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Prevalence of Pre-diabetes, Diabetes and Associated Risk Factors among Staff and Students of Federal Polytechnic, Kaura-Namoda

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ABSTRACT

Obesity and overweight are major public health issues worldwide. This study was aimed at assessing the prevalence of diabetes and its associated risk factors among the staff and students of Federal Polytechnic Kaura-Namoda. A total of 159 participants took part in the study, consisting of 60 staff and 99 students. Anthropometric measurement and the World Health Organization's (WHO) cut-offs were used to classify body weight into underweight, normal weight, overweight and obesity. Fasting blood glucose (FBG) level was determined using glucometer. Blood pressure was measured using an electronic blood pressure monitor. The overall prevalence of diabetes was 2.5%, with 2.0% being known cases and 0.5% newly diagnosed individuals. The prevalence of diabetes was higher in staff (2%) than in students (0.5%). The prevalence of pre-diabetes was 5.7%, with 4.4% occurring in staff and 1.3% in students. While the prevalent overweight and obesity were 51% and 23.9% respectively, among the participants, with students being more affected than staff. Hypertension was found in males (1.9%) and none in females. Also, pre-hypertension was more prevalent in students (32%) than in staff (0%). Pre-diabetes was more prevalent in overweight, obese, hypertensive, and 40 years or above participants. There was a correlation between diabetes and age, obesity, and hypertension. In conclusion, low prevalence of overweight, obesity, hypertension, and diabetes were found among the staff and students of Federal Polytechnic Kaura Namoda. The adoption of regular physical exercise, healthy eating habits, and a healthy lifestyle is therefore recommended among the staff and students for improved health status.

Keywords: Overweight, Obesity, Body Mass Index, Hypertension and Diabetes.

1.0 INTRODUCTION

Diabetes Mellitus (DM) is one of the most common public health challenges. In the 21st century, DM is one of the most common public health challenges, characterized by persistent hyperglycemia and metabolic disturbances caused by an absolute or relative insulin secretion or action deficiency (Pan, et al., 2024). Type 1 DM occurs when the pancreas cannot produce insulin, while type 2 DM occurs when the body cannot effectively use insulin or when there is insufficient insulin production (Yin, et al., 2024). DM-related complications can significantly impact organ function, causing suffering beyond the disease (CDC, 2024). In 2010, there were approximately 285 million adults (6.4%) with diabetes worldwide, with predictions of a rise to 439 million (7.7%) by 2030 (WHO, 2016). Approximately 90-95% of these cases will be type 2 DM, with significant increases predicted in developing countries and adults between 45-64 years of age. These predictions indicate a growing

burden of diabetes, particularly in developing countries (Ochi, et al., 2024). In Nigeria, DM prevalence was estimated at around 3.7 % in 2021 and by 2045 it will be around 55 million (IDF, 2024). characterized by persistent hyperglycemia and metabolic disturbances due to insufficient insulin secretion or action, either absolute or relative (Kankara, Ibrahim, & Ade, 2023).

Both type I and type II diabetes mellitus are characterized by distinct causes that give rise to heightened sugar levels in the blood, leading to a range of complications (Saedi, Petersohn, & Salpea, 2019). These complications may include damage to the small and large blood vessels, resulting in issues with the kidneys, nerves, heart, and eyes. Additionally, high blood pressure and cholesterol levels can exacerbate the risk of cardiovascular disease (Sabitha, 2011). Though diabetes has no cure, it can be effectively managed

by using medications designed to lower blood sugar levels (Kankara, Ibrahim, & Ade, 2023).

2.0 RESEARCH DESIGN AND METHODS

2.1 Study Design

The study is a population based descriptive research

2.2 Inclusion and Exclusion Criteria

The study population for this research includes the staff and students of Federal Polytechnic, Kaura Namoda, who voluntarily agree to participate and sign a consent form. However, individuals below 18 and non-staff or non-students are excluded from the study.

2.3 Sampling and sample size

The population of the Polytechnic was divided into two strata - Staff and Students. Each stratum was further divided into clusters based on gender. The study selected a sample size of 10% of the subjects from each stratum to represent the population, considering the costs involved in conducting the survey (Mugenda & Mugenda, 2003)

2.4 Data Collection

The participants were interviewed using a 20-item questionnaire to gather data during the study. The questionnaire included three parts: the first part focused on demographics such as age, education, employment, and marital status. The second part had questions about smoking, chronic medical illness, and chronic pain. The last part consisted of physical parameters such as weight and height. All participants completed the self-administered questionnaire, followed by a physical examination and blood test to collect additional information.

2.5 Anthropometric Assessment

Participants' height, body weight, and blood pressure were measured using standardized techniques. Weight was taken using a scale of 0.1 kg, with participants wearing light clothes and no shoes. Height was measured to the nearest 0.1 cm while participants stood with their back to the wall, touching the occiput, back, hip, and heels. Body mass index (BMI) was calculated by dividing weight in kilograms by height in meters squared (kg/m²) (NHLB, 2024). Blood pressure was measured using a mercury sphygmomanometer.

Participants were asked to rest for 10 minutes seated before their blood pressure was estimated to reduce variations. Three readings were taken, and the mean was recorded (WHO, 2016)

2.6 Biochemical Assessment

Blood samples were collected using sterilized disposable vacutainer tubes containing sodium fluoride (for glucose). Within 1 hour of blood collection, the samples were centrifuged, separated and sent to the laboratory. Plasma glucose was measured using the glucose oxidase peroxidase method (Kankara, Ibrahim, & Ade, 2023).

2.7 Diagnostic criterion

The WHO definition was used to diagnose diabetes and pre-diabetes (intermediate hyperglycaemia). The fasting blood glucose level testing results were categorized as follows: fasting blood glucose of 7mmol/L or higher was considered diabetes. In contrast, a fasting blood glucose level between 6.1mmol/L and 6.9mmol/L was classified as pre-diabetes. Additionally, BMI was used to determine weight status, with normal BMI being less than 25, overweight being between 25 and 30, and obese being over 30. People were considered hypertensive if a physician had already diagnosed them, were taking antihypertensive medication, or if their systolic blood pressure was 140mm Hg or higher and their diastolic blood pressure was 90mm Hg or higher. (WHO, 2016)

2.8 Statistical analysis

The data was analyzed using SPSS V.20. Descriptive analysis involved estimating the mean and standard deviation for continuous variables. Prevalence values were presented as percentage. The prevalence of diabetes was calculated using the following formula (Cochran, 1977).

$$P = \frac{\text{Sample size}}{\text{Total population}} \times \frac{\text{Number of diabetics}}{\text{Sample size}}$$

Associated risk factors of diabetes, pre-diabetes, hypertension, and obesity were investigated using regression analysis. Univariate logistic regression was carried out to select potential predictors ($p \leq 0.05$).

3.0 RESULT AND DISCUSSION

3.1 Result

This survey gathered data from 300 individuals, with a response rate of 53%, resulting in 159 participants. Table 1 outlines the basic characteristics of the study population, revealing that all participants had at least a tertiary level of

education. Of those who participated, 62.3% were female, and 37.7% were male. The majority of students (63.2%) fell in the age range of 30-39 years old, with 57.5% female and 42.5% male. Similarly, 44.4% of staff were within this age range, with 55.6% female and 44.4% male. The study focused on screening these 159 subjects for diabetes.

Table 1: Socio-demographic Characteristics of the of the study participants, by Staff and Students of Federal Polytechnic Kaura Namoda

| | Staff | Students |
|-------------------------------------|-----------|-----------|
| Number of participants | 72 | 87 |
| Age | | |
| 19-29 | - | 55 (63.2) |
| 30-39 | 30 (41.7) | 32 (36.8) |
| 40-49 | 25 (34.7) | - |
| 50-59 | 10 (13.9) | - |
| 60-69 | 7(9.7) | - |
| >70 | - | - |
| Gender | | |
| Male | 32(44.4) | 37(42.5) |
| Female | 40(55.6) | 50 (57.5) |
| Primary education or more | 72 (100) | 87 (100) |
| Tobacco addiction | 2 (2.3) | 4 (5) |
| Positive family history of diabetes | 8 (11) | 6 (7) |

In Table 2, the Body Mass Index (BMI) of the participants was presented. The results showed that only 4.2% of the staff had an average body weight classified as Normal. The majority of the staff

(70.8%) were overweight, while 25% were classified as Obese. Among the students, 27.58% had a normal body weight, while 24.1% were overweight.

Table 2 Body Mass Index (BMI) of among staff and the students of federal polytechnic Kaura Namoda

| Participants/BMI | Normal(kg/m ²) | Overweight(kg/m ²) | Obesity(kg/m ²) |
|------------------|----------------------------|--------------------------------|-----------------------------|
| Staff | 4.2(24.26+0.02) | (70.8) 28.62+1.22 | 25(32.70+2.71) |
| Student | 27.58(23.56+1.29) | 24.1 (27.94+1.41) | 48.32(36.21+4.65) |

Data are presented as % (mean±SD) Normal weight BMI 18.5-24.9 kg/m²; Overweight BMI 25.0-29.9kg/m²; Obesity BMI ≥30kg/m² (WHO, 2010)

Table 3. Percentage of the prevalence of diabetes and pre-diabetes among staff and the students of federal polytechnic Kaura Namoda

| Participants | Pre-diabetes mmol/L % (95%CI) | Diabetes (mmol/L) % (95%CI) | Newly diagnosed diabetes |
|--------------|-------------------------------|-----------------------------|--------------------------|
| Staff | 4.4 (6.65-6.71) | 1.5 (11.23-11.25) | 0.5 (10.23-10.2) |
| Student | 1.3 (6.28-6.32) | 0.5 (8.65-8.71) | - |
| Total | 5.7 | 2.0 | 0.5 |

Diabetes: fasting blood glucose ≥7mmol/L; Pre-diabetes: fasting 6.1–6.9mmol/L

Table 4. Percentage prevalence of Hypertension among staff and the students of federal polytechnic Kaura Namoda

| Participants | At Risk Systolic (mm/Hg) | Diastolic (mm/Hg) % (95%CI) | Hypertension Systolic(mm/Hg) % (95%CI) | Diastolic(mm/Hg) % (95%CI) |
|--------------|--------------------------|-----------------------------|--|----------------------------|
| Staff | 0(128.79-131.15) | 0.45 (84.52-85.6) | 1.9 (139.2-140.2) | 1.9 (93.1-93.64) |
| Student | 32 (128.79-131.15) | 0.02 (83.1-83.64) | | |

Normal Systolic ≤ 120 Diastolic ≤ 80 ; At risk of Hypertension Systolic ≤ 139 Diastolic ≤ 89 ; Hypertension Systolic ≥ 140 Diastolic ≥ 90

The multivariable logistic regression analysis findings, presented in Table 5, identify the risk factors for diabetes, pre-diabetes, hypertension, and obesity. The results indicate that individuals aged 40 years or older with a family history of diabetes, hypertension, and obesity are at a significant risk

for developing diabetes ($p \leq 0.001$). Additionally, the study found a noteworthy correlation between having a family history of diabetes, developing diabetes and hypertension, being 40 years or older, and being obese ($p \leq 0.05$).

Table 5. Risk Factors associated with Diabetes

| Risk Factors | Diabetes | |
|----------------------------|--------------------|----------|
| | Adjusted R (95%CI) | P values |
| Gender | | |
| Male | 0.063-0.069 | 0.52 |
| Female | 0.227-0.240 | 0.51 |
| Aged (>40years) | 0.288-0.292 | 0.001 |
| Obesity | 0.291-0.299 | 0.000 |
| Hypertension | 0.227-0.240 | 0.002 |
| Family history of diabetes | 0.291-0.299 | 0.001 |

Linear regression was used for obtaining adjusted R and p value.

3.2 Discussion

The present study estimated the overall age-adjusted weighted prevalence of diabetes and pre-diabetes, which were 2.5% and 5.7%, respectively. Further analysis revealed that the prevalence of diabetes and pre-diabetes among staff and students was 2.0% and 0.5%, respectively. The age and gender-weighted prevalence also suggest that in the early years, pre-diabetes is more common, but diabetes prevalence rises steeply after the age of 30. This could be due to the rapid transition from pre-diabetes to diabetes observed in the participants. The prevalence of DM among adults aged 20-69 years in Nigeria is estimated to be 1.7%, according to the International Diabetes Federation (IDF). However, many experts believe this figure significantly underestimates the burden of DM in the country, as it is based on data extrapolated from other nations. Recent studies have reported prevalence rates ranging from 2% to 12% across Nigeria. The last nationwide survey on DM in

Nigeria occurred during the 1992 Nigerian National Non-Communicable Diseases (NCD) survey, which found that 2.2% of the population had DM. Since then, there has been no nationwide health survey on diabetes. It is essential to accurately determine the burden of DM in Nigeria to enable appropriate health resource allocation, advocacy, and planning.

The study also looked into other factors, such as hypertension and obesity, which were also low. This indicates a rise in the risk factors that lead to diabetes, making it a major public health concern. Therefore, the study's findings highlight the importance of taking preventive measures and intervening early to decrease the burden of diabetes and its related complications.

3.3 Conclusion

This research revealed low diabetes prevalence in Federal Polytechnic Kaura Namoda. However, the country needs national strategies for early

diagnosis, effective management, and cost-effective primary prevention programs to manage the condition.

Conflict of Interests

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