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FOOD AND LIVING HABITS OF DIABETIC PATIENTS TYPE 2 MONITORED TO DEPARTMENTAL HOSPITAL CENTER (CHD) ATACORA (BENIN)

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ABSTRACT:

Rapid urbanization and the globalization of the food market have led to changes in nutritional behavior and the way of life of populations, including developing countries such as Benin, with the consequent emergence of various pathologies such as diabetes type 2.

The aim of this study was to study the food profile and lifestyle of type 2 diabetic patients followed by CHD-Atacora from Natitingou, Benin. It was a cross-sectional study with a descriptive and analytical purpose. Sociodemographic, biometric and dietary information were collected on the basis of a pre-established and validated questionnaire.

A total of 204 type 2 diabetic patients were enrolled in the study. The mean age of the subjects was 56 ± 12 years with female predominance (sex-ratio = 1.5). The Wama, Bariba and Ditamari ethnic groups accounted for 43% of the sample. Almost 75% have a level of education less than or equal to secondary school. The main comorbidities were abdominal obesity (90%) and high blood pressure (48%). About 70% of the subjects reported that they regularly engage in physical activity, including walking (60%). Cereal-based foods (maize, rice, millet and sorghum) and vegetable sauces largely dominate the food consumed by the subjects (90%).

Food habits including cereal-based foods, mainly maize seem to have a definite impact on the management of the disease. Educational attainment would also be a key factor to consider as higher educated individuals appear to be more aware of the influence of food habits and lifestyle on diabetes management.

Key words: Lifestyle, food habits, diabetes type 2, North-Benin

INTRODUCTION

In recent decades, the urbanization and globalization of the food market have contributed significantly to changes in people's behavior and lifestyle in developing countries, particularly in Africa. These changes in lifestyle and food habits have favored the emergence and aggravation of the risk factors for noncommunicable diseases (NCDs), the consequences of which are very important in terms of morbidity and mortality. Among these NCDs, we have type 2 diabetes, or non-insulin-dependent diabetes, commonly known as "mellitus diabetes " (1). This pathology develops when the secretion of insulin is insufficient to maintain normo-glycemia or rather, and more often moreover, in a context of insulin resistance induced by obesity (2).

Despite of the importance of obesity in risk factors, there is a significant clinical heterogeneity in the pathways of type 2 diabetes. A recent study has shown that more than 10% of cases of type 2 diabetes occur in subjects of normal weight, and

more than 50% of cases involve subjects who were not obese at the base. It has been shown that waist circumference is also associated with the risk of type 2 diabetes, so that for the same body mass index (BMI), the distribution of adipose tissue storage is an important determinant of the risk of developing diabetes. type 2. Indeed, being overweight with a large waist considerably increases the risk of type 2 diabetes compared to an obese subject of more or less normal waist circumference (3).

Diabetes is a public health problem because of its ever-increasing prevalence in both developed and developing countries. Indeed, in 2011 there are 366 million people with diabetes worldwide with a prediction of 552 million for 2030 (4). The figure of 21 million people with type 2 diabetes in Europe is generally high (5, 6). According to estimates by the World Health Organization (WHO), the number of adults affected by diabetes mellitus will increase by 17% in developing countries against 41% in developed countries between 1995 and 2025 (7, 8) . Epidemiological forecasts estimate that the prevalence of diabetes will have increased by 98% in 2030 in Sub-Saharan Africa (9). Benin is hardly spared from this scourge. The STEPS survey, conducted in 2003 in Benin, revealed that out of 3822 surveyed subjects 101 had a diabetic hyperglycemia, which had a prevalence of 2.6% (10). From a geographical point of view, the department of Atacora comes in second position (6%) after the one of Alibori. On the other hand, the Otamari ethnic group (in the Atacora department) taken alone has a prevalence of 6.8% (10). These numbers challenge us in many ways. Thus, the present study set itself the objective of studying the food profile and lifestyle of type 2 diabetic patients followed at the Departmental Hospital Center (CHD) of Atacora, Natitingou.

The objective of our study was to study the food profile and lifestyle of type 2 diabetic patients followed at the Departmental Hospital Center (CHD) of Atacora, Natitingou (Benin).

METHODOLOGY

Our study was conducted at the departmental hospital of Atacora precisely in the diabetology service. This was a descriptive and analytical cross-sectional study that was conducted over a 3-month period from December to February 2018. The target population of the study consisted only of patients with type 2 diabetes who were followed at CHD Atacora. Included in the study were all patients over the age of 20, both sexes, followed in the center for at least 6 months, with a complete medical file and with their consent. Any pregnant patient and also patients with edema were systematically excluded from the study. The data were collected on the basis of a pre-established and validated questionnaire. Each of the registered patients provided information on socio-demographic data (age, sex, origin, marital status, religion, educational level, ethnic group), anthropometric data (weight, height, size), family history, food habits (number of meals, capacity of meals, time of meal, frequency of meal consumption, type of oil frequently consumed) type of treatment received (dietetic, medicated, traditional) lifestyle and personal and family history.

Data analysis

Data was captured and analyzed with sphinx software, and SPSS version 3.5.1. All statistical tests were performed at the significance level of 5%.

The sample size was calculated by the SCHWARTZ formula

$$n = \frac{z^2 X\ p\ X\ q}{i^2}$$

With z = 1.96 for a risk of 5%

p: according to the STEPS survey carried out in 2008 on MNT, the prevalence of diabetes is 2.6% in Benin (10)

q = 1-p and i = 0.03.

$$n = \frac{1.96^2 X 0.026 X 0.974}{0.03^2} = 108.09$$

We conducted an exhaustive census of all patients meeting the inclusion criteria.

RESULTS

1. Sex and age

The mean age of the subjects was 56 ± 12 years with a female predominance (males = 40%, females = 60%, sex ratio = 0.67). This female predominance has also been reported (Figure 1).

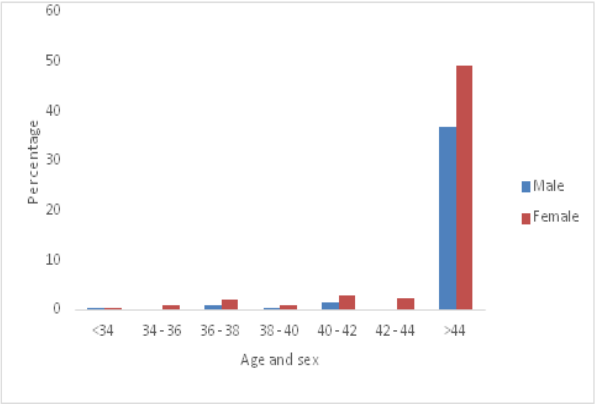

Figure 1: Distribution of patients by age and sex.

2. Marital status

Most (95%) of the subjects are married or widowed. This seems logical since the average age in our sample is 56 years old. Generally we observe that at this age people live in couples (Figure 2).

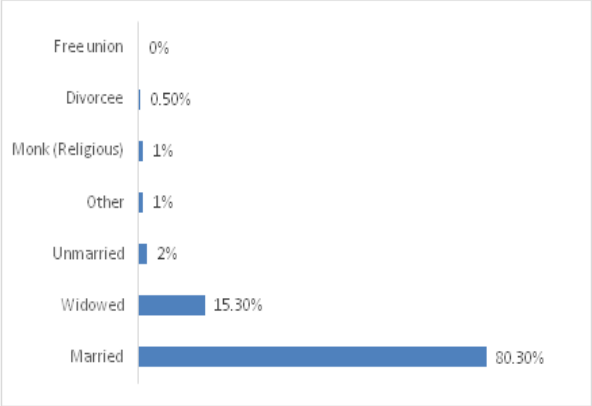

Figure 2: Distribution of patients by marital status

3. Ethnic group

The Bariba and the Wama come in first with about 15%, followed by Ditamari and Dendi, then the Nago (Figure 3).

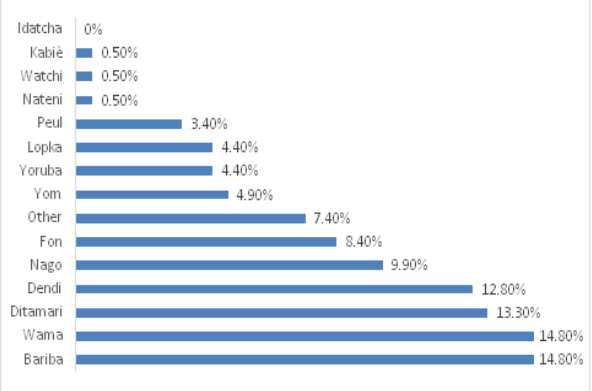

Figure 3: Distribution of patients by ethnic group

4. Level of schooling

The majority of subjects have a level of education lower than or equal to secondary school. Only 7% of the subjects had higher education (Figure 4).

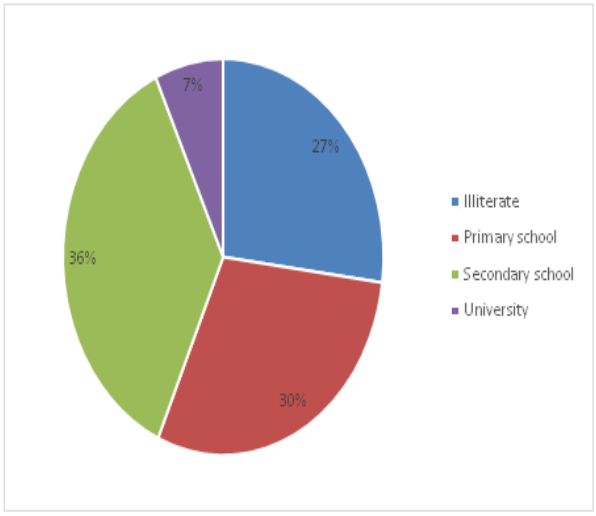

Figure 4: Distribution of patients surveyed by level of schooling.

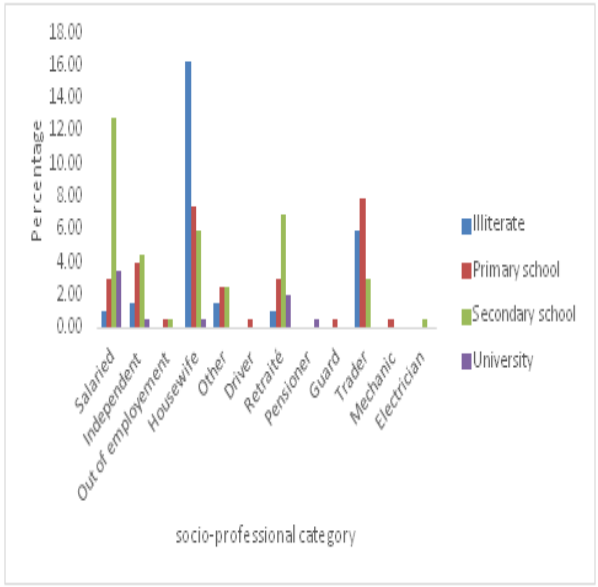

Figure 5: Distribution of participants by socio-professional category

The incidence of diabetes appears to be higher in the household category, particularly among women who have not been to school.

Then among employees, especially those with secondary level. Moreover, regardless of occupational category, the proportion of people with primary or secondary education seems relatively high (Figure 5).

5. Patient's religion

We have a more or less significant predominance of the Christian religion (59.6%) compared to Islam (38.4%). Two hypotheses can emerge: either religion would have an influence on the onset of type 2 diabetes or the population would be majority Muslim (Figure 5)

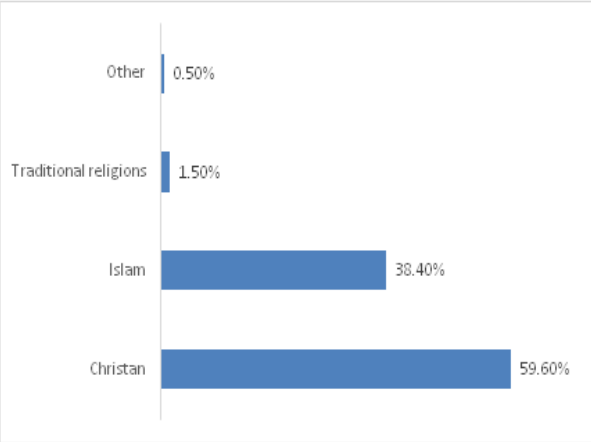

Figure 6: Distribution of religions of the patients surveyed.

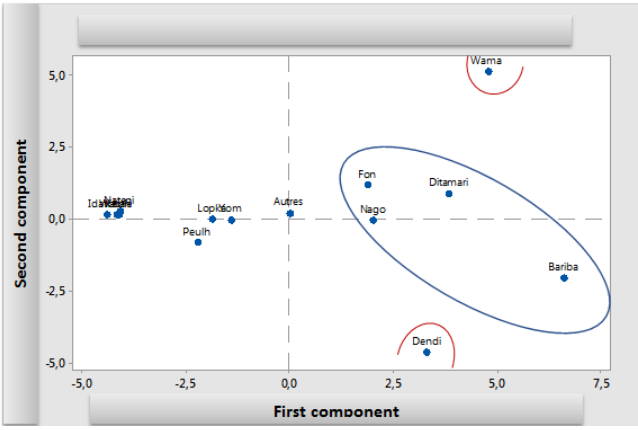

Figure 7: ethnic representation on the first two components.

The analysis of Figure 7 shows that the Fon, Ditamari, Nago and Bariba ethnic groups constitute the group of diabetic patients over 44 years old, in a couple and having a level of education at least equal to the secondary level. Moreover, Wama and Dendi represent more the Muslim world.

6. Screening for the disease

6.1. BMI of patients at first checking according to the sex.

About one-third (1/3) of participants are overweight (35%) and about one quarter (1/4) are moderately to morbidly obese (25.1%). The proportion of obese women (moderate to severe) is significantly higher than that of men (Table 1).

Table 1: Anthropometric data of patients at first checking

BMI	Number	Frequency (%)	Male		Female	
			Number	Frequency (%)	Number	Frequency (%)
Undernutrition (BMI<16,5)	2	1	2	2.4	0	0
Thinness (16,5<BMI<18,5)	8	3.9	4	4.9	4	3.3
Normal body (18,5<BMI<25)	71	35	33	40.2	38	31.4
Overweight (25<BMI<30)	71	35	34	41.5	37	30.6
Moderate Obesity (30<BMI<35)	30	14.8	8	9.8	22	18.2
Severe obesity (35<BMI<40)	13	6.4	0	0	13	10.7
Morbid Obesity (BMI.>40)	8	3.9	1	1.2	7	5.8

6.2. Waist according to gender

Analysis of Figure 8 showed that more than seventy-seven percent of women (77.7%) had waist circumferences of between 86.00 and 114.67 cm compared to 70.7% of men. In addition, 8.3% of women had

a waist circumference of between 111.67 and 143.33 cm, compared to only 2.4% of men. Waist circumference is a determining factor in the onset of type 2 diabetes.

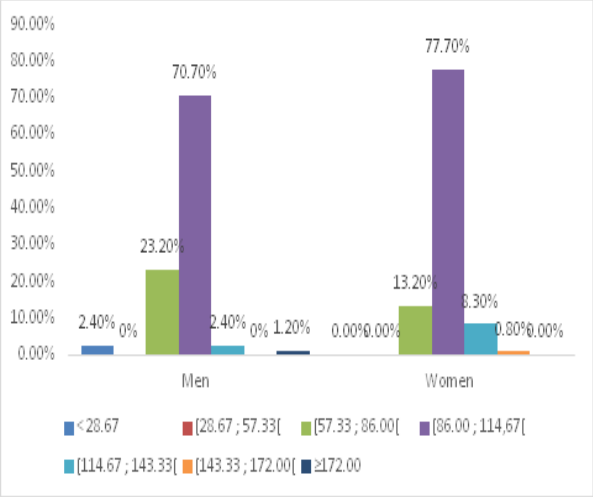

Figure 8: Waist circumference of patients surveyed by gender

6.3. Physical activity practice

Just over 70% of the subjects reported that they regularly engage in physical activity (Figure 9).

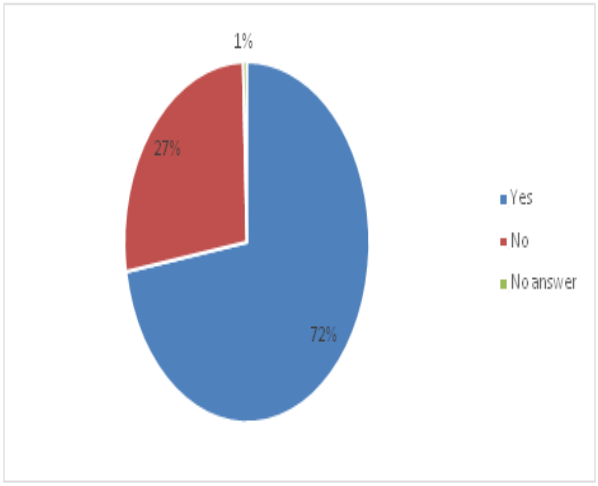

Figure 9: Percentage of patients practicing physical activity

6.4. Moving's method of patients

Walking is the most practiced physical activity by patients (60%). Just over one-third (36%) of the participants in this study travel by motorcycle (Figure 10).

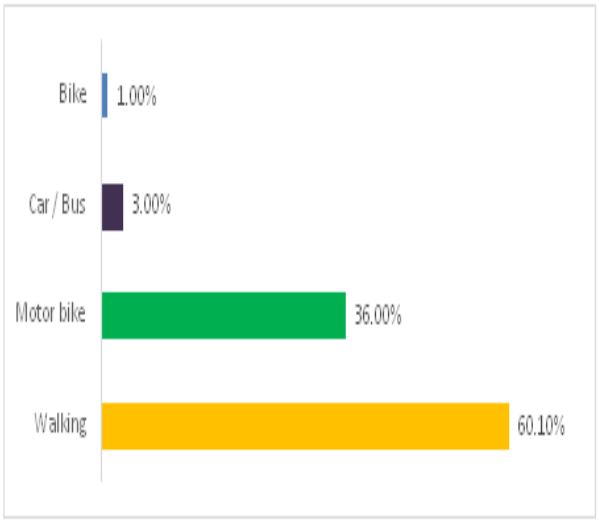

Figure 10: Percentage of patients practicing physical activity.

7. FOOD HABITS

7.1. Food behavior

7.2. Frequency of food intake during the day

The vast majority of patients (93.3%) have a food ration of 3 meals a day. And a high proportion (76%) takes a snack in the afternoon.

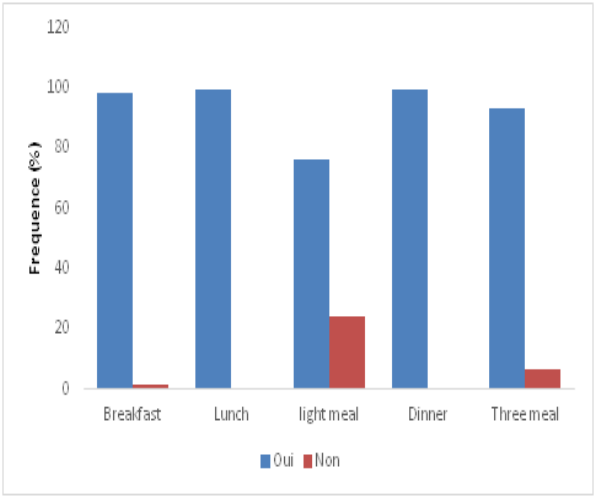

Figure 11: Distribution of diabetics according to the frequency of food intake of the day.

7.3. Frequency of main foods consumed at breakfast

Maize-based foods dominate (28.47%) the breakfast of diabetic patients included in this study (Figure 12).

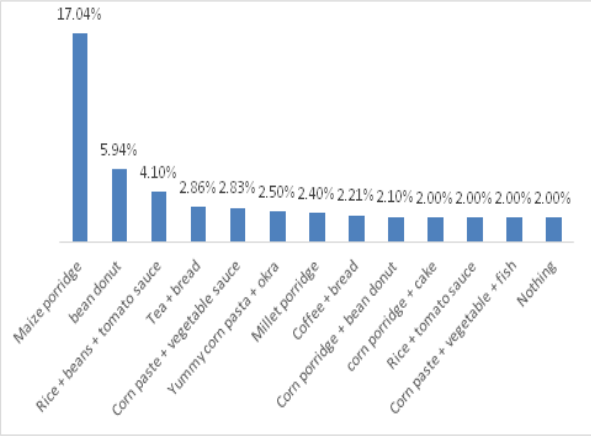

Figure 12: Distribution of the main foods consumed by diabetics at breakfast.

7.4. Frequency of main foods consumed at lunch

The analysis in Figure 13 showed that foods based on yam, corn and rice dominate the lunch of diabetic patients included in our study.

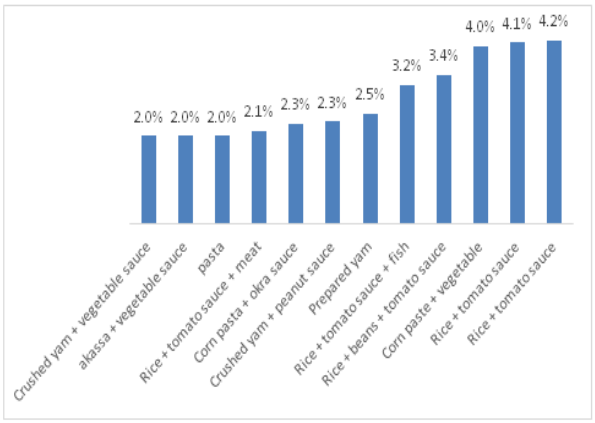

Figure 13: Distribution of the main foods consumed by diabetics at lunch.

7.5. Frequency of main foods consumed as a snack

Snacks are very diverse. They are made of cake, fried yams, porridge made of corn, etc. (Figure 14)

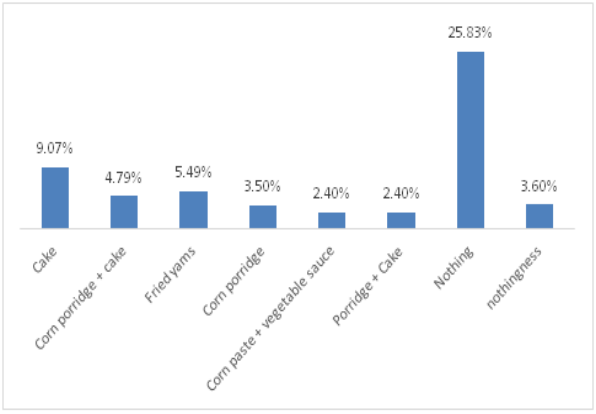

Figure 14: Distribution of the main foods consumed by diabetics as a snack.

7.6. Frequency of main foods consumed at dinner

Corn dough largely dominates (over 90%) evening meals (dinner) (Figure 15).

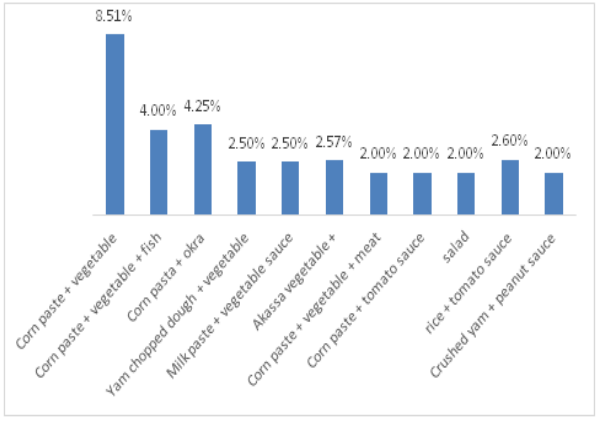

Figure 15: Distribution of the main foods consumed by diabetics at dinner

Energetic foods are the largest part of the daily diet of the respondents. Protective foods come in the second position, especially at lunch and dinner.

In terms of food group, carbohydrates come first, especially at breakfast, lunch and dinner. Then come the lipids and vegetables (Table 2).

Table 2: Frequency of food consumed by major food groups and functional groups

Periods	Foods			Food Groups				
	Energy	Growth	Protection	Carbohydrate	Fat	Protein	Fruits	Vegetables
Breakfast	58.52	14.14	10.93	39.55	18.98	14.14%	0.00	10.93
Lunch	33.45	11.75	28.95	31.12	28.62	8.68%	0.00	26.62
Snack	27.65	0.00	0.00	27.65	7.89	0.00%	0.00	2.40
Dinner	32.93	6.00	32.93	32.93	32.93	6.00%	0.00	32.93

7.7. Type of oil used by participants according to their frequencies

Industrial oils and red oil each make up about one third of the oils consumed by participants. Peanut oil represents 20% of the oils consumed (Figure 16). Otherwise, eighty percent of participants consume oil twice a day. One percent more than 3 times a day, eleven percent 3 times a day and eight percent 1 time per day (Figure 17).

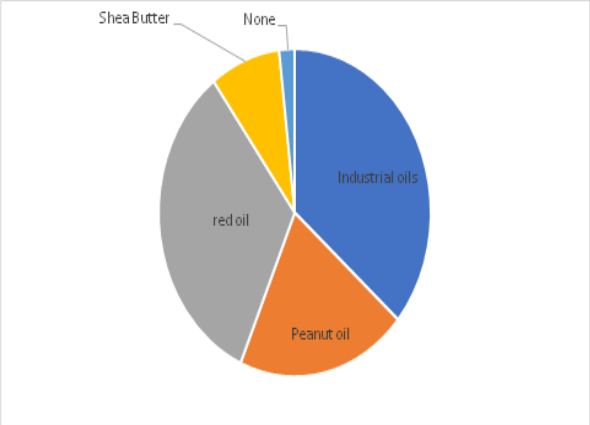

Figure 16: Distribution of the main oils consumed by the participants

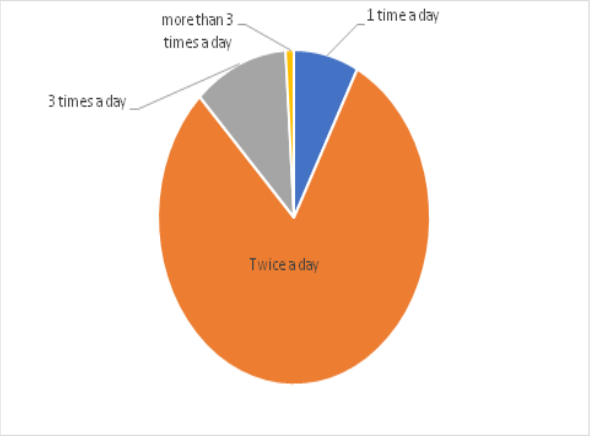

Figure 17: Frequency of oil consumption

DISCUSSION

The present study showed a female predominance of 67% (sex ratio = 0.67). In 2017, in a study on dietary habits of type 2 diabetics followed at the antidiabetic center of Abidjan in Côte d'Ivoire, Ake-Tano and her colleagues (11) also recorded a female predominance of 59.4% (sex ratio = 0.68). This female predominance was also found in a population of black Americans compared to Caucasian women, in a proportion of one to two (10). On the other hand, these results are to some extent opposed to those described in France in the context of the ObEpi study. Since 1997, the ObEpi study has evaluated the prevalence of overweight and obesity in France every three years, thanks to a self-administered questionnaire sent to 20,000 households. In 2012, 25,714 subjects over the age of 18 answered this questionnaire. According to the data collected in this study, while subjects with type 2 diabetes are more often men (55% of subjects), women are more often obese (severe or very severe), hypertensive or dyslipidemic. (12).

We also found in our sample a more or less significant predominance of the Christian religion (59.6%) compared to Islam (38.4%). Two hypotheses can emerge from this observation: either the population of Natitingou would be predominantly Christian, or the food habits of the population would be influenced by religion. In this case the defense of consuming pork and alcoholic beverages advocated by Islam could it be an effective asset against type 2 diabetes?

The principal component analysis applied to the characteristics of our sample shows that the first component alone accounts for 46.3% of the information in the initial matrix, and that with the first 3 components we can explain 72.5% of the information. of the initial matrix, which is sufficient to guarantee an accuracy of interpretation of the starting information.

Figure 7 shows that the Fon, Ditamari, Nago and Bariba ethnic groups constitute the group of diabetic patients over the age of 44, in a couple and having a level of education at least equal to the secondary level. Moreover, the Wama and Dendi represent more the Muslim world. These observations corroborate those of the STEPS survey conducted in Benin in 2008. In fact, this survey revealed a high prevalence of hyperglycemia among Ditamari people (6.8%) in the Atacora department. Specifically, it was a prevalence of 6.0% abnormal fasting hyperglycemia, and 3.8% diabetic hyperglycemia). These figures are in second position at the national level after those of the department of Alibori (13).

Abdominal obesity and hypertension were the main risk and comorbidity factors observed in our sample at 90% and 48%, respectively. Associated with diabetes, these factors favor the appearance

and / or progression of cardiovascular pathologies. Indeed, the prevalence of type 2 diabetes is directly related to that of obesity, with insulin resistance being the key factor that links the two disease states. Moderate obesity increases the risk of developing type 2 diabetes by a factor of 2, average obesity by a factor of 5, and severe obesity by a factor of 10. The type of obesity, characterized by the mode of distribution of the fat masses, must also be considered attentively. Indeed, it is the distribution of android type fats, that is to say at the abdominal and peri-visceral level, which seems deleterious metabolically. In contrast, gynoid obesity (fat distribution in the lower body) would have a protective effect against these metabolic complications. Overall, the weight problem affects adults of both sexes, even in economically disadvantaged areas. We are talking about "diabesitis". With regard to hypertension, in general, most (60% to 80%) people with type 2 diabetes die from cardiovascular complications and up to 75% of specific cardiovascular complications have been attributed to a higher blood pressure. (14, 15). Hypertension is also a major contributor to kidney failure and eye disease in diabetics (16, 17). In Ivory Coast, Kouamé et al., (18) noted that high blood pressure was the most common cardiovascular risk factor in type 2 diabetics.

In terms of food groups, carbohydrates come first, especially at breakfast, lunch and dinner. Then come the lipids and vegetables. Indeed, carbohydrates provide 40 to 45% of our daily calorie intake while lipids provide more than 40% of calories, mainly in the form of saturated fat. For both the general population and diabetic patients, this type of diet appears to be harmful to health, and in recent years there has been a tendency to increase the proportion of carbohydrates ingested. Several studies have compared the effect on the metabolic parameters of high carbohydrate diets (55% of calories in carbohydrate) or low (35 to 40% of calories in carbohydrate form). These studies indicate that, in obese type 2 diabetic patients, substitution of carbohydrates for monounsaturated lipids could lower postprandial glucose and plasma triglyceride levels, improve insulin sensitivity, reduce visceral fat, and increase of HDL cholesterol level (19, 20) However, it should be remembered that, compared with carbohydrates, the caloric density of lipids is significantly higher (9 kcal / g against 4 kcal / g for carbohydrates). In addition, always compared to carbohydrates, the satietogenic power of lipids is low, the energy cost of their storage represents only 3 - 4% of their energy intake and, finally, their palatability (that is to say the character creamy and pleasant food in the mouth) is excellent, which favors a larger intake (21).

In our study, industrial oils make up more than a third of the oils consumed by patients, followed by red oil, which alone accounts for one third of consumption. Indeed, the main objective regarding lipid intake in the type 2 diabetic subject is to reduce the intake of saturated fats and cholesterol. Saturated fats are the main determinant of LDL cholesterol. These are contained in animal fats (beef, pork, lamb, dairy products), but also in some vegetable oils (palm oil, coconut oil). Saturated fat intake should not exceed 10% of total energy intake. In subjects whose LDL cholesterol level is equal to or greater than 100 mg / dl, saturated fat intake should not exceed 7% of energy intake (22). As regards dietary cholesterol, its intake should not be higher than 300 mg / day. Polyunsaturated fats must represent 10% of daily energy intake. Polyunsaturated fats in the omega 3 (n-3) family are found in fish, particularly cold-water fish (tuna, salmon, herring, mackerel). It is therefore recommended that both diabetics and the general population consume fish at least twice a week (23, 24).

Regarding the practice of physical activity, about 70% of respondents reported that they regularly engage in physical activity, including walking (60%). The STEPS survey conducted in the general population in Benin in 2008 also found a low prevalence of physical inactivity in the department of Atacora (2.09%) compared to the Littoral Department (19.52%) (8) . Konan and colleagues (25) in Côte d'Ivoire and Coulibaly et al., (26) in Mali found respective proportions of 19.7% and 35%. In France, Bongard et al., (27) showed that regular physical activity was less common among diabetics and subjects with the metabolic syndrome compared to non-sick subjects (27). It is admitted, however, that regular physical activity has favorable effects on glucose metabolism (28) and some associated cardiovascular risk factors (28, 29) and should therefore be encouraged in type 2 diabetic patients.

CONCLUSION

The diabetic subjects followed at CHD Atacora have a non-sedentary lifestyle with a marked predominance of women. Dietary habits including cereal-based foods, mainly corn, the lack of fruit, and the wrong culinary method of vegetables, are dangerously influencing their lifestyle. The level of education would also be a determining factor to take in consideration by figuring out the level of illiteracy of participants, with regard to the impact of food habits and lifestyle on the occurrence of diabetes. Moreover, the subjects surveyed do not practice a sustained and regular physical activity.

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