 10% allowable error, sample size of 400 was obtained with the formula of $N= 4pq/l^2$. So it was decided to study 405 slum women covering 135 from each of the three zones.

The study was conducted in one slum area from each zone making a total of three slum areas. One slum area was randomly selected from each of the three zones from the list given by Corporation authority. After surveying the boundaries of the slum area, each slum area was divided into three subareas and 45 women from each of these subareas, making 135 from each slum, were included in the study. For each subarea, first household was selected randomly from the centre of that area. Nearest door to the first house was taken as second house till the desired sample for that area was achieved. An enquiry regarding an eligible participant was made and included as designated participant in the study.

Women of age 35 years or more were included in the study while pregnant women, women unable to give satisfactory interview and/or unfit for examination were excluded from the study.

Data collection

Pre-tested and semi-structured questionnaire was used. The questionnaire was filled by personal interview in local language after taking written consent. Privacy was ensured and individual results were kept confidential.

Questionnaire included information regarding participant's socio-demographic profile like age, occupation, income and questions regarding risk factors. Anthropometric measurements (height and weight) and blood sugar measurement was also carried out.

Random blood sugar (capillary blood) was recorded using an automated glucometer (Dr. Morepen–GlucoOne). Subjects were classified into normal, pre-diabetes and diabetes categories. Diabetes was diagnosed and prevalence was estimated based on American Diabetes Association criteria.[6] Accordingly, any individual who had random blood sugar (RBS) ≥200 mg/dl or reported to be known diabetic was diagnosed as diabetic. Awareness status was determined based on cases that were known diabetic. The treatment status was defined as taking any pharmacological treatment for diabetes. Participants who were already diabetic and taking treatment were considered to have control if the RBS was <200 mg/dl.

Height was measured in centimetres by non-stretchable measuring tape with 0.5 cm accuracy. Weight was recorded in kilograms on digital weighing machine (Omron). Throughout the study same weighing machine was used. Body mass index (BMI) was calculated from the height and weight measurement. It is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2). Modified Prasad classification was used to categorise participants from class I to V based on their socio-economic status.

The data entry was done in Microsoft Office Excel 2007 and analysis was done by using Microsoft Office Excel 2007 and Epi info Software (Version 7.1.5.2) from CDC, Atlanta, U.S.A. Chi-square test was used to know the association of Diabetes with various factors. Ethical clearance was taken from the Institutional ethical committee, P.D.U. Government Medical College, Rajkot to conduct the study.

RESULTS

It is evident from Table 1 that 307 (75.80%) were having normal blood sugar measurement while 34 (8.40%) women were in pre-diabetes category. Total 64 (15.80%) women were diabetic out of which 36 (8.89%) women were known cases of diabetes whereas 28 (6.91%) women were newly detected cases.

Table 1: Distribution of participants according to their random blood sugar measurement (n=405).

Category (blood sugar in mg/dl)*	N	%
Normal (<140)	307	75.80
Pre-diabetes (140- 200)	34	8.40
Diabetes (≥200)	28	6.91
Known case	36	8.89
Total	405	100.00

Table 2 reveals that out of 405 women, 212 (52.35%) were having BMI of 25 or more among which 46 (21.70%) were diabetic. Statistically significant association is observed between BMI and diabetes.

Proportion of diabetes was highest, 32 (24.62%) in women who did not remain busy in household work throughout the day. This suggest role of lack of physical activity in diabetes. The relationship between remaining busy in household work and diabetes is statistically highly significant. Out of 405 women, 332 (81.98%) walked 1 kilometer or less and among them 60 (18.07%) women were diabetic. The association between walking and diabetes was statistically highly significant.

Table 2: Association of diabetes with various variables on applying Chi-square.

Particulars	Variables	Status of diabetes				Test of significance
		Normal N (%)	Pre-diabetic N (%)	Diabetic N (%)	Total N (%)	
Age groups (in years)	35-50	173 (80.09)	16 (7.41)	27 (12.50)	216 (53.33)	$\chi2=4.856$; df=2; p=0.088
	≥50	134 (70.90)	18 (9.52)	37 (19.58)	189 (46.67)	
	Total	307 (75.80)	34 (8.40)	64 (15.80)	405 (100.00)	
Socio economic class	I/II	50 (76.92)	3 (4.62)	12 (18.46)	65 (16.05)	$\chi2=1.947$; df=4; p=0.745
	III	109 (76.76)	13 (9.16)	20 (14.08)	142 (35.06)	
	IV/V	148 (74.75)	18 (9.09)	32 (16.16)	198 (48.89)	
	Total	307 (75.80)	34 (8.40)	64 (15.80)	405 (100.00)	
BMI	<25	160 (82.90)	15 (7.77)	18 (9.33)	193 (47.65)	$\chi2=12.407$; df=2; p=0.002
	≥25	147 (69.34)	19 (8.96)	46 (21.70)	212 (52.35)	
	Total	307 (75.80)	34 (8.40)	64 (15.80)	405 (100.00)	
Remain busy in household work	Yes	221 (80.36)	22 (8.00)	32 (11.64)	275 (67.90)	$\chi2=11.920$; df=2; p=0.003
	No	86 (66.15)	12 (9.23)	32 (24.62)	130 (32.10)	
	Total	307 (75.80)	34 (8.40)	06 (15.59)	405 (100.00)	
Walking (in kilometers)	≤1	243 (73.19)	29 (8.74)	60 (18.07)	332 (81.98)	$\chi2=7.914$; df=2; p=0.019
	>1	64 (87.67)	5 (6.85)	4 (5.48)	73 (18.02)	
	Total	307(75.80)	34 (8.40)	64 (15.80)	405 (100.00)	
Total sleep duration (in hours)	<6	21 (72.41)	2 (6.90)	6 (20.69)	29 (7.16)	$\chi2=0.658$; df=4; p=0.956
	6-9	198 (75.86)	22 (8.43)	41(15.71)	261 (64.44)	
	>9	88 (76.52)	10 (8.70)	17 (14.78)	115 (28.40)	
	Total	307 (75.80)	34 (8.40)	64 (15.80)	405 (100.00)	
Practicing healthy habits	Yes	22 (52.38)	4 (9.52)	16 (38.10)	42 (10.37)	$\chi2=18.199$; df=2; p=0.000
	No	285 (78.51)	30 (8.26)	48 (13.23)	363 (89.63)	
	Total	307 (75.80)	34 (8.40)	64 (15.80)	405 (100.00)	
Parental history (n=385)	Yes	34 (62.96)	1 (1.85)	19 (35.19)	54 (14.03)	$\chi2=18.025$; df=2; p=0.000
	No	256 (77.34)	31 (9.37)	44 (13.29)	331 (85.97)	
	Total	290 (75.33)	32 (8.31)	63 (16.36)	385 (100.00)	
Sibling history (n=387)	Yes	13 (43.33)	2 (6.67)	15 (50.00)	30 (7.75)	$\chi2=27.263$; df=2; p=0.000
	No	279 (78.15)	30 (8.40)	48 (13.45)	357 (92.25)	
	Total	292 (75.45)	32 (8.27)	63 (16.28)	387 (100.00)	

Out of all participants, 42 (10.37%) women were practicing healthy habits. Highest proportion of diabetes, 16 (38.10%) was found among women practicing healthy habits. These findings are likely due to the fact that known cases of diabetes are more likely to practice healthy habits. There is statistically high significant association between practicing healthy habits and diabetes.

Proportion of diabetes was highest, 19 (35.19%) among women with positive parental history. There is a statistically high significant association between parental history and diabetes. Proportion of diabetes was highest, 15 (50.00%) among women having sibling history. There is a statistically high significant association between sibling history and diabetes. This study shows no relationship between other variables like age group, socio economic class and total sleep with diabetes.

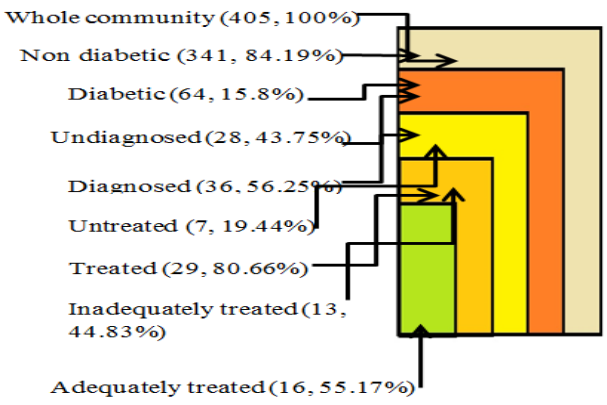

Figure 1: Status of awareness, treatment and control of diabetes among study participants diagnosed with diabetes (n=64)*.

Figure 1 shows that out of 64 women who were diagnosed with diabetes, about half i.e., 36 (56.25%) were aware of their diabetic status i.e., they are known cases. Out of those aware, 29 (80.66%) were on treatment. Among those on treatment, about half i.e., 16 (55.17%) had their blood sugar under control.

DISCUSSION

The present study was carried out in three slum areas of Rajkot city to know the clear and complete picture of this iceberg named 'diabetes'. This study reveals the high prevalence of diabetes in slum areas amongst women. This study adds to the much required data regarding diabetes amongst women, who are usually neglected. So, this study brings out the picture of one of the most vulnerable group of the country.

The findings of a study done by Singh et al among elderly more than 60 years in urban slums of Delhi showed the prevalence of diabetes to be 18.8%.[7] It was 15.9% in men and 21.8% in women. The prevalence is higher than that of the present study which may be due to elderly subjects included in the study.

Similar findings were shown by Mohan et al in the Chennai urban rural epidemiology study in which the overall crude prevalence of diabetes using WHO criteria was 15.5% (age-standardised 14.3%), while that of Impaired Glucose Tolerance was 10.6%.[8] Ramachandran et al in the National Urban Diabetes Survey revealed the age standardised prevalence of diabetes to be 12.1% and impaired glucose tolerance to be 14%.[9]

A study conducted by Misra et al in urban slum population of northern India showed different findings.[10] Prevalence of diabetes was 10.3% and it increased with advancing age. The subjects were stratified according to the age groups: 18–30, 31–50 and 51 years and above. BMI was observed to be a significant positive predictor of fasting blood glucose for both males and females which was in line with the findings of present study.

Ahmad et al conducted a study in urban slum of Mumbai among diabetics which revealed that majority of patients (60%) were in late adulthood (40-60 years) stage with mean age as 53.42 years.[11] 27% of patients had positive family history of diabetes. It was found that mean blood sugar level was significantly low in patients who had adopted major modification in their life styles compared to those who had adopted some modifications and the difference was statistically significant.

Findings of a study by Anjana et al in subjects more than 20 years revealed that age, male sex, family history of diabetes, urban residence, abdominal obesity, generalised obesity, hypertension and income status were significantly associated with diabetes.[12] Ramachandran et al showed positive and independent association of diabetes with age, BMI, waist hip ratio, family history of diabetes, monthly income and sedentary physical activity.[9]

Singh et al showed that about one-third (36.0%) of the 89 diabetics were aware of their condition.[7] Of those participants who were aware, more than half (55.66%) were on treatment. Of those on treatment, three-fourth (75%) had controlled fasting blood sugar.

The findings of present study contrasts with the earlier belief that diabetes is the disease of affluent. A high prevalence of diabetes is found in women residing in slum areas. A significant association between diabetes and various factors has been found. Women living in slum areas deserve special attention from policy makers and programme managers. The studied population had poor awareness; poor treatment status and inadequate control of diabetes. There is an urgent need to conduct similar researches in other cities and states to find the exact burden and treatment status of this silent disease so that required measures can be adopted.

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