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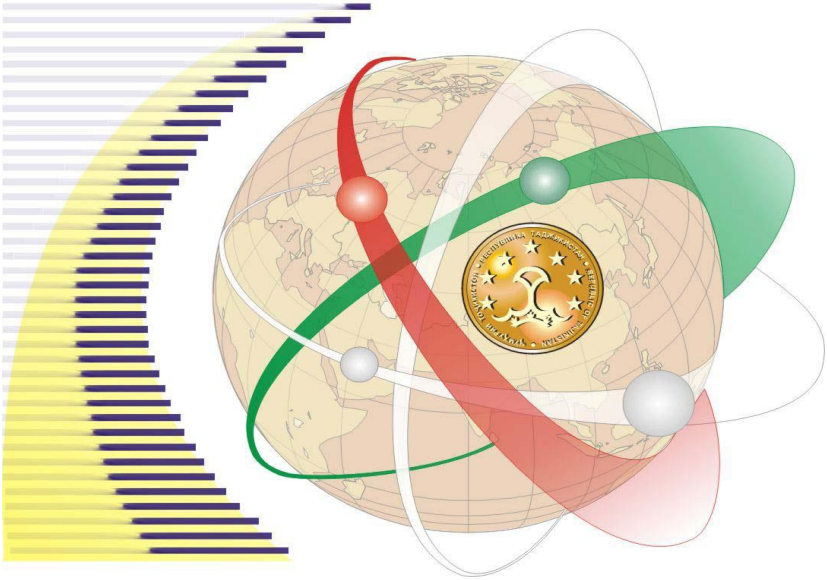

03 BP 1665Tél (229) 21 32 12 63 2132 09 77
Fax : (229) 21 32 36 71
Mail : cahiersducbrst@yahoo.fr ;
cahiersducbrsi@gmail.com
Site Web: http:/www.cbrst-benin.org

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PREVALENCE AND FACTORS ASSOCIATED WITH TYPE 2 DIABETES IN AVRANKOU, SOUTHERN BENIN

PREVALENCE ET FACTEURS ASSOCIES AU DIABETE DE TYPE 2 A AVRANKOU, AU SUD DU BENIN

PADONOU Sètondji Géraud Roméo [1*], GNINKOUN Comlan Jules [2], MIZEHOUN-ADISSODA Carmelle [3], DAMIEN Georgia [1], HINSON Antoine Vickey [4], AYELO Paul [4], AGUEMON Badirou [1]

1 : Département de Santé Publique. Faculté des Sciences de la Santé. Université d'Abomey-Calavi. 01 BP 188 Cotonou, République du BENIN.
2 : Service d'endocrinologie et diabétologie. Centre National Hospitalier et Universitaire HKM. Faculté des Sciences de la Santé. Université d'Abomey-Calavi. 01 BP 188 Cotonou, République du BENIN.
3 : Ecole de Nutrition et Diététique. Faculté des Sciences de la Santé. Université d'Abomey-Calavi. 01 BP 188 Cotonou, République du BENIN.
4 : Unité de recherche et d'enseignement en santé au travail et environnement. Faculté des Sciences de la Santé. Université d'Abomey-Calavi. 01 BP 188 Cotonou, République du BENIN.
***Corresponding author :** Sètondji Géraud Roméo PADONOU; Département de Santé Publique. Faculté des Sciences de la Santé. Université d'Abomey-Calavi. 01 BP 188 Cotonou, République du BENIN. geraudpad@yahoo.fr Tél : 00229 66 64 75 75*

ABSTRACT

Objectives: In a context of epidemiological transition of chronic non-communicable diseases in middle-income and low-income countries, the objectives of this study were to determine the community prevalence of type 2 diabetes and to research the associated factors.
Methods: A descriptive and analytical cross-sectional study was conducted from July to September 2021 in Avrankou, a city located in the south-east of Benin. 402 subjects were recruited from whom the following data were collected: fasting capillary glycaemia, anthropometric measurements, socio-demographic and economic factors, nutritional information, practice of physical activity. A logistic regression model was made to identify the factors associated with diabetes defined by a glycaemia > 1.26 g/L.

Results: Prevalence of diabetes in our sample was 13.18%. Mean age (SD) was 45.74 (7.89), the M/F sex ratio was 1.32. Most were civil servants or executives (40.81%), 44.53% had a BMI > 25, 40.05% were sedentary. Mean food consumption score was 32.79 and the food diversity score was 8.32. Age > 40 years (OR=2.34; p=0.000), BMI > 25 (OR=3.79; p=0.000), sedentary lifestyle (OR=2.09; p=0.001) and household wealth index (OR=1.94; p=0.02), were significantly associated with the occurrence of type 2 diabetes. **Conclusion**: This study highlights the need to intensify public health interventions to prevent the onset of diabetes in target populations, by acting on modifiable risk factors.

***Key-words**: Type 2 diabetes-Risk factors-BMI-Sedentary lifestyle -Household wealth index*

RESUME

Introduction : Dans un contexte de transition épidémiologique des maladies chroniques non transmissibles dans les pays à revenu intermédiaires ou faible, cette étude avait pour objectifs de déterminer la prévalence en communauté du diabète de type 2 et d'en rechercher les facteurs associés.
Matériel et méthodes : Une étude transversale descriptive et analytique a été menée de Juillet à septembre 2021 à Avrankou, une ville située au sud-est du Bénin. 402 sujets ont été recrutés chez qui les données suivantes ont été collectées : glycémie capillaire à jeun, mesures anthropométriques, facteurs sociodémographiques et économiques, informations nutritionnelles, pratique d'activités physiques. Un modèle de régression logistique a été fait pour identifier les facteurs associés au diabète défini par une glycémie supérieure 1,26 g/L.
Résultats : La prévalence du diabète dans notre échantillon était de 13,18%. L'âge moyen (ET) était de 45,74 (7,89), le sex ratio M/F était de 1,32. La plupart était fonctionnaire ou cadre (40,81%), 44,53% avaient un IMC > 25, 40,05% étaient sédentaires. Le score moyen de consommation alimentaire était 32,79 et celui de diversité alimentaire était 8,32. L'âge > 40 ans (OR=2,34 ; p=0,000), l'IMC > 25 (OR=3,79 ; p=0,000), la sédentarité (OR=2,09 ; p=0,001) et l'indice de richesse du ménage (OR=1,94 ; p=0,02), étaient significativement associées à la survenue du diabète de type 2.

Conclusion : Cette étude souligne la nécessité d'intensifier les interventions de santé de publique pour prévenir la survenue du diabète dans les populations cibles, en agissant sur les facteurs de risque modifiables.

Mots clé *: Diabète de type 2-Facteurs de risque-IMC-Sédentarité-Indice de richesse du ménage.*

INTRODUCTION

Diabetes is a serious chronic disease. It represents a global public health issue on the one hand because of high morbidity and mortality, on the other hand because of its complications [1]. These complications affect several organs including the heart and vessels, kidneys, brain, eyes, nervous system. Patients suffering from these complications have a poor quality of life with family, social, economic and professional repercussions [2-4]. Diabetes is due to a metabolic hormonal imbalance that occurs through 2 main mechanisms: a dysfunction of the pancreas which means that it does not produce enough insulin, or an inability of the body to properly use the insulin produced.
According to the World Health Organization, there is a worrying increase in the prevalence of diabetes worldwide. In 1980, only 108 million people suffered from diabetes worldwide [5, 6]. This rate rose to 422 million people in 2014 and 463 million in 2019. According to a latest report, diabetes affected more than 537 million people in 2021, including 24 million in Africa. One and a half million deaths are directly attributable to diabetes each year worldwide [1]. The scale of these figures testifies to the public health challenge that this pathology represents.

There is an epidemiological transition that affects both rich and low-income countries [2]. The increase has even been stronger in low-income countries than in rich countries [6, 7]. Like other African countries, Benin is experiencing an increase in the number of cases of diabetes according to statistics from the national program for the fight against non-communicable diseases. This pathology affects increasingly young subjects. The major problem in Africa is that the disease is unknown and is only discovered at the stage of complications, with a high burden of morbidity [8]. Indeed, according to the WHO, it is estimated that more than 70% of people with diabetes in Africa are unaware of their status. It is therefore important to intensify screening interventions.

It is in this context that the present study was conducted with the objectives of determining the prevalence of type 2 diabetes and identifying the associated factors.

METHODS

Setting, type and duration of study

This study took place in the commune of Avrankou located in the south-east of Benin in the department of Ouémé. This was a descriptive and analytical cross-sectional study that took place from July to September 2021.

Study population

The study population was composed of adult subjects living in a community in the city of Avrankou.
Inclusion criteria

- Be at least 18 years old
- Reside permanently in the study area

Exclusion criteria

- Refusal to participate

Sampling

We used a probabilistic method: the 3-stage cluster survey. The first degree was the district, the second degree the village and the third degree the house or hearth. At each stage a random draw was made. The minimum sample size calculated using the Schwartz formula, integrating the cluster correction factor and a margin of error of 10% gave 348 subjects.

Collection of data

The data were collected at the town's health center or at home, during an individual interview where a questionnaire was completed by interviewers. Anthropometric measurements, weight and height, were taken according to the techniques recommended by the WHO. The weight was taken with a SECA® brand electronic scale with an accuracy of ± 100 grams. The height was measured with a vertical wall board with an accuracy of ± 10

millimeters. Fasting capillary blood glucose was taken in all subjects with a strip glucometer. Two blood sugars were taken in the morning before 9 a.m., and the average of the numbers obtained was noted as the individual's blood sugar.

Variables

Dependent variable
The existence of type 2 diabetes was our dependent variable. It was defined for a blood sugar level above 1.26 g/L or 11 mmol/L according to WHO standards.

Independent variables

- Sociodemographic and economic factors such as: age, gender, ethnicity, religion, level of education and profession, household wealth index (calculated according to the goods owned by the household: lamp, radio, bicycle, motorbike, car, TV, electricity, and the nature of the house (a score that ranged from 1 to 25).
- Nutritional information that helped determine the food consumption score and the dietary diversity score, alcohol consumption.
- Anthropometric variables that made it possible to calculate the BMI body mass index.
- Practices of physical activities. Sedentary lifestyle was defined as the absence of at least 30 minutes of physical activity per day.

Statistical aspects

After analyzing all the questionnaires, a quality approach was applied to all the data. After having made a description of the study population, the prevalence of type 2 diabetes was determined, then univariate and multivariate analyzes were conducted to search for the factors associated with the occurrence of diabetes. We used the Chi2 test or the Fisher test to compare the percentages and the Student test to compare the means. For the multivariate analysis, the age variable was coded into 2 categories: < 40 years and ≥ 40 years. All variables with a univariate $P \leq 0.20$ were entered into a logistic regression model for multivariate analysis. The significance threshold was set at $P<0.05$.

Ethics

The subjects were included in the study on the basis of their free and informed oral consent. Each participant had the right to withdraw from the survey at any time. All data collected has been kept anonymous and confidential.

RESULTS

A total of 402 people were recruited for this study.

Prevalence of type 2 diabetes

During this survey, 53 people had a blood sugar level above 1.26 g/L, representing a prevalence of 13.18% of diabetes.

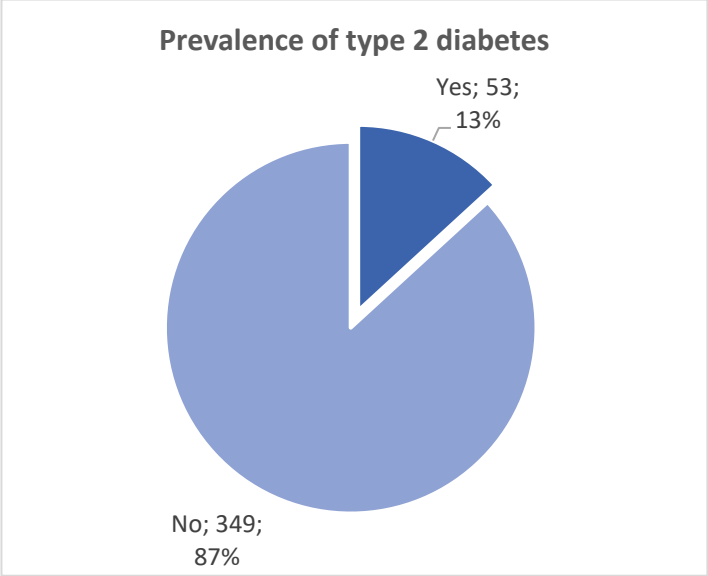

Figure 1: Prevalence of type 2 diabetes

Description of the study population and univariate analysis of factors associated with diabetes

The majority were men, 56.96%. The M/F sex ratio was 1.32, sex was not associated with diabetes. The mean age (SD) of the subjects in our study population was 45.74 years (7.89), the most represented age category was that of [40 – 50[; more than 20% of individuals were at least 50 years old. The distribution of subjects in general and that of diabetic subjects according to age categories is shown in Figure 2. Age was significantly associated with diabetes and it is observed that there is more diabetes in subjects aged 40 and over.

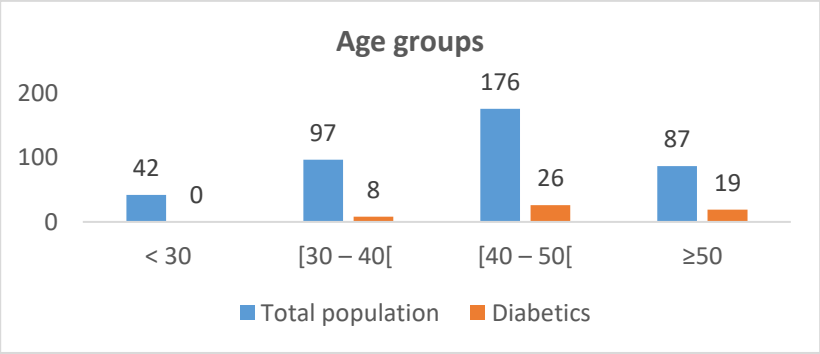

Figure 2: Age groups

Most of the subjects had primary or secondary and higher education. Less than 10% were out of school. The dominant profession was that of civil servants and executives, followed by merchants and workers. There was a significant association between occupation and diabetes. Indeed, senior civil servants and traders were the most affected. Most subjects (59%) lived in a monogamous household. The average household wealth index was 16.39 and was linked to diabetes. This index was significantly higher in diabetic subjects than in non-diabetic subjects. The majority of individuals, 55.47% had a BMI ≤ 25. There were significantly more subjects with a BMI > 25 among diabetics. Nearly 60% of the population was not sedentary. But among diabetic subjects the majority, 38, were sedentary; this link was significant. The nutritional variables food consumption score (FCS) and dietary diversity score (DDS) were significantly associated with diabetes. Indeed, the FCS is higher in diabetics while conversely the DDS is lower in them. Nearly 70%

and more than 80% of individuals declared that they did not consume alcohol and tobacco respectively on a daily basis. We did not find any significant link between these variables and diabetes.

Table I summarizes the characteristics of the study population.

Table I: Description of the population

Variables	N (%) ou Mean (SD)	Diabetes		
		Yes	No	*p*
Sex				0.41
Male	229 (56.96)	31	255	
Female	173 (43.04)	22	93	
Age in year	**45.74 (7.89)**	**49.24**	**38.97**	**0.002**
Age groups				**0.000**
< 30	42 (10.47)	0	42	
[30 – 40[	97 (24.13)	8	89	
[40 – 50[	176 (43.78)	26	150	
≥50	87 (21.62)	19	68	
Educational level				0.74
No schooling	38 (6.96)	9	29	
Primary and secondary	167 (41.54)	18	149	
Superior	197 (51.50)	26	171	
Occupation				**0.04**
Unemployed	29 (7.21)	7	22	
Student	12 (2.98)	0	12	
Worker	95 (23.63)	6	89	
Shopkeeper	102 (25.37)	15	87	
Civil servant / Executive	164 (40.81)	25	139	
Household status				0.25
Polygamy	57 (14.18)	13	44	
Monogamy	237 (58.95)	29	208	
Single	108 (26.87)	11	97	
Household wealth index	**16.39 (0.12)**	**22.18**	**17.93**	**0.02**
BMI				**0.000**
≤ 25	223 (55.47)	12	211	
> 25	179 (44.53)	41	138	
Sedentary lifestyle				**0.01**
Yes	161 (40.05)	38	123	
No	241 (59.95)	15	226	

Food Consumption Score	**32.79 (1.46)**	**38.95**	**29.48**	**0.000**
Dietary diversity score	**8.32 (0.65)**	**5.56**	**9.78**	**0.02**
Daily alcohol consumption				0.14
Yes	125 (31.09)	29	96	
No	277 (68.91)	24	253	
Daily tobacco consumption				0.56
Yes	67 (16.66)	11	56	
No	335 (83.34)	42	293	

Search for factors associated with the onset of type 2 diabetes. Multivariate analysis

We introduced into a logistic regression model all the variables that had a p-value less than or equal to 20% during the univariate analysis. The variables: age, BMI, physical inactivity and household wealth index were significantly associated with the onset of diabetes. Subjects over 40 years old (OR=2.34; p=0.000), those with a BMI > 25 (OR=3.79; p=0.000), and those who were sedentary (OR=2.09; p=0.001) had a higher probability of having diabetes. Similarly, the increase in the household wealth index (OR=1.94; p=0.02) was associated with a greater risk of onset of diabetes. The food consumption score was no longer significant and daily alcohol consumption remained non-significant in the final model.
The entire multivariate analysis is shown in Table II.

Table II: Factors associated with diabetes. Multivariate analysis by logistic regression

Variables	Diabetes	
	Adjusted OR [CI 95%]	*p*
Age ≥ 40 years	**2.34 [1.87-6.18]**	**0.000**
BMI > 25	**3.79 [2.03-9.56]**	**0.000**
Sedentary lifestyle (Yes)	**2.09 [1.65-4.90]**	**0.001**
Household wealth index	**1.94 [1.25-3.10]**	**0.02**
Food Consumption Score	1. 24 [0.87-1.45]	0.32
Daily alcohol consumption	1.15 [0.57-1.23]	0.17

DISCUSSION

This study, which involved 402 subjects in Avrankou, aimed to determine the community prevalence of type 2 diabetes and to determine the associated factors.

The prevalence of diabetes in our study population was 13.18%. This rate is similar to what is found in other countries, in rural or semi-rural areas like ours [1-4]. Higher prevalences have been reported in populations living in urban areas and in large cities [5-9]. Conversely, the rate of diabetic subjects is lower in other populations [10-15]. This clearly reflects the variability of this pathology according to several factors. The environmental context plays an important role in the occurrence of chronic non-communicable diseases in general. Populations living in rural areas are less exposed to risk factors than those living in urban areas. The behavioral factors are not the same.

In our study, high age, from the age of 40, was a risk factor for diabetes. This result is widely described in the literature [3, 12, 14, 16-19]. Higher age ranges have even been reported by other authors. Diabetes is a metabolic disease that involves the endocrine system. Advanced age is clearly established as a factor favoring metabolic diseases in general and especially diseases such as diabetes and arterial hypertension [5]. Subjects aged 40 and over are a population at risk [20]. After the age of 50, the risk of death from hyperglycaemia is higher, especially in low-income countries. Health interventions must be specifically directed towards them. It is important to carry out screening campaigns among this age category. Most are unaware of their status with respect to metabolic diseases, which are only revealed when complications arise [6].

The body mass index makes it possible to identify overweight subjects, i.e. those with a BMI greater than 25. In our sample, nearly 45% of subjects were overweight. They were 3.79 times more likely to have diabetes. These results are consistent with other studies [11-14, 18, 21]. Overweight and obesity are predisposing factors for diabetes because of the imbalance in the metabolism of caloric intake [17, 22].

Our results also showed that sedentary subjects were more likely to have diabetes, as reported in other studies [13, 14, 19]. These are individuals who

practice very few sporting activities and their professions are sedentary and do not encourage physical activity. Globally, more than 25% of the population does not practice regular physical activity. Added to poor diet, these behavioral factors worsen BMI and increase the risk of metabolic diseases. The WHO recommends the practice of at least 30 minutes of regular physical activity per day. This reduces the risk of cardiovascular disease [22]. The objective is to have an energy balance and weight control in order to prevent the onset of diabetes.

The wealth index of the household is an indicator of the socioeconomic level and in our work we noted that the higher this index is, the greater the probability of occurrence of diabetes. Other studies have reported similar results [1, 2, 16]. When we are not careful, the improvement of the socioeconomic level is accompanied by poor nutritional practices and poor food hygiene. There is then an excess of caloric intake.

While it is true that there are genetic, ethnic, and age-related risk factors that are not modifiable, most other factors are factors that can be acted upon. These are factors relating to lifestyle in general, such as overweight, diet, sedentary lifestyle. The promotion of a healthy and balanced diet, the promotion of sports and physical activities within the community are effective strategies for reducing the incidence of diabetes and its complications [23]. Public authorities must strengthen measures such as quality control of imported food, setting nutritional standards for food products, agricultural policies to promote the development of local food products.

It is also necessary to set up nutritional education for the target subjects but also for the population in general. In order to have a healthy and balanced diet. This must be done in a global context of IEC of the population on chronic diseases such as diabetes.

Screening represents a major oar of struggle. Free screening campaigns must be reinforced to reach a greater number of people. Complications are less serious when diabetes is detected early and early and adequate management is put in place.

CONCLUSION

This study made it possible to identify the factors associated with diabetes, such as advanced age, BMI > 25, physical inactivity and good socioeconomic level. These are modifiable behavioral factors on which it is possible to act through public health interventions directed at the target populations. This will reduce the burden of non-communicable diseases in general.

Conflict of interest
None

Funding
None.

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