

HEALTH-RELATED BEHAVIOURS OF PEOPLE WITH DIABETES MELLITUS (TYPE 2) IN RURAL AREAS OF JAMNAGAR AND DEVBHUMI DWARKA DISTRICTS

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Abstract

Background: Diabetes mellitus is a chronic heterogeneous metabolic disorder with complex pathogenesis. By the year 2030, this number has been estimated to increase to 578 million, representing 10.2% of the total world adult population and further increase to 700 million by the year 2045, which represents 10.9% of the total world adult population. **Aims & Objectives:** To know the health-related behaviour of people diagnosed with T2DM and to analyse its association with occurrence of disease. **Materials and Methods:** A community based cross sectional study was conducted between June 2018-May 2019 in two districts of Saurashtra region in which 6 Primary Health Centres (PHC) from Jamnagar District and 4 PHCs from Devbhumi Dwarka District were selected randomly in which adult population >20 years of age attending Out Patient Department (OPD) were screened for Diabetes with aim to estimate the prevalence of it. **Results:** The study found a high prevalence of diabetes in Jamnagar, specifically in Dabasang and Hadiyana, compared to Verad in respect to Dwarka. 10% of participants in both the diabetic and non-diabetic groups were smokers while 25% of participants in the diabetic group and 17.5% of participants in the non-diabetic group had a family history of diabetes. **Conclusion:** Family history of diabetes, smoking, and physical inactivity are all important factors to consider in understanding the health behaviour of individuals and their risk of developing diabetes.

INTRODUCTION

Diabetes Mellitus (DM) is a complex metabolic disorder characterized by hyperglycaemia; a physiologically abnormal condition represented by continued elevated blood glucose levels. Diabetes follows a progressive pattern with complex pathogenesis and varied presentation.^[1,2] Type-2 Diabetes Mellitus (T2DM) is a chronic disease which often develops for years without any clinical symptoms.^[3-9]

According to the World Health Organization (WHO), noncommunicable diseases (NCDs) accounted for 74% of deaths globally in 2019, of which, diabetes resulted in 1.6 million deaths, thus

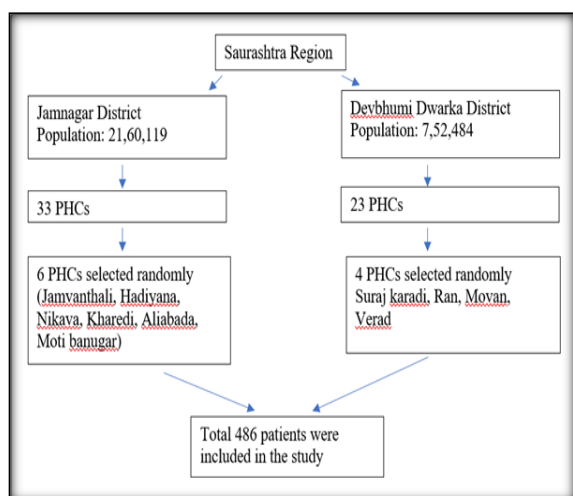
becoming the ninth leading cause of death globally.^[10] By the year 2035, nearly 592 million people are predicted to die of diabetes.^[11] Diabetes is an "iceberg" disease. In the Indian Council of Medical Research-India DIABetes study, the largest nationally representative epidemiological survey conducted in India on diabetes and prediabetes, the data from 15 states/UT of the country showed that the prevalence of diabetes ranged from 3.5 to 8.7% in rural to 5.8 to 15.5% in urban areas.^[12,13]

The development of type 2 diabetes is a multifactorial process that occurs over a lifetime.¹⁴ Healthy lifestyle is the key for T2DM management. Healthy life style meant for physical activity, healthy diet including fruit and vegetable intake,

abstinence of smoking, alcohol and junk food, regular body check-up, family history of T2DM. Many cases can be preventable due to the relationship between T2DM risk, adiposity and modifiable health behaviours. Inclination in making choices towards unhealthy eating habits, sedentary lifestyle in conjunction with smoking-alcohol habits are the major factors for the increase in the cases of diabetes.^[15] Thus, this study was conducted with the aim and objectives to know the health-related behaviour of people diagnosed with T2DM and to analyse its association with occurrence of disease.

MATERIALS AND METHODS

A Community based, cross-sectional study was conducted between June 2018 to May 2019 in two districts of Saurashtra region namely Jamnagar district and Devbhumi Dwarka district. Jamnagar district have 33 PHCs and Devbhumi Dwarka have total 23 PHCs in district. In the current study 6 PHCs from Jamnagar District and 4 PHCs from Devbhumi Dwarka district selected randomly by using random number table. PHC Jamvanthali, Hadiyana, Nikava, Kharedi, Aliabada, Moti-banugar were selected from Jamnagar district while Suraj karadi, Ran, Movan and Verad PHCs were selected randomly from Devbhumi Dwarka district.



Inclusion Criteria

- Participants who were residence in the study area
- Participants who were ≥ 20 years in the age attending OPD of PHCs
- Participants who were willing to participate
- Willing to give written consent for clinical examination including Blood pressure measurement, Fasting Blood Sugar (FBS) and Post Prandial Blood Sugar (PP2BS) measurement by Glucometer.

Exclusion Criteria

- Participants who were not residence in the study area
- Participants who were < 20 years in the age attending OPD of PHCs

- Participants who were not willing to participate
- Not willing to give written consent for clinical examination including Blood pressure measurement, Fasting Blood Sugar (FBS) and Post Prandial Blood Sugar (PP2BS) measurement by Glucometer.

For data collection and processing, patients were screened for inclusion and exclusion criteria in OPD for the enrolment in the study. Total 563 patients were identified; 77 patients were excluded as they were not fulfilling inclusion criteria. So that total 486 patients were enrolled in this study.

Before starting of the study purpose of the study was explained to patients. Information was collected in pretested proforma and Blood pressure measurement was done as per WHO guidelines. Anthropometry in form of weight and height measurement was done for Body Mass Index Calculation. Blood Glucose level measured with Glucometer. Random Blood Sugar (RBS) level $>200\text{mg}\%$ considered as diabetic. Those patients having RBS $>200\text{mg}\%$ were informed to come on next day morning for Fasting Blood Sugar (FBS) and for that they were explained nothing to eat after 10 pm till their FBS done on next day. Same patients were informed for Post Prandial Blood Sugar (PP2BS) and blood collected 2 hours after meal for PP2BS. FBS level $>126\text{mg}\%$ and PP2BS $>200\text{mg}\%$ were considered diabetic otherwise they were considered non diabetic.

In order to ensure the quality of the data, each completed questionnaire was manually checked before it could be coded in MS Excel 2019. The data was analysed using Statistical Package for Social Sciences (SPSS version 26) and result in terms of quit rate were presented in tables and charts using MS Excel 2019.

RESULTS

Table-1 shows that the 127 were belong to age group of more than 60years in which 22 belongs to diabetic group and 105 belongs to non-diabetic group. In case of gender, 301 were males in which 27 were Diabetic and 274 were non-Diabetic group. So, proportion of Diabetic peoples are increasing when the age increases which is also Statistically significant ($p\text{-value}=0.001$). The proportion of Diabetic peoples are more in Upper class (Class-1 and 2) than lower class which was also statistically Significant. Table-2 shows prevalence of Diabetics in Two Districts (Jamnagar and Dwarka). Table-3 Shows the Health behaviour of the study participants, in which intake protein and fat were significant($p\text{-value}<0.05$). Fig-1 shows the Association of family history with diabetics in the participants. Fig-2 shows the association of Smoking with Diabetics. Fig-3 shows the association of Physical Activity with Diabetics, which is statistically significant.($p<0.05$).

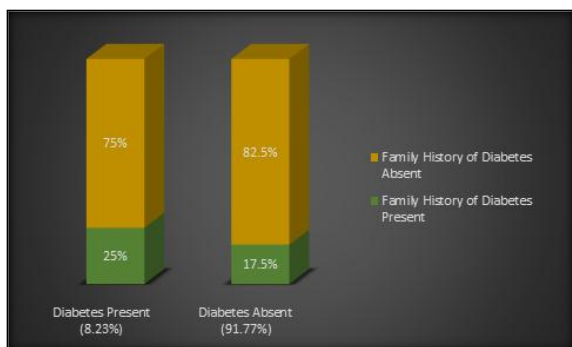


Figure 1: Association of Family history with diabetes

*Crude OR=1.57 (0.72 to 3.35) p-value=0.241

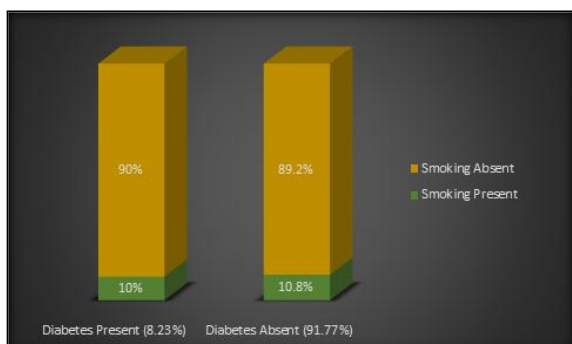


Figure 2: Association of Smoking with diabetes

*Crude OR=0.92 (0.31 to 2.7) p-value=0.88

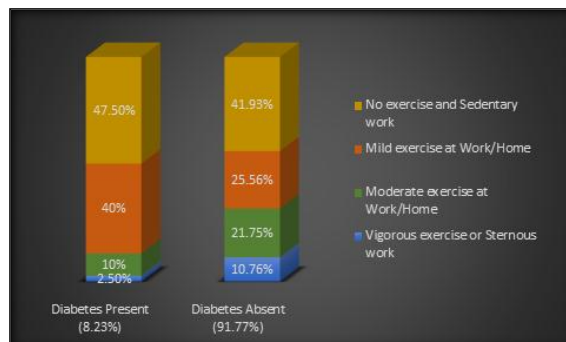


Figure 3: Association of Exercise/ Physical Activity with diabetes

*Chi Square=8.05, p value=0.045

Table 1: Distribution and association of study population according to sociodemographic variables

Sociodemographic variables	Frequency (n=486)	Diabetic (40)		Non diabetic (446)		p-value*
		No.	%	No.	%	
Age (years)	21-30	43	0	43	100	0.000
	31-40	88	3	85	96.59	
	41-50	113	5	108	95.57	
	51-60	115	10	105	91.30	
	>60	127	22	105	82.67	
Gender	Male	301	27	274	91.03	0.45
	Female	185	13	172	92.97	
Religion	Hindu	456	38	418	91.67	0.748
	Muslims	30	2	28	93.33	
Type of family	Nuclear	232	16	216	93.10	0.243
	Joint	184	20	164	89.13	
	3 Generation	70	4	66	94.29	
Social class	I	50	12	38	76	0.000
	II	150	14	136	90.67	
	III	68	2	66	97.06	
	IV	126	8	118	93.65	
	V	92	4	88	95.65	
Marital status	Married	436	32	398	92.66	0.038
	Unmarried	50	8	42	84%	
Educational status	Illiterate	108	10	98	90.74	0.430
	Primary	204	20	184	90.20	
	Higher 2 ^o	118	8	110	93.22	
	Graduate	56	2	54	96.43	
Occupation	Agriculture	98	12	86	87.76	0.018
	Business	16	0	16	100	
	Service	104	6	98	94.23	
	Labour	96	2	94	97.92	
	Others	172	20	152	88.37	

* Chi Square test or Fisher's Exact Test

Table 2: Prevalence and association of Diabetes among study population (District/PHC)

District	PHC	Diabetes				p value*
		Present		Absent		
		No.	%	No.	%	
Jamnagar	Dabasang	6	13.04	40	86.96	

	Hadiyana	6	15.79	32	84.21	0.922
	Jamvanthali	4	13.33	26	86.67	
	Kharedi	4	20.00	16	80.00	
	Moti-banugar	2	8.33	22	91.67	
	Seth vadala	4	14.29	24	85.71	
Devbhumi Dwarka	Movan	2	6.67	28	93.33	0.163
	Ran	2	2.86	68	97.14	
	Suraj karadi	4	8.00	46	92.00	
	Verad	6	14.29	36	85.71	

* Chi Square test or Fisher's Exact Test

Table 3: Health Behaviour of study participants and its association with Prevalence of Diabetes

Variables	Diabetes		Crude OR (95% CI)	p-value	
	Present	Absent			
BMI	≥25 kg/m ²	33	304	2.2	0.065
	<25 kg/m ²	7	142	(0.95 to 5.09)	
Carbo hydrate	< 50% of total energy intake	12	102	1.44	0.310
	≥ 50% of total energy intake	28	344	(0.34 to 1.41)	
Protein	< 15% of total energy intake	23	180	0.5	0.0381
	≥ 15% of total energy intake	17	266	(0.26 to 0.96)	
Fat	< 30% of total energy intake	15	95	0.45	0.022
	≥ 30% of total energy intake	25	351	(0.23 to 0.89)	
Fibre	< 25 g/day	31	298	0.58	0.17
	≥ 25 g/day	9	148	(0.27 to 1.26)	
Alcohol	>20 g/day and abstainers	5	104	0.47	0.124
	>0 g and ≤20 g/day	35	342	(0.18 to 1.23)	
Fruit & Vegetables	≥5 portions daily	11	158	0.69	0.32
	<5 portions daily	29	288	(0.34 to 1.42)	

DISCUSSION

In the current study, among all 486 study participants, mean age of diabetics were 58.25 years with 9.6 SD. Proportion of diabetics among male and female was almost similar while maximum belonged to joint family type. Previous studies have shown that diabetes disproportionately affects racial and ethnic minorities and low-income adult populations in the US.^[16] A large body of evidence demonstrates strong associations between the prevalence of diabetes and social factors such as socioeconomic status.^[17] Furthermore, a study conducted in mainland China found that the prevalence, awareness, treatment, and control of diabetes were associated with sociodemographic factors¹⁸. In the current study, finding like age, social class, and occupation status were statistically significant factors in the distribution and association of the study population according to sociodemographic variables is consistent with previous research. The study highlights the importance of considering sociodemographic factors when studying the prevalence and distribution of diabetes.

The study found a high prevalence of diabetes in Jamnagar, specifically in Dabasang and Hadiyana, compared to Verad in respect to Dwarka. However, previous studies have shown that diabetes prevalence varies across different regions and populations. For example, a study conducted in Nepal found a strong heterogeneity in diabetes prevalence across the studies and between rural and urban areas.^[19] Another study conducted in mainland China found that the prevalence of

diabetes varied across different regions and populations¹⁸. The high prevalence of diabetes in Jamnagar, specifically in Dabasang and Hadiyana, may be due to various factors such as lifestyle, genetics, and environmental factors. Further research is needed to identify the specific factors contributing to the high prevalence of diabetes in these areas. The finding highlights the importance of conducting region-specific studies to identify the factors contributing to the high prevalence of diabetes and to develop targeted interventions to prevent and manage diabetes in these areas.

The current study found that protein intake and fat intake were statistically significant factors in the health behaviour of the study participants. However, previous studies have shown that high-protein diets may have both positive and negative effects on health outcomes. A systematic review and meta-analysis of prospective cohort studies found that high-protein diets were associated with a reduced risk of cardiovascular disease.^[20] As per Lonnie, Marta, et al.^[21] high-protein diets may increase the risk of adverse health outcomes in older adults. However, current study did not provide any specific information on the type of fat consumed by the participants. But those findings were statistically significant factors in the health behaviour of the study participants highlights the importance of considering dietary factors when studying health outcomes and further research is needed to identify the specific types of protein and fat consumed by the participants and to determine the effects of these dietary factors on health outcomes.

The study found that 25% of participants in the diabetic group and 17.5% of participants in the non-

diabetic group had a family history of diabetes. This finding is consistent with previous studies that have shown a strong association between family history and the risk of developing diabetes.^[22] Family history is considered a non-modifiable risk factor for diabetes, indicating a genetic predisposition to the disease. Individuals with a family history of diabetes should be aware of their increased risk and take proactive measures to prevent or manage the condition.

According to current study, 10% of participants in both the diabetic and non-diabetic groups were smokers. While the prevalence of smoking was the same in both groups, it is important to note that smoking is a well-established risk factor for the development of diabetes.^[23] Smoking has been shown to increase insulin resistance and impair glucose metabolism, contributing to the development of type 2 diabetes. It is crucial for individuals, especially those with diabetes, to quit smoking to reduce their risk of complications and improve overall health. Also, around 48% of participants in the diabetic group and 42% of participants in the non-diabetic group had no exercise and a sedentary lifestyle. This finding suggests that a significant proportion of the study population had low levels of physical activity, which is concerning as physical inactivity is a known risk factor for diabetes as per Hamilton, Marc, et al.^[24] Regular physical activity has been shown to improve insulin sensitivity, promote weight management, and reduce the risk of developing type 2 diabetes. Encouraging individuals to engage in regular exercise and promoting an active lifestyle is crucial in diabetes prevention and management.

CONCLUSION

In conclusion, the study's findings regarding family history of diabetes, smoking history, and physical activity levels align with previous researches. Family history of diabetes, smoking, and physical inactivity are all important factors to consider in understanding the health behaviour of individuals and their risk of developing diabetes. Those findings demonstrate the potential for population-based prevention approaches targeting obesity, physical activity, tobacco use and diet to prevent and control the rising burden of diabetes and also it highlights the need for more strategies to address the growing burden of disease associated with unhealthy lifestyles. The current study highlights the need for the development of more effective interventions and strategies for diabetes prevention and control by minimizing the gap between awareness and lifestyle modifications.

Limitations and Recommendations

The study has some limitations in terms of recruiting participants as study was OPD based and did not provide any specific information on the type

of fat consumed by the participants. Types Designing interventions for health promotion program using the findings of this study is recommended. Strategies to Involve all health professionals in changing the behaviour of patients with diabetes. More and more use of technology and innovative methods can be used to motivate, initiate and sustain healthy behaviour.

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