Journal of Advances in Medicine and Medical Research

27(12): 1-7, 2018; Article no.JAMMR.44640
ISSN: 2456-8899
(Past name: British Journal of Medicine and Medical Research, Past ISSN: 2231-0614, NLM ID: 101570965)

Prevalence of Type II Diabetes Mellitus (T_2DM) and Risk Factors among Rural Farmers

Ayuba Affi[1*], Dalili Shabbal[2], Mercy Solomon[1], S. A. Longwam[1], A. Lukdem[1], T. Selowo[1] and Ganiyu Amusa[3]

[1]Department of Chemical Pathology, University of Jos, Nigeria.
[2]Department of Chemical Pathology, College of Health Sciences, University of Abuja, Nigeria.
[3]Department of Internal Medicine, University of Jos, Nigeria.

Authors' contributions

This work was carried out in collaboration between all authors. Author AA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors DS, SAL, TS, MS, AL and GA managed the analyses of the study. Authors MS, AL and GA managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JAMMR/2018/44640
Editor(s):
(1) Dr. Mohamed Essa, Department of Food Science and Nutrition, Sultan Qaboos University, Oman.
Reviewers:
(1) Arthur Chuemere, University of Port Harcourt, Nigeria.
(2) Mra Aye, Melaka Manipal Medical College, Malaysia.
(3) Rupali Sengupta, SNDT Women's University, India.
Complete Peer review History: http://www.sciencedomain.org/review-history/27103

Original Research Article

Received 08 August 2018
Accepted 21 October 2018
Published 08 November 2018

ABSTRACT

Aim: To determine prevalence of T_2DM and risk factors among rural farmers of Panyam in Plateau Central, Nigeria.
Background: Diabetes mellitus is one of the commonest metabolic disorder characterized by persistent hyperglycemia due to lack of insulin secretion or inactivity of insulin resulting in risk of microangiopathy and macroangiopathy [1,2].
Many lifestyle factors affect the incidence of Type II Diabetes Mellitus, which includes cigarette smoking, inactivity and heavy alcohol consumption that could cause hyperuriceamia. Other risk factors include obesity, age, family history.
Materials and Methods: The study population consisted of 200 adults above 40 years mainly farmers. Both females and males were recruited into the study.

**Corresponding author: E-mail: ayubaaffi67@gmail.com;*

Venous blood (2.5 ml) was collected into fluoride-oxalate and transported to the chemical pathology lab in JUTH within 2 using enzymatic uricase method for serum uric assay. The reference interval for SUA if 120-420 µmol/L. Glucose was determined by glucose oxidase method. The coefficient of variation of glucose is 6.4% at 5.6 mmol/L and 2.1% at 18.3 mmol/L. The reference interval for serum glucose is 3.5-5.9 mmol/L.

Results: The data obtained were coded and entered into State Software for analysis. The data are presented as mean ±S.D. comparison was done by student's t-test for continuous variables. The overall crude prevalence of T2DM in Panyam farmers was 5.5% while for males and females prevalence was 4% and 6% respectively.

A BMI of >30 kg/m^2 was found in 31 individuals giving a prevalence 15.5% and SUA prevalence of 41% with 32% being prevalence of hypertension.

Conclusion: It shows that the prevalence of Type II Diabetes Mellitus for the general population was 5.5 mmol/L with high uric acid levels. The associated risk factors such as lifestyle of alcoholism indulgence could explain this outcome.

The high prevalence of Type II Diabetes Mellitus warrant adequate preventive measures like dietary advice exercise and adjusting lifestyle with moderation or total abstinence from alcohol will go a long way in reducing this disease.

Although he present analysis is based on a limited number of diabetics, the evidence of consistently against interaction between diabetes and cardiovascular risk factors.

Keywords: T_2DM = Type II diabetes mellitus; SUA = Serum uric acid; BMI = Body mass index.

1. INTRODUCTION

Diabetes mellitus is one of the commonest metabolic disorder characterised by persistent hyperglycemia due to lack of insulin secretion or inactivity of insulin resulting in risk of microangiopathy (blindness, kidney failure, limb amputation) and macroangiopathy(Ischemic heart disease, stroke and peripheral vascular damage) [1,2].

Globally, approximately 200 million people currently have type II DM a prevalence that has been predicted to increase to 366 million by 2030. The rate of cardiovascular disease mortality and morbidity are particularly high in this population.

It is estimated that prevalence of T_2DM is 1% [3,4].

Many lifestyle factors affect the incidence of T_2DM, which includes cigarette smoking, inactivity and heavy alcohol consumption that could cause hyperuriceamia. Other risk factors include obesity, age.

Type 2 diabetes mellitus (T_2DM) comprises about 90% - 95% of all diabetes cases, and its prevalence has been steadily increasing, Obesity, classified as body mass index (BMI)> 30 kg/M^2, is a known predictor of T_2DM and has become a major public health problem [7].

It is clear that increased body weight is a risk factor for T_2DM, the relationship between body weight and Type is more properly attribute to the quantity and distribution of body fat. Increase adipose tissue (adiposopathy) distribution leads to peripheral insulin resistance leading to T_2DM. That is why decreasing weight proportionally lower blood glucose levels [8,9].

It has become pertinent to study the prevalence of and assess risk factors for Type II Diabetes Mellitus in Panyam Plateau Central of Nigeria.

2. MATERIALS AND METHODS

2.1 Study Design and Setting

This is a cross-sectional prospective study done at Panyam district (PHC). Subjects were selected by random sampling technique. Primary health care (PHC) Panyam district of Mangu area of plateau central was the area of study. The study was preceded by an announcement by the district head to the Churches and Mosques a week prior the study.

2.2 Sample and Sampling Method

The study population consisted of 200 adults above 40 years mainly farmers. Both females and males were recruited into the study.

This study was done between 08:00 and 15:00 h in April 2016.

On arrival at the study venue, each subject was allowed to rest for about 10 min. A brief health education was given. Socio-demographic data and history of personal habits such as alcohol consumption was taken.

Physical examination was carried out by the authors. The weight of the subject was measured to the nearest kilogram with a Hanson type bathroom weighing scale. The height was measured to the nearest centimeter. The body mass index (BMI) was calculated and recorded. Classification by BMI was done according to the recommendations of the WHO expert committee for the classification of overweight.

The waist and hip circumferences were measured with a flexible tape to the nearest 0.5 cm wearing minimal clothing; the waist/hip ratio (WHR) was then calculated and recorded.

Venous blood (2.5 ml) was collected into fluoride-oxalate and transported to the chemical pathology of JUTH within 2 h for the determination of casual plasma glucose (CPG) by the glucose oxidase method. Subjects who had CGP levels ≥ 7.0 mmol/l were subjected to a 75 g oral glucose tolerance test (OGTT) as soon as possible during the study period, with sampling at 0 and 2 h after glucose load. Subjects reported for OGTT between 08:00 and 09:00 h after overnight fasting.

2.2.1 Inclusion criteria

1) Age, 40 years and above.
2) Resident in the study area- Panyam, Mangu.
3) Selected by the random sampling procedure explained above.
4) Willing to participate and comply with the instructions of the study e.g. overnight fasting where necessary.
5) Informed consent

2.2.2 Exclusion criteria

1) History of use of drugs that could affect glucose metabolism e.g. steroids, B-blockers, thiamine diuretics
2) Pregnant women.

2.3 Ethical Consideration

This study was conducted with adherence to ethical standards. Informed consent was used in the recruitment of participants. Approval for this study was obtained from the Ethics committee of JUTH. Confidentiality was maintained in accordance with standard medical practice.

3. RESULTS

3.1 Characteristics of Study Participants According to Their Quartiles

The analysis was conducted on 200 farmers who had both BMI, GLU, Uric acid and blood pressure assessment. The age range of the individuals was 40-80 years and approximately 43% were male and 57% female.

The overall crude prevalence of T_2DM in Panyam farmers was 5.5% while for males and females prevalence was 4% and 6% respectively.

A BMI of ≥ 30 kg/m^2 was found in 31 individuals giving a prevalence 15.5% with SUA prevalence of 41% with 32% being prevalence of hypertension.

3.2 Associations

Partial Spearman correlation analysis demonstrated the strongest association between Uric acid and body mass index (BMI) and GLU. It also signifies a low correlation between uric acid and blood pressure. BMI had a very little relationship with GLU, so also SBP, GLU, DBP, and GLU. SBP and DBP had a very strong Correlation from the data analyzed.

Table 1. Characteristics of study participants according to their quartiles

Characteristics	1st quartile	2nd quartile	3rd quartile	4th quartile	P-value
	≤0.2	0.2-0.24	0.25-0.29	≥0.30	
AGE	47.5±7.5	59±3	85±5	110±10	<0.0001
BMI	19.58±2.64	23.40±1.05	26.52±2.06	33.73±4.84	<0.0001
GLU(F/R)	2.04 – 3.85	3.93 – 4.76	4.81 – 6.5	6.6 – 11.6	<0.0001
SBP	110±10	125 ±5	135±5	160±20	<0.0001
DBP	75±5	80 ±5	85±5	110±10	<0.0001

Table 2. Partial Spearman correlation coefficients among Uric acid, blood pressure, Body mass index and Graphical Representation Histograms

	Uric acid	BMI	SBP	DBP
BMI	0.1453			
SBP	-0.0394	-0.0740		
DBP	-0.0758	-0.0767	0.7561	
GLU(F/R)	0.1265	0.0108	0.0972	0.0250

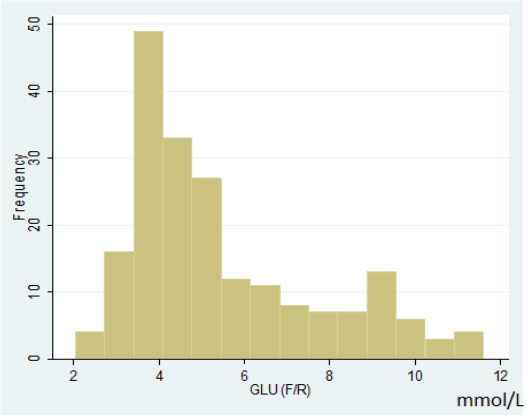

Fig. 1. A histogram showing glucose levels

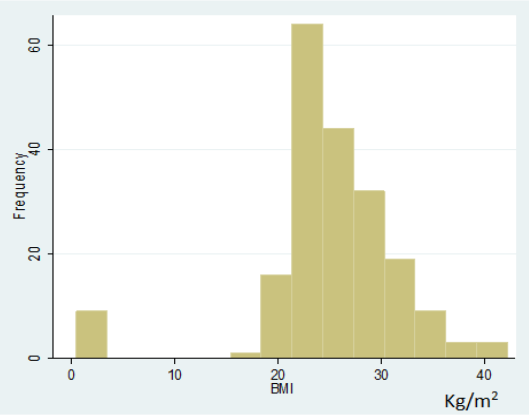

Fig. 2. A histogram showing BMI distribution

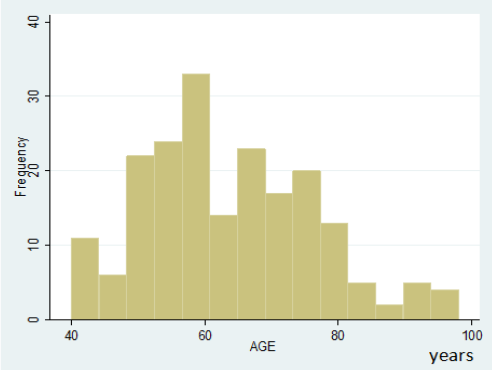

Fig. 3. A histogram showing age distribution

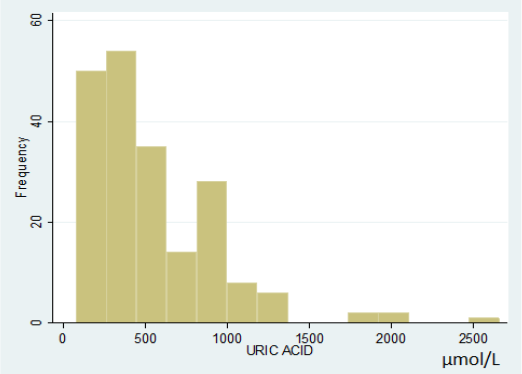

Fig. 4. A histogram showing uric acid levels

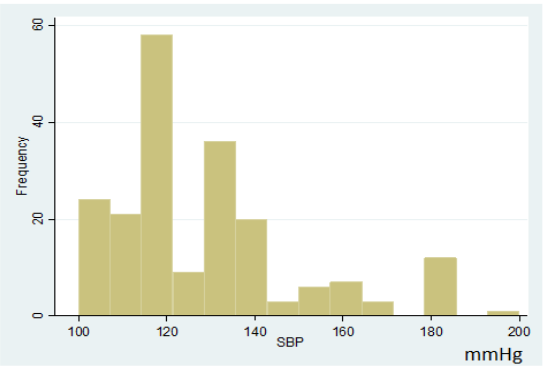

Fig. 5. A histogram showing SBP distribution

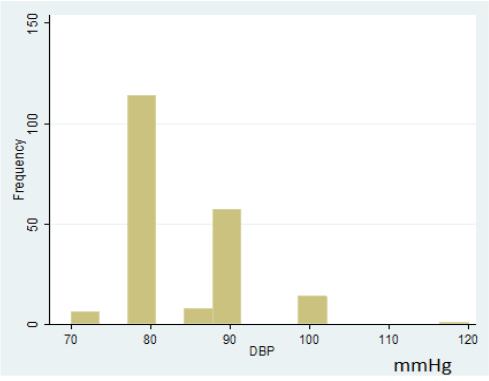

Fig. 6. A histogram showing DBP distribution

Frequency = Population

4. DISCUSSION

This study was aimed at unveiling the prevalence and risk factors of T_2D in elderly farmers.

The overall crude prevalence of T_2DM in Panyam farmers was 5.5% while for males and females prevalence was 4% and 6% respectively. This is close to that found in Jos, an urban area with rate of 3.1% but at variance to prevalence found in the same area more than a decade ago of 1.6%. This increase prevalence could be due to modernization. The mean glucose level of this work 5.5% with 4% in males and 6% in female is similar to the work is in accord with the study in Western Nigeria [5].

Some proven and hypothesized risk factors were examined to evaluate their associations with T_2DM in a population. The findings of the study are in accord with what has been known about obesity and diabetes. Obesity is the strongest controllable risk factor for T_2DM. Subjects with BMI ≥ 30 kg/m^2 were at significant higher risk of having T_2DM [8-10].

Aging was another identified independent risk factor for T_2DM, which was more prevalent in subjects aged 50-60 years. McLarty et al. [6] that the peak incident of diabetes in Nigeria was 45-50 years of age. It is known that the prevalence of T_2DM increases with advance in age [12].

Indulgence of heavy alcohol consumption has been positively associated with T_2DM due to hepatic damage known to complicate alcoholism [7]. It was been found that the average farmer spent his leisure time at the local beverage bar every evening leading to hyperuriceamia. It was also known that moderate alcohol consumption reduces the risk of T_2DM by improving insulin sensitivity [14]. These elderly were found to have increased prevalence of T_2DM as compared to the previous work done in the same locality.

A part from the inherent family history predisposition there are additional increase in the risk factors like the hyperuriceamia, BMI and sedentary lifestyle [15].

If these risk factors are not checked there, will be a vicious circle of increased energy intake and reduce energy expenditure and vice versa. In the United States, diabetes is found to be increasing simultaneously with obesity. T_2DM is found to be steadily increasing and obesity (adiposopathy) [16] proportionally rising affecting over 1/3 (35.7) of the United States population.

In Nigeria (plateau), a work done in not too recent past showed overweight of 22% by Puepet et al. Jos, [4] another urban center had a T_2DMprevalence rate of 3.1% [13]. Although these studies included younger age groups, the wide difference observed may not be explained by age alone [17].

The influence of time and modernisation may explain the difference between these two studies. Advancing age was another identified independent risk factor for diabetes, which was more prevalent in subjects aged 50 years and above. McLarty et al. [6] found that the peak incidence of diabetes in Nigeria and Tanzania, respectively, was after 45-50 years of age. It is well known that the prevalence of diabetes increases with age [19]. In Nigeria, the risk of diabetes increases 3-4 folds after the age of 44 years [11]. The worsening of insulin resistance with age and increasing longevity of diabetic patients due to improved care, all contribute to the rising prevalence of type 2 diabetes with age [14,19].

Physical inactivity that may be responsible for the increased BMI is a well-known risk factor for type 2 diabetes. The risk of diabetes was reduced by 50% among men who take moderately vigorous exercise. This suggests that not all diabetes is the same or that other factors markedly influence its impact on health.

The cardiovascular sequelae of diabetes may differ, depending on whether the diabetes is hyperinsulinemic, early or late in onset caused by some known cause, or treated or untreated [18,19].

Some studies of cigarette smoking among diabetics have been published [20]. The finding of reduced cigarette consumption among diabetic males appears to be unique.

In general, it does not appear that diabetics cope less well with risk factors than do non-diabetics. Although the present analysis is based on a limited number of diabetics, the evidence of consistently against interaction between diabetes and cardiovascular risk factors.

5. CONCLUSION AND RECOMMENDATION

The prevalence of T_2DM has almost doubled since the previous study.

Most of the identifiable risk factors are controllable and therefore the prevalence can be reduced if not completely eradicated.

The sedentary lifestyle caused by obesity in the life of an alcoholic will further diminish energy expenditure leading to a vicious circle. A vicious circle of the sustained increase in energy intake and decreased energy expenditure – a circle almost impossible to break. It is prudently recommended that the subject should be screen regularly, health education given, dietary counseling and exercise be advocated.

CONSENT

Informed consent was used in the recruitment of participants.

ETHICAL CONSIDERATION

This study was conducted with adherence to ethical standards. Approval for this study was obtained from the Ethics committee of JUTH. Confidentiality was maintained in accordance with standard medical practice.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. WHO. Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1, WHO, Geneva; 1999.
2. Akinkugbe OO, (Ed). Non-communicable disease in Nigeria. Final Report of National Survey, Federal Ministry of Health and Social Services, Lagos. 1997;64-90.
3. Olatunbosun ST. Prevalence of diabetes mellitus and impaired glucose tolerance among civil servants in Ibadan, Oyo State, Nigeria. WACP Dissertation, West African Postgraduate Medical College; 1996.
4. Puepet FH. The prevalence of diabetes mellitus and associated risk factors in adults in Jos. FMCP Dissertation, Postgraduate Medical College; 1996.
5. Ohwhovoriole AE, Kuti JA, Kabiawu SIO. Casual blood glucose levels and prevalence of undiscovered diabetes mellitus in Lagos Metropolis, Nigeria. Diabetes Research and Clinical Practice. 1989;4(2):153-158.
6. McLarty DG, Swai ABM, Kitange HM, Masuki G, Mitnangi BL, Kilama PM, Makene I, Chuwa LM. Prevalence of diabetes and impaired glucose tolerance in rural Tanzania. The Lancet. 1989;1:871-875.
7. Rimm EB, Chan J, Stamper MJ, Corditz GA, Willet WC. Prospective study of cigarette smoking, alcohol use and the risk of diabetes in men. British Medical Journal. 1995;310:555-559.
8. WHO Expert Committee on Diabetes Mellitus. Second Report WHO Technical Report Series 646, WHO Geneva; 1980.
9. Zimmet P. Type 2 (non-insulin dependent) diabetes. An epidemiological overview. Diabetologia. 1982;22:299-311.
10. Groop LC. Insulin resistance. The trigger of type 2 diabetes, obesity and metabolism. 1999;1(Suppli):S_1-S_7.
11. Shurtleff D. Some characteristics related t the incidence of cardiovascular disease and death. Framingham study, 18-year follow-up. DHEW Publication No. (NIH). 1974;74-599.
12. Gordon T, Garcia-Palmieri MR, Kagan A, Kannel WB, Schiffman J. Differences in coronary heart disease in Framinghan, Honolulu and Puerto Rico. J Chron Dis. 1974;27:329-344.
13. West KM. Diabetes in American Indians and other native populations of the new world. Diabetes. 1974;23:841.
14. Frosnitz LR, Mandell GL. Diabetes mellitus among Navajo and Hopi Indians: The lack of vascular complications. Am J Med Sci. 1967;253:700.
15. William B. Kannel, Daniel L. McGee. Diabetes and cardiovascular disease: The Framingham study. JAMA. 1979;241(19): 2035-2038
16. Araneta MR. Ethnic differences in visceral adipose tissue and type 2 diabetes: Filipino, African-American and white women. Obes Res. 2005;13:1458-1465.
17. Owoaje EE, Rotimi CN, Kaufman JS, Tracy J, Cooper RS. Prevalence of adult diabetes in Ibadan, Nigeria. East Afr. Med. J. 1997;74(5):299-302.

18. Sonny Chinenye, Ekene Young. State of diabetes care in Nigeria. Niger. H, J. 2011;4:101-105.
19. Nyenwe EA, Odia OJ, Ihekwaba AE, Ojule A, Babatunde S. Type 2 diabetes in adult Nigerians: A study of its prevalence and risk factors in Port Harcourt, Nigeria. Diabetes Res. Clin. Pract. 2003;62(3):177-85.
20. Akinjinmi AA, Adeyooye OA, Akhingbade OA, Okerentugba PO. Prevalence of diabetes mellitus in Abeokuta, Ogun State, Nigeria. Researcher. 2014; 6(2).

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sciencedomain.org/review-history/27103