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TO DETERMINE THE PREVALENCE OF PREDIABETES AND DIABETES MELLITUS AMONG POPULATION OF JAMSHORO: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Diabetes, an endocrine disorder that makes it difficult to regulate blood sugar levels within normal physiological limits, is becoming more widespread. The global prevalence of diabetes increased from 2 folds between early 90's and become 4 folds by the end of this millennium, putting heavy toll on the overall health status of individuals as well as community. Hence this study is of utmost importance to detect its load on our region. **Objective:** To determine prevalence of prediabetes mellitus (preDM) and diabetes mellitus (DM), among population of Jamshoro. **Methodology:** This cross sectional analysis was conducted on 2145 individuals, age between 20 to 60 attending medical OPD at LUMHS Jamshoro from dated: 1st January 2022 to 31st July 2022, using array of preformed questioners and blood tests (HbA1c, FBS Blood CP) after precisely following all inclusion criterions. Descriptive analysis was conducted on the data and cross tabulations were obtained. **Results:** This cross sectional analysis conducted on 2145 population size, out of which 1129 (52.6%) were male and 1016 (47.4%) were female. Prevalence of Prediabetes among this population was found out to be 15.4% (331 individuals) and Prevalence of diabetes mellitus was found to be 39.95% (857 individuals). Out of the 331 patients of Prediabetes 127 (38.3%) were male and 204 (61.6%) were female. Out of these 127 male that were positive for prediabetes 39% were smokers and 71% were having physical inactivity or sedentary lifestyle for minimum of 3 years. Out of these 204 female that were positive for prediabetes 13% were smokers and 63% were having physical inactivity or sedentary lifestyle for minimum of 3 years. Out of these 313 male that were positive for diabetes mellitus 37% were smokers and 69% were having physical inactivity or sedentary lifestyle for minimum of 3 years. Out of these 544 females that were positive for diabetes mellitus 17% were smokers and 67% were having physical inactivity or sedentary lifestyle for minimum of 3 years. **Conclusions:** This study shows that prevalence of Prediabetes and diabetes mellitus was found out to be 15.4% and 39.95% respectively, which itself are very alarming signs. BMI, Smocking status, Central obesity, physical inactivity and healthy diet status were found out to be primarily associative factors. Health authorities and policy makers must take immediate measure to early diagnose, and prevent, control, and management of these conditions as these are putting heavy toll on the individuals health and putting community on risk as whole.

KEYWORDS: Prediabetes, Diabetes mellitus, risk factors, endocrinology, prevalence, associative factors.

INTRODUCTION

Cardiovascular disease, kidney disease, and other systemic illnesses account for a disproportionate share of premature deaths worldwide, and metabolic syndrome disorders including prediabetes mellitus (preDM) and diabetes mellitus (DM) are major contributors to these conditions.[1,2] Major pathophysiological mechanisms that lead to CVDs in persons with DM include endothelial dysfunction, oxidative stress, and vascular inflammation.[3] Pre-diabetes affects approximately 9.2% of the Mediterranean community, while 12.8% have full-blown diabetes.[1,4] However, the worldwide research shows that sedentary lifestyle, tobacco use, poor food, excessive weight, and a family history of diabetes, along with other significant anthropometric and behavioral risk factors for the emergence of diabetes mellitus.[5,6] To help clarify population profiles of NCD risk-factors and to evaluate and inform policies and programmes throughout other countries, WHO launched a STEP-wise approach to surveillance (STEPS) after recognising the need for reliable statistics on primary risk elements for this overall prevalence.[7] In both the industrialised and the developing world, diabetes mellitus (DM) is the leading cause of death and disability. The World Health

Organization (WHO) predicts that by 2030, diabetes will be the sixth largest cause of death worldwide.[8] An estimated 347 million individuals throughout the globe are diabetic.[9] It has been noted that the prevalence of DM varies greatly amongst populations and ethnic groups. The incidence of diabetes mellitus (DM) is greatest in developing nations, and this trend is expected to worsen during the next 25 years.[10] India has the highest rate of diabetes prevalence in South Asia. Pakistan, like many other developing nations, is suffering from an increase in the prevalence of diabetes. Despite this, information on the incidence of DM in Pakistan is scant. The prevalence of diabetes mellitus was 13.9% in Sindh and 13.14% in Punjab, according to national level surveys.[11,12] 22% of urban Pakistani adults and 17.1% of rural Pakistani adults were found to have glucose intolerance in a study done in 2007.[13] There has not been another population-based research of diabetes since then. In addition, the most up-to-date criteria for diagnosing DM were not used in prior surveys and research. This research used the most up-to-date ADA diagnostic criteria for glycated haemoglobin (HbA1c) to assess the prevalence of DM in both the urban and rural populations of Jamshoro, Pakistan. No other prevalence research in Pakistan has employed HbA1c as a diagnostic criteria as far as we know. Another purpose was to identify the most prevalent socio-demographic and biological risk factors for developing DM. Therefore, we set out to update and define the epidemiologic profiles of preDM and DM among the population of Jamshoro aged 20-60 years old who visit the medical OPD of LUMHS Hospital. As a follow-up to this report, we ran regressions to learn more about the variables that may have led to the development of diabetes. Lastly, we calculated the proportion of risk for prediabetes and diabetes that may be attributed to modifiable variables in the general population. The research was done to help with public health planning, programming, and funding.

METHODOLOGY

This cross-sectional study surveyed 2,145 members of the general population (aged 20-60) who visited the medical outpatient department (OPD) at LUMHS Jamshoro between January 1, 2022 and July 31, 2022. Due to the lack of current study on this socioeconomic problem, a sample size of 2145 was determined by the use of EPI INFO software and the prevalence of 13.9%(11) from prior research by (Shera AS et all, 1995). As a means of reducing bias, we chose our participants/subjects using a probabilistic kind of convenience sampling. People in their 20s to 60s were included. Chronic renal disease patients, those with severe mental disorder, and those on steroids were not allowed to participate. Also not allowed were pregnant mothers. The survey was given the approval by the LUMHS Hospital Ethical review committee (ERC). The importance, aims, and rationale of the study were disseminated via pre-research interviews with consultant doctors and hospital management. Patients with a confirmed diagnosis of diabetes mellitus were sent to the endocrinology ward at LUMHS in Jamshoro for further clinical examination if required. Data was gathered under the supervision of doctors and registered expert nurses. Participants filled out a questionnaire detailing their socioeconomic status and demographic information such gender, age, education level, eating habits, occupation, personal and family medical history, and lifestyle risk factors. The questionnaire was presented to respondents in their native tongue (Sindhi or Urdu). The questionnaire results were followed up with a comprehensive clinical evaluation. Blood pressure, height, weight, and other physical measurements were recorded (BP). As is customary, we calculated body mass index (BMI) by dividing weight (in kilogrammes) by height (in metres). Measurements of HbA1c, FBS, and Blood CP were taken from blood drawn from veins. When analysing the data, we utilised SPSS 26. To estimate the prevalence of diabetes and prediabetes throughout the whole sample and for subgroups defined by age, gender, and other relevant variables, cross tabulation was developed using the collected data. Diabetes and prediabetes risk factors were estimated and evaluated. A p-value less than 0.05 and a confidence interval (CI) higher than 95% were considered to indicate statistical significance.

RESULTS

Table 1: showing the demographics (Age, Gender, BMI, Residential) data of sample size (n=2145).

Gender	Frequency	Age (mean)	BMI (mean)	Urban	Rural	Std deviation
Male	**1129 (52.6%)**	**31.32**	**34.9**	**632 (29.46%)**	**497 (23.17%)**	**31.45**
Female	1016 (47.4%)	43.19	39.13	635 (29.6%)	381 (17.7%)	41.31

Table 2: showing prevalence (Prediabetes and Diabetes) data of sample size (n=2145).

Diagnosis	Frequency	Percentage	Male	Female	Std deviation	P value
Prediabetes	331	15.4%	127 (38.3%)	204 (61.6%)	13.721	0.0357
Diabetes	857	39.95%	313 (36.5%)	544 (63.4%)	27.432	

Table 3: showing Associative factors of (Prediabetes and Diabetes) data of sample size (n=2145).

Factors	Prediabetes (Male) n= 127		Prediabetes (Female) n= 204		Diabetes (Male) n= 313		Diabetes (Female) n=544	
Responses	**YES**	**NO**	**YES**	**NO**	**YES**	**NO**	**YES**	**NO**
Family History	09%	91%	11%	89%	17%	83%	21%	79%
Smoking Status	39%	61%	13%	87%	37%	63%	17%	83%
Marital Status	71%	29%	84%	16%	91%	09%	97%	03%
Physical Inactivity	71%	29%	63%	37%	69%	31%	67%	33%
Healthy diet status	03%	97%	05%	95%	09%	91%	11%	89%
Central Obesity	67%	33%	53%	47%	71%	29%	69%	31%
Blood Transfusion	11%	89%	04%	96%	17%	83%	03%	97%

Table: 4 showing Lab values of (Prediabetes and Diabetes) data of sample size (n=2145)

Diagnosis	HbA1c (mean)	FBS (mean)	MCV (mean)	TLC (mean)	ESR (mean)	HB (mean)	P value
Prediabetes	6.121	112	91	11876	09	11.21	0.0312
Diabetes	8.367	175	112	14986	27	10.11	

DISCUSSION

It is believed that Pakistan's prevalence of diabetes is increasing. Despite the fact that this study only included (urban and rural) population of Jamshoro Sindh. Given that the study was population-based and used a random sampling technique, it is assumed that the findings accurately reflect the general condition in Pakistan's urban and rural areas. Our study discovered that individuals had a 39.95% prevalence of diabetes and a 15.4% prevalence of prediabetes, which is greater than that of other studies conducted in Pakistan. According to a national survey of diabetics conducted by Shera et al., rural areas had an impaired glucose tolerance rate of 17.1%, but urban areas had a total IGT of 22%.[13] As a result, diabetes is more common urban areas which is also in line with our study, albeit similar high prevalence rates have been found in other studies from around the globe. According to surveys conducted in various Gulf Arab countries, Bahrain has a 25% prevalence of diabetes mellitus.[14] A significant prevalence rate of 34.7% was discovered by another Indian investigation.[15] Similar to that, 15.4% of the study population was found to have pre-diabetes. Our results for prediabetes did not match those of a survey conducted in China, where the prevalence was claimed to be as high as 50.1%.[16] This study, which used the HbA1c test to diagnose diabetes and pre-diabetes, used novel diagnostic criteria in comparison to earlier studies conducted in Pakistan. This test was not employed in earlier national level research and small surveys, which made it possible to overestimate the prevalence of diabetes and prediabetes. Numerous studies have shown that one of the primary causes of the sharp increase in the prevalence rate of DM in recent years is a change in lifestyle brought on by urbanization.[17] The IGT is significantly influenced by age. According to our research, the risk of developing diabetes rose with age, with subjects between the ages of 45 and 60 showing the highest risk. Studies conducted in India revealed the similar pattern.[18] In our study, although women were more likely to have diabetes mellitus (DM) than males (2:1), women were also more likely to have prediabetes (2:1.5), with a statistically significant gender difference ($p>0.05$). Our findings are consistent with those of a national survey carried out by Shera et al. in 2007.[13] They reported that 20.5% of women and 15.9% of males, mostly in the 45–54 age range, had IGT. Samples from the population under study came from both urban and rural locations. In a study conducted by Zafar et al. in a small metropolitan population, it was discovered that women were more likely than men to have diabetes.[19] As a result, there are differences in the ratio of the two sexes among the populations analysed, which may be related to the distribution of risk factors. The study, like others, found a significant correlation between the likelihood of having diabetes and a favourable family history. This finding is consistent with a number of other research that found a very high relationship between family history and the occurrences of diabetes type 2 (DMT2). The notion that DMT2 is a condition with significant genetic impacts and one of the greatest risk factors is now widely acknowledged. Family history can be used as a crucial screening tool for the early identification of diabetes, and it may be used to identify high-risk individuals who might benefit from early interventions to postpone or prevent complications of the condition, which would lower the socioeconomic burden of the illness. Individuals with high BMIs had a higher prevalence of diabetes. People had high BMIs and a high rate of DM as a result of their bad eating habits and sedentary lifestyles. Our investigation revealed that the biggest risk factor for diabetes was not just a high BMI but also central obesity. There is mounting proof that central obesity raises the chance of developing diabetes. Despite having a relatively low level of BMI, research have indicated that Asians, particularly Indian Asians, are more prone to developing diabetes than the Western population. This might be because they have central obesity, which causes insulin resistance syndrome (IRS).[20] Our survey also revealed that, compared to 53% of prediabetic women and 69% of those with diabetes, over 67% of prediabetic men and 71% of those with diabetes have central obesity, which is a very concerning symptom in and of itself. Comparing lab results between

patients with diabetes and those with prediabetes revealed substantial differences. Since this was a cross-sectional comparative study, its findings can be applied to the population of Pakistan's cities. Due to restricted funding, this study had some limitations, including a reduced sample size.

CONCLUSION

Prediabetes was found to have a frequency of 15.4%, while diabetes mellitus had a prevalence of 39.95%; both of these numbers are quite concerning. Body mass index, Smocking, Central obesity, inactivity, and poor nutrition were identified as major contributors. It would be impossible to get an accurate picture of the problem without conducting a comprehensive nationwide survey of both urban and rural areas. Reducing the societal and financial impact of this illness requires an urgent national effort for prevention, early detection, and addressing modifiable risk factors. These disorders are taking a severe toll on people's health and putting the community at risk as a whole, thus health authorities and policymakers must act immediately to improve diagnosis and early prevention, control, and treatment.

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