AN EPIDEMIOLOGICAL STUDY ON DIABETES AND PRE-DIABETES IN AN URBAN AREA WITH REFERENCE TO LIFESTYLE MODIFICATION

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ABSTRACT: Diabetes mellitus (DM) is one of the most common non-communicable diseases (NCDs) globally. It is the fourth or fifth leading cause of death in most high-income countries and there is substantial evidence that it is an epidemic in newly industrialized and many economically developing countries. Diabetes mellitus is a chronic illness requiring continuous medical care with multi-factorial risk reduction strategies beyond glycemic control. Ongoing patient self-management education and support are critical to preventing acute complications and reducing the risk of long-term complications. Genetic factors are responsible for at least some of this. However, as evidenced by the increased incidence of diabetes mellitus in urban populations, the fast epidemiological shift linked to food pattern alterations and decreased physical activity is the main cause of the diabetes mellitus epidemic. Due to population aging, growth, urbanization, a lack of physical exercise, and a high incidence of obesity, there are more persons with DM. Lifestyle factors include eating patterns, exercise routines, alcohol consumption, and smoking. An improvement in these parameters would lead to better adherence to hypoglycemic medications. An epidemiological study on diabetes and pre-diabetes in an urban area with reference to lifestyle modification. A community-based intervention study. It was conducted in an urban area. Personal interviews using a semi-structured, pretested questionnaire were the main technique of data gathering. Detailed information has been taken on the demographic and socio-economic characteristics at both

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the individual and household levels. All responders provided their willingly given consent. Every second household was visited by systematic random sampling procedure to select 400 respondents. Due to non-response, inaccuracy and/or unreliability of information 50 Cases were not included in the analysis. Four more instances of diabetes were also removed from the research. Finally, analysis was carried out on 346 respondents. All respondents were questioned using a pretested, semi-structured questionnaire after giving their informed consent. Significant difference was observed with positive family history of diabetes, obesity, physical activities in male, high calorie intake, stress, chewable tobacco and blood pressure level with pre-diabetes and diabetes. Compared to responders with normal blood glucose levels, pre-diabetics and diabetics showed more positive family histories. Compared to responders with normal blood glucose levels, pre-diabetics and diabetics were more likely to be overweight. With regard to personal habits of the respondents, smoking was associated with more than 1-fold increase risk of obtaining serum glucose level >110 mg/dl as compared to non-smokers. The current research was an attempt to examine the effect of intervention with reference to life style modification. From the study, it is evident that overall awareness about diabetes has been found low and no awareness has been found about pre-diabetes. The present study also demonstrated that education is the fundamental tool to make the population aware of their health issues. Awareness about pre-diabetes and diabetes, which can make them beneficial for community and nation and so, they can play an innovative role for prevention of diabetes.

KEYWORDS: Diabetes mellitus, Non-communicable Diseases (NCDs), American Diabetes Association (ADA), Impaired glucose tolerance (IGT), Impaired fasting glucose (IFG).

1.INTRODUCTION

One of the most prevalent non-communicable diseases (NCDs) worldwide is diabetes mellitus (DM). The majority of high-income nations rank it as the fourth or fifth biggest cause of death, and there is strong evidence that it is an epidemic in many newly industrialized and economically developing nations. Diabetes mellitus is a chronic condition that needs ongoing medical attention and risk-reduction measures that go beyond glycemic management. Prevention of acute problems and lowering the risk of long-term sequelae need ongoing patient self-management education and assistance."[1]

The etiopathogenesis, symptomatology, consequences, and therapy of parmesan are all well explained in the Charaka Samhita. It is clear that the illness was prevalent even though there are no records of its prevalence in ancient India. This "Maharoga" has three therapy options: exercise, nutrition, and medication. [2,3]

Since there were no established diagnostic standards for DM in the first half of the 20th century, it was challenging to determine its prevalence. The majority of earlier studies used glycosuria as the diagnostic standard and were based on hospital records. In their publication that was published in 1991, Ramaiya et al. (1990) created a fantastic combination of investigations. [4] A population-based survey conducted in 1966 revealed a prevalence of

2.3% in Chandigarh. A survey conducted in Puducherry that year that used blood glucose for diagnosis revealed a prevalence of 0.7%.[5] In 1971, Cuttack recorded a prevalence of 1.2%. [6] In 1972 the prevalence of DM in urban Hyderabad was 2.5%([7] and Delhi had a prevalence of 2.3 %.

There are so many non-communicable diseases prevalent in India like obesity and diabetes. Hypertension is increasing at an alarming rate among adolescents. Tobacco use, cigarette smoking, and chewable tobacco mostly start during early life i.e. adolescence which impacts health and can have disastrous consequences in later life. To put it in its appropriate context, it should be noted that the figures for the prevalence of diabetes mellitus in India come from a few dispersed studies carried out across the nation. Several multi-center studies have been done, including the ICMR studies from 1979[8], 1991[9], and 2004, the National Urban Diabetes Survey (NUDS), 2001[10], and the Prevalence of Diabetes in India Study (PODIS), 2004 [11]

It is possible that the quick changes in lifestyle that have taken place over the past 50 years are to blame for the substantial increase in the incidence of type 2 diabetes mellitus and associated illnesses including obesity, high blood pressure, and metabolic syndrome. Although this "epidemiological transition," which consists of better nutrition, good hygiene, the prevention of many communicable diseases, and improved access to high-quality healthcare, has increased longevity, it has also sped up the emergence of new-age diseases like obesity, diabetes mellitus, and heart disease. [12]

Diabetes mellitus can be prevented in large part by changing one's food choices, stress management techniques, alcohol and cigarette use, and physical activity levels. In recent days, there has been progress in the development of behavioral strategies to modify these lifestyle habits. Public-private partnerships comprising the government, partner organizations, health service providers, the community, and individuals with diabetes mellitus may be the most effective way to promote a healthy lifestyle. There is an urgent need for efficient methods to lower the prevalence of diabetes mellitus and support for addressing the underlying problems.

There is a lack of information on diabetes awareness in emerging nations like India. Such information is crucial for developing public health plans for any future diabetes management initiatives. Few studies really address diabetes awareness among those with the condition, and there are almost no population-based statistics, according to a literature review on diabetes knowledge and awareness in developing nations.

2.MATERIAL AND METHODS

Study Design and Area: A community-based intervention study. It was carried out in an urban area. The universe of the study comprises adults (22-60 years) residing in the ward, an urban area.

Exclusion Criterion

- Pregnant women
- Known diabetic patients

Sampling procedure:

As per 2020 census data, the total population of the area was 12,211 from 1245 households. So, the average household size was almost 5 people. Also, the census data shows that about 50 percent of the population was between the ages of 22 and 60 years. Thus, on average every household has approximately 3 adults between the ages of 22 and 60 years. If more than one eligible adult was present in the household, only one was selected by random sampling (lottery method). In the present study, households were chosen through systematic random sampling.

The study was carried out in three phases:

Pre-intervention phase:
Every second household was visited by systematic random sampling procedure to select 777 respondents. Due to non-response, inaccuracy, and/or unreliability of information, 71 cases were not included in the analysis. Further 6 known diabetic cases were also not included in the analysis. Finally, an analysis has been executed on 700 respondents. The next day morning between 6 am-8 am, the blood test was carried out for the purpose of estimating fasting blood glucose (FBG) levels. Respondents, who had forgotten to remain fasting on that day, were again explained about the importance of blood tests, and the test was conducted on the next day. Results were informed to all respondents.

Intervention:
During the pre-intervention phase (September 2020 to February 2021) interpersonal approach was used to educate all respondents. To maximize the impact of lifestyle changes on fasting blood glucose levels, a leaflet was also created. In the booklet, all information about the disease was simplified and given in a structured format in the Hindi language. Following interviews and measurements of fasting blood glucose, blood pressure, weight, and height, each respondent received individualized instruction on pre-diabetes and diabetes mellitus. Importance was given to explaining risk factors, diet modification, physical activity, etc.

Post Intervention phase
After one and a half years from the pre-intervention phase, all respondents were interviewed again along with all measurements i.e. fasting blood sugar level, weight, height, and blood pressure were taken again.

Period of the research:
This investigation was carried out over the course of two years (July 2020 to June 2022). The initial period (July 2020 to December 2021) of the study was devoted to an extensive literature search followed by the preparation of the research design and appropriate tools for the investigations. The field data collection was carried out for a period of one year (September 2020 to October 2021).

• Pre-intervention phase of data collection was carried out for a period of five months (September 2020-January 2021).

• After 1.5 years from the pre-intervention phase, a four-month post-intervention phase of data collecting was also conducted (March-2020-June 2020). The entry of data was completed in one month (August 2020- September 2020). After that, it took more than six months for analyzing the data (October 2020 to march 2021)

Strengths of the research
The findings of the study may be useful in increasing awareness of prediabetes and diabetes. It will also help in suggesting measures to reduce risk factors in the community for the further progression of the disease.

Limitations
Because the prevalence of diabetes mellitus was calculated using fasting glucose values rather than OGTT, it is understated. Self-reported- physical activity. Single location study.

Statistical analyses: Collected information was checked thoroughly to avoid errors and maintain consistency. Necessary editing was carried out before entering the information into the computer program. Thereafter, all the individual data form was entered into SPSS for appropriate data analysis. In the SPSS trial version 16.0, the data were re-coded into different categorical variables to make it easier for the further analysis process. Data were entered in the coded form was created for its rapid computerization.

3.RESULT: -

Table 1: Likelihood of respondents with risk factors vs diabetes mellitus

Risk factors	Likelihood of the respondents with risk factors			
	Unadjusted		Adjusted	
	B (Standard Error.)	OR (95% Confidence Interval)	B (Standard Error)	OR + (95% Confidence Interval
Body Mass Index				
Normal weight		REF		REF
Under-weight	-0.5 (0.2)	0.2 (0.1-0.5)	-0.50 (0.3)	0.3 (0.2-1.2)
Over-weight and obese	0.3 (0.2)	1.2 (0.9-2.9)	0.1 (0.3)	1.0 (0.6-2.2)
Diet (Caloric consumption in Kcal)				
Below 2000		REF		REF
2001-2500	0.3 (0.3)	1.4 (0.9-3.3)	0.2 (0.3)	1.2 (0.8-3.3)
2501-3000	0.5 (0.3)	1.9 (1.2-5.0)	0.7 (0.4)	2.1 (1.1-5.9)
Above 3000	1.2 (0.3)	3.9 (2.7-9.1)	1.1 (0.3)	4.7 (2.8-12.2)
Physical activity				
Mild		REF		REF
Moderate and vigorous activity	-0.01 (0.2)	0.6 (0.5-1.5)	-0.3 (0.2)	0.4 (0.3-1.0)
Stress				
No Stressful events in their life		REF		REF
Stressful events in their life	2.2 (0.5)	20.5 (8.2-74.1)	28.4 (0.6)	26.0 (8.1-119.2)
Family History of diabetes mellitus				
No family history				
Positive family history	1.0 (0.2)	2.0 (2.4-6.7)	1.0 (0.3)	1.7 (1.5-5.0)
Smoking habit				
Non-smoker		REF		REF
Smoker	0.1 (0.5)	1.1 (0.4-3.6)	0.05 (0.5)	1.0 (0.3-3.4)
Chewable Tobacco				
No		REF		REF
Yes	0.2 (0.1)	1.3 (1.1-2.4)	0.03 (0.2)	1.0 (0.6-1.7)
Alcohol consumption				
No		REF		REF
Yes	-0.1 (0.5)	0.5 (0.2-2.3)	-0.2 (0.6)	0.3 (0.1-2.1)

The outcomes of logistic regression analysis for estimating the probability of having a fasting blood glucose level >110 mg/dl are shown in Table 1. In the analysis, fasting blood glucose

level was taken dependent variable, while BMI, physical activity, stress, personal habits, and family history as predictors of having a fasting blood glucose level >110 mg/dl. One of the significant contributing variables to the chance of having a fasting blood glucose level >110 mg/dl was shown to be BMI. No discernible difference between mild and moderate-vigorous physical activity was found in the current research to account for fasting blood sugar value >110 mg/dl. Respondents who were taking tobacco were almost two times more likely to have fasting blood sugar value >110 mg/dl and the respondents who were consuming alcohol were less likely to have the risk of fasting blood glucose level >110 mg/dl as compared to non-users.

Table 2: Changes in mean fasting blood glucose level of respondents from the pre to post-intervention phase.

Fasting blood glucose level		**Pre-intervention Mean ± SD**	**Post-intervention Mean ± SD**
The Normal blood glucose level	446	82.5 +16.4	82.4+13.2
Pre-diabetics	50	99.2 ± 3.2	101.1 ± 12.3
Diabetics	30	155.4 ± 50.2	135.5 ± 42.3

The analysis shows that the mean fasting blood sugar value was significantly decreased from the pre- to post-intervention phase, where the mean fasting blood glucose in pre-diabetics and in diabetics in the post-intervention phase was decreased respectively.

Table 3: Changes in mean blood pressure of respondents from the pre- to post-intervention phase

		Blood pressure level	
Fasting blood glucose level		**Pre-intervention Mean ± SD**	**Post-intervention Mean ± SD**
The normal blood glucose level	446	110.3 ±14.1	106.7 ± 11.2
Pre-diabetics	50	122.4 ± 19.1	109.7 ± 9.2
Diabetics	30	126.2 ± 20.3	110.0 ± 15.3

Table 3 shows that mean blood pressure was significantly decreased from the pre- to post-intervention phase. In the pre-intervention phase, the mean blood pressure of respondents belonged to normal blood glucose levels. While in the post-intervention phase, it decreased respectively.

4.DISCUSSION

A metabolic condition called diabetes mellitus affects the sugar-metabolizing property of the body and causes blood sugar to increase. It could be fatal if uncontrolled. However, treatment options for the disease are limited. Worldwide, the number of persons with diabetes mellitus

has grown. In research released in September 2012, the World Health Organization predicted that there may be more than 300 million individuals worldwide who have diabetes mellitus, with that figure expected to rise by another 60–70% by the year 2030. [13]
The spurt in diabetes prevalence may be due to lifestyle changes and food habits, although the role of genetic components may not be ruled out. Lack of proper exercise and excessive sedentary life are thought to be major players in the onset of diabetes. Proper monitoring of diabetes mellitus is a serious issue in India. Due to this, the vast majority of the Indian population is unaware of diabetes mellitus and its underlying problems. Therefore, the fight against diabetes mellitus will have to be multidirectional [14,15].
The total prevalence of diabetes mellitus was 6.0% in the study by [16], with known diabetes mellitus being 4.0% of the study population and newly diagnosed diabetes mellitus being 2.0% of respondents. Another study was done by [17] where the prevalence of diabetes mellitus overall was 6.1%, with known diabetes prevalence being 5.0% and newly diagnosed diabetes mellitus prevalence being 1.1%.
World Health Organization (WHO) report shows About 32 million individuals in 2000 had diabetes mellitus. Currently, 387 million individuals worldwide have diabetes mellitus, and by 2035, that number is expected to reach 592 million[18].Diabetes mellitus is one of the five leading causes of death worldwide[19].Additionally, diabetics are more likely to develop heart disease, stroke, high blood pressure, blindness, renal illness, nervous system disease, amputations, dental problems, and pregnancy issues. [20]
Tobacco use increases hemoglobin A1C levels, an indicator of chronically-elevated blood glucose. [21] Cigarette smoking and oral tobacco mostly start during early life i.e. adolescence which impacts health and can have disastrous consequences in later life. Significantly weak relationship was observed between systolic blood pressure and respondents' fasting blood glucose level. This is similar to the study conducted by [22] where diabetes mellitus and systolic blood pressure were substantially linked.
Chronic pancreatitis frequently results in diabetes mellitus and is mostly brought on by binge drinking. Chronic pancreatitis patients are one in three to acquire diabetes mellitus (NHS). An assessment of 15 prior research on the relationship between alcohol and diabetes mellitus found that "moderate drinkers" had a third lower risk of type-2 diabetes than heavy or abstainers. Heavy drinkers and teetotalers both have a significant risk of acquiring diabetes mellitus. [23]
A study was done by [24] where the mean systolic blood pressure in the pre-intervention phase was 130.0+13.4 and in the post-intervention phase, it reached 126.9+15.8. This may be due to the respondents taking medicine to control high blood pressure and taking less salt in their diet and adopting some home remedies also. A study conducted by [25,26] When respondents consumed more than 2-4 drinks per week had a decreased prevalence of type 2 diabetes mellitus in the next 12 years compared with non-drinkers; associations maintained after adjusting for BMI and other diabetes risk variables.

5.CONCLUSION:

The current research was an attempt to examine the effect of intervention with reference to lifestyle modification. From the study, it is evident that overall awareness about diabetes has been found low and no awareness has been found about pre-diabetes. The present study also demonstrated that education is the fundamental tool to make the population aware of their health issues. Awareness about pre-diabetes and diabetes can make them beneficial for the community and nation so, they can take a creative approach to the prevention of diabetes.

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