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Prevalence of Metabolic Syndrome and its Associated Factors Among the Employees of a Commercial Company in Togo

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Abstract

Background

The Metabolic Syndrome is a set of clinical and biological signs that indicate a metabolic disorder and predispose to or indicate cardiovascular disease and/or type2 diabetes.

Aims

To evaluate the prevalence of metabolic syndrome and the associated factors among the employees of a commercial entity.

Materials and Methods

It was a cross-sectional descriptive study. The study population consisted of all employees who participated in the periodic medical examination in 2016.The metabolic syndrome was studied on the basis of the definition criteria of the FID-2005.Data analysis was performed using the Epi info software version 3.5.4. The chi-square test is used to compare the percentages. The logistic regression was used to analyze the relationship between metabolic syndrome and risks factors. The threshold of significance was $p \leq 0.05$.

Results

A total of 652 employees participated in our study. The prevalence of the metabolic syndrome was 26.5% according to the definition of IDF-2005. The presence of metabolic syndrome was significantly associated with other definitional criteria in addition to abdominal obesity: general obesity (44.4%), hypertension (31.0%), hyperglycemia (19.8%), HDL cholesterol (30.5%), and hypertriglyceridemia (15.2%). Among those criteria, the most frequent combinations included, besides abdominal obesity, low HDL cholesterol and a high blood sugar. In this company, more than 40 years old, work experience of 15 years or more, absence of high-energy physical activity, socio-professional groups of executives and executing agents were the risk factors significantly associated with the presence of the metabolic syndrome.

Conclusion

Metabolic Syndrome is a reality in the workplace in Sub-Saharan Africa. Adequate preventive measures must be taken.

Keywords

Metabolic Syndrome; Workers; Sub-Saharan Africa; Togo

Introduction

The Metabolic Syndrome is a set of clinical and biological signs that indicate a metabolic disorder and predispose to or indicate cardiovascular disease and/or type 2 diabetes [1]. It takes into account the multi factorial nature of cardiovascular risk. Several definitions were proposed without a real consensus. They differ from one another by the recognition thresholds and the priorities given to one or other of the definition criteria. However,

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the definition of the International Diabetes Federation (IDF) of 2005 [1], taking into account the populations of the poor countries, is unanimously accepted. Metabolic syndrome is a major health problem in the workforce. In the industrialized countries, cases of prevalence ranged from 10 to 34% in the general population [2, 3]. But reached 70-80% among patients with type2 diabetes [4, 5]. A US study showed that the prevalence of this syndrome, defined according to the NCEP-ATP III criteria, is very high, 21.8% on average in the adult population of the United States [6]. This prevalence increased by 6.7% among the people aged 20 to 29 years to 43.5% between 60 and 69 years. In this population, the prevalence of MS, defined and adjusted for age, is comparable for men (24.0%) and for women (23.4%). In Europe, a meta-analysis took up the data collected in 8 countries in 8200 men and 9363 women without diabetes [7]. The syndrome defined according to WHO criteria increases with age in both sexes: in men, the prevalence is 14% under 40 years, 23% between 40 and 55 years and 41% over 55 years of age; among women, the corresponding figures are 4%, 13% and 26%, respectively. In general, using the WHO definition, the prevalence of the metabolic syndrome in men is twice that of women. This difference between the two sexes is strongly attenuated using the National Cholesterol Education Program's definition of Adult Treatment Panel III (NCEP-ATP III). In the European multicenter, study Hu et al [8]. Prevalence was estimated at 15.7% in 6,156 men and 14.2% in 5,356 women. In the Dutch Hoorn study [9], the prevalence of MS is 19% for men and 26% for women using the NCEP-ATP III definition, whereas with the WHO definition, it is 32% and 26% respectively according the sex. Studies in Africa have identified prevalence between 20 and 39% in the general population and between 48% and 79% in target groups such as type 2 diabetics and hypertensive patients [10-14]. This syndrome has somehow been studied in Togo. Very few studies have been found in the literature on occupational metabolic syndrome in Africa, the following prevalence has been found: Garido: 34% in Zimbabwe in 2009 [15]. Ndiaye: 25.2% in 2015 in Senegal [16]; in South Africa in 2017, Gradidge: 42% [17] and Maritza: 46.3% [18]. The objective of this study is to determine the prevalence of the metabolic syndrome in a commercial company and to identify risk factors for better prevention.

1. Methodology

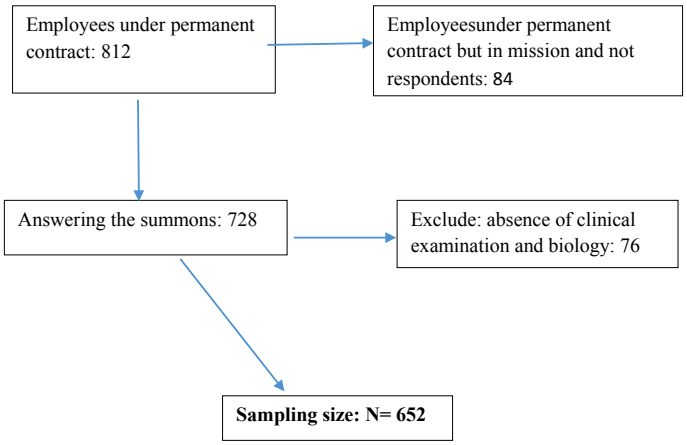
1.1. Type and Population of Study

It was a descriptive and observational cross-sectional study, which took place between February 2nd and June 20th, 2016 among employees of a commercial company in Togo. Involved in the study were employees on open-ended contracts who participated in both clinical examination and blood sampling.

Study Sampling and Size

The Study used a convenience sampling (non-probability sampling), through a systematic recruitment process of all persons is fulfilling all the inclusion criteria: have a permanent contract, answered the summons and available to participate in the study: see the flowchart bellow. This study was done during the regulatory annual check-up of the employees.

Sampling Flowchart



1.2. Data Collection

The data were collected using a questionnaire initially designed by us and the various items of which were included in the fact sheet which was filled in for each participant.

This questionnaire consists of socio-demographic and occupational characteristics (age, sex, marital status, professional qualification, level of education, work experience), working conditions (working hours, type of work position), mode (alcohol consumption, smoking, diet and physical activity) and personal medical history (diabetes, high blood pressure, known dyslipidaemia and under treatment or not). Two medical doctors in inside the country did the physical examination (as the company is situated on the whole of the territory) and four (04) medical doctors in the office of the company situated at “Lomé” the country capital.

The physical examination resulted in the following biometric data: The Waist Size (WS) was measured using

a tape measure at the level of the umbilicus (The waist size was measured halfway between the anterosuperior iliac thorn and the lower edge of the last coast on a belly stripped at the end of normal expiration and the waist size was according to the recommendations of the WHO), blood pressure (BP) was taken twice in both arms after a sitting rest of at least fifteen minutes and the average of the two results was considered, (the BP was measured using the sphygmomanometer: Blood pressure cuff of type manual pear LIAN classic SPINGLER); the height was taken standing by means of a measuring rod (the height was measured using mobile, foldable Leading height gauge mark: TANITA adult / child), the weight on a well-tarred scales (using the Mark SECA 761 - class III material), and the Body Mass Index (BMI) was calculated from the size and weight obtained by the formula: $\frac{Weight\ (Kg)}{(Size\ in\ m)^2}$.

All the doctors have been trained on the questionnaire, on the contents and on the data to be collected. They administered personally the questionnaire to the workers.

3 Nurses, recycled occasionally on the conditions and the quality requirements to respect in taking of constants and anthropometric data (Cf the conditions of lower data collection).

One doctor was in charge of verifying quite the 3 hours of time by simple observation and of correcting the application of the instructions given to the nurses and the calibration of weight material. Finally, a blood sample taken from each fasted employee was used to measure blood glucose, cholesterol (Total cholesterol, HDL cholesterol, and LDL cholesterol), triglyceride and creatinine.

1.3. Studied Parameters

The parameters studied are those relating to the socio-demographic and occupational characteristics of the population; conditions of work, lifestyle, cardiovascular risk factors. We choose as the dependent variable: "the metabolic syndrome according to the definition of the FID-2005" [1]. It is defined as: waist circumference ≥ 94 cm for men and ≥ 80 cm for women (in the African context), a mandatory criterion. To which must be added two of the four following parameters: triglyceridemia ≥ 1.5 g / l; HDL cholesterol <0.4 g / l for men, <0.5 g / l for women or specific treatment in progress; blood pressure ≥ 130/85 mm Hg or antihypertensive therapy; Fasting glucose ≥ 1.0 g / l or anti-diabetic treatment in progress [1].

1.4. Data Analysis

Data analysis was performed using the Epi info software version 3.5.4. The qualitative parameters were expressed as a number followed by the percentage and the quantitative variables are expressed on average ± SD. The chi-square test is used to compare the percentages. We used logistic regression to calculate the Odds Ratios and their 95% confidence intervals, which allowed us to analyse the relationship between metabolic syndrome, age, working conditions and lifestyle. The threshold of significance was p≤0.05.

2. Results

2.1. Socio-demographic and occupational characteristics of the study population

We involved 652 workers, including 512 men (78.5%) and 140 women (21.5%), a sex ratio (M/F) of 3.66. The distribution of people according to socio-demographic characteristics is summarized in table 1.The average age of the study population was 46.8 ± 7.8 years, 86.8% of the population was married. 151 employees (23.12%) were obese of whom 45 (6.9%) had severe obesity (BMI ≥35 Kg

Table1: Socio-demographic characteristics

	Variables	Man (n=512)	Woman	Total (n=652)	P
Age groups (Year)	Mean age	46.8 ± 7.8	47.4±7.6	44.7 ± 8.2	0.004
	<25	0	1	1	
	25-34	28	11	39	
	35-44	216	50	215	
	45-54	159	56	266	
	≥55	109	22	131	

BMI (Kg/m²)	Mean BMI	26.0±5.02	30.6± 6.13	27.0±5.59	<0.0001
	Thinness	5	0	5	
	Normal weight	191	24	215	
	Overweight	231	49	280	
	Moderate obesity	69	37	106	
	Severe obesity	15	30	45	
Waist size (WS cm)	Mean WS	93.4±11.0341	96.5±13.9	94.1±11.7	0.006
	<80	44	25	69	
	80≤WS<94	208	50	258	
	≤94	260	65	325	
Marital status	Married	470	96	566	<0.0001
	Cohabitation	13	12	25	
	Single	16	22	38	
	Widower/ Widows	8	7	15	
	Divorcee	5	3	8	
Study level	Any	7	0	7	0.002
	Primary	30	1	31	
	Secondary	252	52	304	
	University	223	87	310	

/ m²). 57.6% of employees have abdominal obesity (table 1).

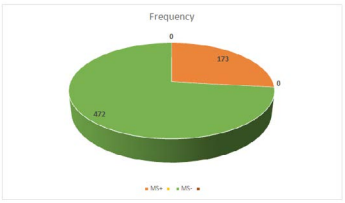
Concerning the Occupational characteristics, the average work experience was 17.1 ± 9.1 years with extremes of 1 and 47 years. It is 15.3 ± 8.7 in women compared with 17.6 ± 9.1 in men. Women were mainly in administration (70.7%), and men were more technicians (55.7%).The majority of workers (96.2%) were in their jobs in the day shift.

2.2. The Metabolic Syndrome Prevalence

- **Prevalence**

Of the 652 agents involved, 173 had the metabolic syndrome as defined by IDF, a prevalence of 26.5% (figure 1).

Figure 1: Prevalence of metabolic syndrome (MS + = presence of syndrome, MS - = absence of syndrome)



- **Different criteria which contributed to the metabolic syndrome**

The most frequent combinations of criteria were those, which, apart from waist circumference (WS), included low HDL-cholesterol and high blood glucose (GLY) levels above the thresholds.

2.3. The Risks Factors of Metabolic Syndrome

- **Impact of lifestyle on metabolic syndrome**

Employees who were not physically active were at greater risk of metabolic syndrome than those who had physical activity (p = 0.0001). Metabolic syndrome was much more prevalent among workers who reported hypo-caloric and hypo-glucidal diets (n = 43 or 67.2%), followed by those who reported having a hypo-lipid and low-sodium diet (n = 17 or 36, 2%). Employees who were not physically active were more at risk of the metabolic syndrome than those who did not (p = 0.0001): table 2.

Table2: Distribution of the metabolic syndrome prevalence according to the lifestyle

	Variables	SM- (n= 479)	SM+ (n= 173)	Total (n=652)	p
Alcohol consumption	Yes	126 (76.8)	38 (23.2)	164 (100)	0.3
	Noor sometime	353 (72.3)	135 (27.7)	488 (100)	
Smoking	Yes	31 (63.3)	18 (36.7)	173 (100)	0.09
	No	448 (74.3)	155 (25.7)	479 (100)	
Diet	Hypo lipid/ Hypo sodium	30 (63.8)	17 (36.2)	47 (100)	<0.0001
	Low carbohydrate / hypocaloric	21 (32.8)	43 (67.2)	64 (100)	
Physical activity	Any	442 (77.4)	129 (22.6)	571 (100)	0.0001
	High energy	83 (83.8)	16 (16.3)	99 (100)	
	Modedrate energy	133 (74.3)	46 (25.7)	179 (100)	

- **Impact of occupational characteristics on the occurrence of the metabolic syndrome**

The average work experience of employees with metabolic syndrome was 19.45 ± 9.55 years with extremes of 4 and 47 years. Agents with 15 years or more experience were more likely to develop metabolic syndrome (p = 0.03). Executives and executing agents were more likely (p = 0.0001) to develop the metabolic syndrome than control agents (table 3).

Table 3: Distribution of Metabolic Syndrome Prevalence by Occupational Characteristics

	Variables	SM-(n=479)	SM+	Total (n=652)	P
Seniority (years)	< 15	241	60	301	0.003
	≥ 15	238	113	351	
Type of job	Administrative	216	89	305	0.3
	Trade officer	42	15	57	
	Technical	220	69	289	
Socio-Occupational category	Agents of execution	254	99	353	<0.0001
	Line supervisors	167	51	218	
	Executive agents	58	23	81	
Work period	Night shift	9	0	9	0.16
	Shift work	6	7	13	
	Day shift	465	166	631	

- **Contribution of cardiovascular risks in the arisen of the metabolic syndrome**

The mains risk factors of metabolic syndrome are respectively: High blood glucose (OR= 12.87), high triglyceride (OR= 9.36), low HDL cholesterol (OR= 4.94) and the BMI (OR=2.96): table 4.

Table 4: Association between the cardiovascular risk factors and the metabolic syndrome

		SM- (n=479)	SM+ (n=173)	Total (n=652)	p	OR (IC95%)
BMI	<30 Kg/m²	395(78.8)	106(21.2)	501(100)	1	
	≥30 Kg/m²	84 (55.6)	67(44.4)	151(100)	<0.0001	2.96 [2.02- 4.37]
Blood pressure	Normal	341(75.8)	109(24.2)	450 (100)	1	
	High or treated	138(68.3)	64(31.7)	202(100)	0.04	1.45 [1.0-2.1]
Blood glucose	Normal	441(84.3)	82(15.7)	523(100)	1	
	High	38(29.5)	91(70.5)	129(100)	<0.0001	12.87 [8.2-20.7]
HDL cholesterol	Low	100(50.5)	98(49.5)	198(100)	<0.0001	4.94 [3.4-7.2]
	Normal	378(83.4)	75(16.6)	453(100)	1	
Triglycerides	Normal	448(81.0)	105(9.0)	553(100)	1	
	High	31(31.3)	68(68.7)	99(100)	<0.0001	9.36 [5.8-15.0]

3. Discussion

Our study was based on a commercial entity present throughout the territory of Togo and covered employees from all regions of the country carrying out various tasks. In this company, the geographical, cultural and, to a large extent, professional diversities of the country are present. In the literature, studies conducted in companies in our geographical and socio-economic contexts are rare. The studies were mainly conducted in the general population [10] or target groups: diabetic [10, 11], hypertensive [12] and obese [13].

This study covered a population of 652 employees. The size of this study population is sufficient to measure the phenomenon (metabolic syndrome) in a population of apparently healthy workers [19].

3.1. Cardiovascular Risks Factors in the Population Study

Obesity

The average BMI of our study population was 27.0 ± 5.6 Kg /m² with deviations of 16.8 and 49.6 Kg / m². Diallo et al [10] found a similar profile in Guinea; the much higher values found by Yessoufou et al [13] are due to their study populations (obese). Obesity (BMI> 30 Kg / m²) was present in 23.2% of employees, in 16.4% of men and 47.8% of women as in the N'guetta et al series [12]. A contrary profile was found in France in the Monica study [20]. (18.1% of men and 17.2% of women with BMI = 30Kg /m²). In our African contexts, obesity and overweight are seen as signs of ease and wealth, an important factor in self-esteem and consideration on the part of others [21]. While malnutrition is associated with a deficit of intake, it is not uncommon to observe at the same time a poor diet by excess of caloric intake especially among those who work and are relatively well-off, correlated with a low expenditure is a source of obesity.

Abdominal Obesity

The average waist circumference of our study population was 94.1 ± 11.7 cm; 57.5% had abdominal obesity. Lower values were found in Guinea [10] and Côte d'Ivoire [12, 14], but higher in Burkina Faso [11].

High Blood Pressure

The prevalence of high blood pressure (31.0%) in our series is higher than that described in the STEP survey conducted by the Ministry of Health of Togo in 2010 (19%) [22] because the blood pressure thresholds (according to IDF) are lower than those which define high blood pressure. However, it is much weaker than that reported by Youssoufou et al. in a semi-rural population of Ouidah in Benin [13].

Hyperglycemia

We observed a higher proportion of employees with blood glucose levels ≥1.0 g / l in our series compared to the prevalence of diabetes in the country [23]. And to that reported by N'guetta et al. [12]. However, it is much less than that found by Yessoufou [13]. 72% and can be explained by the lack of physical activity (51, 5%) and the absence of diet (87, 6%) with a food, in our contexts, made of crops increasingly treated with pesticides and grown on herbicidally weeded land, recognized endocrine disruptors [24, 25].

Hypo HDL Cholesterol

We found a relatively low rate of workers with low HDL-cholesterolaemia, 30.5% (47.9% in women and 25.8% in men), compared to the proportions reported in the iterature [11-13], but the prevalence among women correlated with sex ratio indicates that this rate could have been high if our study population were matched to sex. Moreover, it can be explained by the proportion of workers without diet or hypo-lipid, hypo-glucidic (91.3%) and without physical activity (51.5%).

Hypertriglyceridemia

The proportion of employees with triglyceridemia> 1.5 g / l is similar to that reported by N'guetta [12] and Yaméodo [11]. Yessoufou has found higher proportions [13]. In obese patients: obesity is correlated with hypertriglyceridemia.

3.2. The Metabolic Syndrome

3.2.1. The Prevalence

We observed a high prevalence of metabolic syndrome: 26.5% in our series, in apparently healthy employees and using the criteria of the IDF-2005. This was also the case with Ndiaye in Senegal following an annual medical check-up in 2015 in an insurance company where he obtained 25% metabolic syndrome as prevalence even with the NCEP-ATPIII criteria [16]. This almost justifies the similarity between the two definitions. Hauhouot-Attoungbre et al in 2008 found a lower prevalence: 4.94% still using NCEP-ATPIII [14] in such a seemingly healthy population. Several studies have reported higher prevalence in the target groups: hypertension [8], diabetics [10, 11] and obese [13]. Those target groups in their definition already have a criterion that goes into defining the syndrome, the presence of two other criteria meant the presence of the metabolic syndrome; which justifies those reported figures of prevalence. Our prevalence is similar to that of Ndiaye in Senegal [16].

3.2.2. Prevalence by Socio-Demographic Characteristics

The prevalence of the metabolic syndrome depends on gender as defined, ethnicity, age and body weight [5].

Gender Prevalence

Our work focused on a population of apparently healthy male-dominated employees (78.5%, sex ratio 3.66). This can be explained by the socio-cultural context of the country where women have little education and few occupations in highly formalized formal companies, as is the case in our study framework. Yaméogo et al in Burkina Faso and Diallo et al in Guinea worked on predominantly female populations of diabetics [11]. We found in our series that women had metabolic syndrome than men (32.1% vs. 25%). But the difference was not statistically significant ($p = 0.09$). Some studies in Africa show a female predominance [11, 12]. On the other hand, a male predominance was reported in the Monica studies in France (18.5% in women compared to 22.5% in men) and Hu et al. in Europe [8]. (14.2% in women versus 15.7% among men). This difference is explained by menopause favoring the process of the syndrome in women, in addition to the culture in our contexts where obesity is of great value in self-esteem.

Prevalence by Age

Our study population was young (average age 46.8 ± 7.8 years with extremes of 23 and 60 years) with men on average older than women (average age = 47, 4 ± 7.6 years for men vs 44.7 ± 8.2 years for women, $p = 0.0003$). Employees aged over 40 years accounted for 74.2% and age 40 years was significantly associated with the metabolic syndrome (30.3% of employees ≥40 years $p < 0.001$). The same observation was made in other studies [11, 12, 20]. Older age is a risk factor for atherosclerosis. It would predispose to an increase in insulin resistance and abdominal adipose tissue.

Prevalence by Marital Status

Employees who lived together as a couple (married and cohabiting) accounted for 90.7% of the total. The prevalence of metabolic syndrome was high among non-married (single, widowed, divorced) employees (27.9%), compared with those who lived together (married, cohabiting) (26.4%).

Prevalence by Level of Study and Socio-Professional Group

They were predominantly in school (94.2% had at least a secondary level). Those data reflect the national profile of the active adult population of Togo [23]. We found a high proportion of employees with syndrome in workers with no level or with a low level of education (primary, secondary) (28.4%) compared to those with a level of high education (academic) (24.5%), $p = 0.2$. The same observation was made in France in the Monica study

[20]. Education plays an important role in preventing the metabolic syndrome by adopting a healthy lifestyle.

3.2.3. Prevalence According to Lifestyle

Physical Activity

When a worker engages in physical activity, the more intense the activity, the less he develops a metabolic syndrome (p = 0.0001). N'guetta et al. [12] Gamila and Dallongeville in France [20] also reported this observation. Physical activity has a moderate or mild effect on the metabolic syndrome in prevention but greatly reduces the risk of type 2 diabetes and cardiovascular disease. It is presented as an element mostly involved in the treatment of the metabolic syndrome and whose absence contributes synergistically to complications such as cardiovascular diseases and type 2 diabetes. It is therefore necessary to educate workers so that they practice regular and relatively intense physical activity. A good knowledge of their state of health and of the risks involved could be decisive in the self-implementation of hygiene-dietetic measures.

The Diet

Contrary to what would be logical, a high prevalence of the metabolic syndrome was found in workers who reported having a hypo-glucidal and low-calorie diet (n = 43 or 67.2%), followed by those who were under low-sodium diet and hypo lipid (n = 17 or 36.2%). Employees who did not observe any diet were less affected (n = 129 or 22.6%) (p <0.0001). This paradox could be explained by the fact that the adoption of the diet whose follow-up is difficult to define would come from an advice for an already existing cardiovascular risk [21].

Smoking and alcoholism

7.5% were smokers, 77.9% were drinkers, 25.1% of whom reported drinking regularly. This rate of smoking is close to the national realities reported in 2010 [22].

Smoking and alcohol consumption contribute to the development of metabolic syndrome by the development of athermanous plaques, adipose tissue deposition and embrittlement of the vessel wall with elevated blood pressure.

3.2.4. Occupational characteristics and working conditions on metabolic syndrome occurs

Work Experience

In our series, the average work experience for employees with metabolic syndrome was 19.45 ± 9.55 years compared to 17.1 ± 9.1 years for the study population. Workers with more than 15 years of work experience were at greater risk of developing the metabolic syndrome (p = 0.003).This is correlated with the fact that advanced age is a statistically significant metabolic syndrome risk factor.

Socio-Professional Group

The risk of presenting the metabolic syndrome was high among executives and executing workers (p <0.0001). This high prevalence among executives can be explained by the fact that few executives were physically active since their job does not require much physical effort. For executing workers, it can be explained by their low level of study making it difficult to understand cardiovascular risk and measures to prevent it.

The Type of Work Position

Women are predominantly in administrative positions (70.7%) and, as might be expected, they are more commercial (26.4% women vs. 3.9% men) and many Less technical (2.9% women versus 55.8% men). This distribution respects the structure of the working population in our contexts, with women being more oriented towards training and administrative and commercial positions and very few towards technical training and activities. A higher proportion of administrators had metabolic syndrome (29.1% vs 24.3%). p = 0.16. Administrators spend more their day sitting and easily gain weight. In addition, they are more represented by women who are more likely to have metabolic syndrome [26].

Organization of Work Schedules

The organization in this company is such that only 3.8% were in night work (1.8%) or alternating (2.0%). This is explained by the fact that the majority of employees are administrative and commercial (n = 363 or 55.7%) and among technicians, the majority of those who worked at night did so at intervals of 10 days or more, of a large current workforce. As reported by Y. Esquirol, who concluded that shift work had an additive effect on the metabolic syndrome [27] by disrupting the circadian rhythm and thus lipid metabolism, night work and alternating work in our series appeared as a factor favoring metabolic syndrome (35% among those who were subjected to it, compared with 26.3% of those who worked during the day). The difference was not significant (p = 0.3).

3.2.5. Prevalence according to cardiovascular risk factors and combinations of criteria

- **Cardiovascular Risk Factors Obesity**

We observed in these workers that obesity (BMI = 30 Kg / m^2) was statistically related to the presence of the metabolic syndrome (p <0.0001, OR = 2.97, 95% CI [2.02 -4.37]).

Blood Pressure

A metabolic syndrome was found in 37.0% of employees with blood pressure above the thresholds set by the IDF or a current antihypertensive treatment compared with 28.8% of those who did not. The difference is significant (p = 0.04, OR = 1.45, 95% CI = [1.00-2.09]). High blood pressure figures are associated with the presence of the metabolic syndrome in these employees.

Hyperglycemia

A rise in blood glucose (≥1.0 g / l) was significantly related to the presence of metabolic syndrome (52.6% versus 7.9%, p <0.0001, OR = 12.88, 95% CI = [8.25 to 20.12]). The same observations were made in Côte d'Ivoire [12] but with lower proportions: 17.8%. The diabetic or high blood sugar workers have a high risk (12.8 times) of developing the metabolic syndrome.

Hypo HDL cholesterol

Among employees who had low HDL-cholesterol, 56.6% had metabolic syndrome versus 20.9% of those who had a normal or high HDL-cholesterol. The difference was significant (p <0.0001, OR = 4.94, 95% CI = [3.40-7.17]). N'Guetta in Côte d'Ivoire [12] had made similar observations. Workers in this company were more than 5 times the risk of having a metabolic syndrome when they have low HDL-cholesterol.

Hypertriglyceridemia

Finally, hypertriglyceridemia was significantly associated with the presence of metabolic syndrome (39.3% vs. 6.5%, p <0.0001, OR = 9.3, 95% CI = [5.82-15, 05]). The same association has been reported in Côte d'Ivoire [12]. In the presence of high triglyceridemia, workers were 9.3 times more likely to develop metabolic syndrome. All those significant associations between the various cardiovascular risk factors entering the definition of the metabolic syndrome and the presence of it in our series, reinforces the definitions of the different groups of experts and testify to an evil already present or to come. We must not remain indifferent in the light of those findings.

Conclusion

In our study based on a commercial entity, the prevalence of the metabolic syndrome was high and significantly related to the age of more than 40 years. The presence of the metabolic syndrome was statistically associated with modifiable cardiovascular risk factors (general obesity, abdominal obesity, hypertension, hyperglycemia, hypertriglyceridemia, and hypo-HDL-cholesterol). We observed a link between metabolic syndrome and physical activity, work experience and the socio-occupational group of employees of this company. However, contrary to what we expected, the presence of the metabolic syndrome was not statistically associated with the type of position held, and not with the period in which the employees worked either. It is inversely associated with diet. This high prevalence of metabolic syndrome appears as if working in our contexts is in itself a way to run the risk of cardiovascular disease. The most frequent combinations of criteria in our study combine low HDL-cholesterol with waist circumference and guide the preventive actions to be carried out in this study. This must call on the public authorities to ensure that public health and occupational health policies place particular emphasis on the prevention of cardiovascular diseases in companies. This prevention must include the awareness of workers on the phenomenon and their education for a healthy lifestyle.

Ethical Considerations

The workers selected for our study were previously informed on the process of the study. They gave their free and informed consent before getting included in the survey. Refusal to participate in the survey did not imply any disciplinary sanction for the worker. The workers had the right to withdraw freely from the survey at any moment. The confidentiality of the data was under the investigator's direct responsibility.

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Conflicts of Interest

None declared

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