

Evaluation of Stress and Cardiovascular Risk Factors among Medical Students at Joseph KI-ZERBO University

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Abstract

Objective: To evaluate the level of stress and cardiovascular risk factors among medical students at Joseph KI-ZERBO University. **Methodology:** This was a cross-sectional, prospective, descriptive, and analytical study with prospective data collection conducted from December 1 to 31, 2024. **Results:** During the study period, 440 students were included. The average age was 23.74 ± 1.62 years, ranging from 18 to 35 years. A male predominance (54.77%) was observed, with a sex ratio of 1.21. High stress was perceived by 32.5% of the students, with an average Perceived Stress Scale (PSS) score of 20.67, ranging from 4 to 37. In multivariate analysis, six (06) factors were significantly associated with high stress levels: Age above 30 years (OR = 2.58 [1.02 - 6.53], $p = 0.041$), Doctorate level of education (OR = 2.48 [1.01 - 6.12], $p = 0.001$), Repeating a year of study (OR = 1.54 [1.07 - 2.20], $p = 0.018$), Regular physical activity (OR = 2.23 [1.55 - 3.47], $p = 0.000$), Obesity (OR = 5.68 [1.96 - 16.47], $p = 0.006$), Waist circumference (OR = 3.96 [2.02 - 9.24], $p = 0.002$). Furthermore, the factors associated with high blood pressure were: Age above 30 years (OR = 1.45 [0.22 - 0.96], $p = 0.007$), Doctorate level of education (OR = 2.06 [1.21 - 3.52], $p = 0.015$), Participation in extracurricular activities (OR = 1.98 [1.81 - 2.25], $p = 0.043$), Tobacco consumption (OR = 2.05 [1.72 - 3.88], $p = 0.007$) and energy drink consumption (OR = 1.24 [1.01 - 1.77], $p = 0.034$), Obesity (OR = 3.28 [3.06 - 5.98], $p = 0.001$), Waist circumference (OR = 2.84 [1.98 - 7.22], $p = 0.041$). **Conclusion:** This study revealed a high prevalence of stress among medical students at Joseph KI-ZERBO University. Associated with multidimensional factors (demographic, academic and lifestyle-related).

Keywords

Academic Stress, Cardiovascular Health, Risk Factors

1. Introduction

According to the World Health Organization (WHO), stress can be defined as a body reaction when facing any need for change or adaptation. It is an instinctive natural response that initially aims at helping each one react properly when facing potentially dangerous or difficult situations. It consists of a complex phenomenon that involves both our body and our mind [1]. For more than a decade, several studies and surveys confirmed that stress and on-job suffering are reaching extreme levels [2]. The healthcare environment remains a particular target with healthcare workers witnessing suffering, diseases and death, with significant mental pressure [3]. Although the psychological suffering of physicians has been known for over a century, the one of medical students has been only recognized recently. Among pre-doctoral students, especially interns, a 2007 literature review found a prevalence of burn-out varying between 18 and 82%; a 2015 meta-analysis found a prevalence of depression or depressive symptoms of 28.8% (95% CI = 25.3% - 32.5%) [4].

The chronic stress of medical students is often associated with the onset of cardiovascular risk factors such as hypertension, overweight, sleeping disorders, eating disorders and the use of certain psychoactive products.

Several studies showed that the combination of these risk factors could increase the risk of cardiovascular diseases (CVD) even in young individuals in the middle or long term [5]. These elements put an emphasis on the importance of understanding stress and other risk factors linked to the live styles of medical students and their consequences on cardiovascular health in our environment.

In fact, psychological, social, and intellectual balance as well as physical integrity are generally required in each human being and particularly in future physicians. This is why the current study aimed to evaluate stress and cardiovascular risk factors among medical students.

2. Methodology

The study was conducted in Burkina Faso, specifically in the Health Sciences-Training and Research Unit (HS-TRU) at Joseph KI-ZERBO University. It consisted of a cross-sectional descriptive and analytical study with prospective data collection going from December 1 to 31, 2024. The study population was made up of all medical students of the HS-TRU who were enrolled during the study period and meeting inclusion criteria.

We conducted a convenience sampling, and all study levels were represented. We included all medical students enrolled during the 2023-2024 academic year at JKZU who gave informed consent for the study.

The variables that were analyzed were split into two groups namely dependent variables (Perceived Stress Scale (PSS) Score and blood pressure) and independent variable (sociodemographic data, past medical history and family history, behavioral features, blood analysis to assess cardiovascular risk factors).

The stress assessment scale we used was the Perceived Stress Scale (PSS). Developed by Cohen *et al.* in 1983, the Perceived Stress Scale (PSS) is one of the most widely used scales for assessing the subjective perception of stress over the past month.

The Perceived Stress Scale (PSS): This is a commonly used tool to measure the perception of stress in everyday life situations. It consists of 10 items, each rated from 0 to 4. The scores are interpreted as follows:

Statement: Never (0) Almost never (1) Sometimes (2) Quite often (3) Very often (4).

Questions

- 1) How often have you been upset by an unexpected event?
- 2) How often have you felt like you couldn't control the important things in your life?
- 3) How often have you felt nervous or stressed?
- 4) How often have you found that you couldn't cope with all the things you had to do?
- 5) How often have you been irritated by things that happened beyond your control?
- 6) How often have you felt that problems were piling up to the point where you couldn't cope? Very often (0) Quite often (1) Sometimes (2) Hardly ever (3) Never (4)
- 7) How often have you felt confident in your ability to manage your personal problems?
- 8) How often have you felt that things were going the way you wanted them to?
- 9) How often have you been able to control the irritations in your life?
- 10) How often have you felt in control of the situation?

Interpretation:

- Score from 0 to 13: Low perceived stress
- Score from 14 to 26: Moderate perceived stress
- Score from 27 to 40: High perceived stress

The data collection was made during a screening campaign that was organized in the medical center of the Regional University Social Work Center of Ouagadougou (RUSWC-O) within the JKZU.

Each student gave an informed consent then received a form with a unique anonymous code. Thereafter, the student went to a separate area where anthropometric features were measured and blood draw made for lipid analysis and blood sugar check through rapid tests. Lastly, each participant had an encounter with a physician in order to interpret the results. Participants with abnormal results were referred to the medical center of RUSWC-O for follow-up visits after

the study period.

The collected data were typed-in on computerized frames, analyzed, and treated through the EPI INFO version 7.1.5.0 software. The chi square and the student tests were used to compare the results. The significance level was set at $p < 0.05$. The univariate and multivariate statistical analysis were made using the logistic regression to determine the factors that were significantly associated with perceived stress and to abnormal blood pressure.

3. Results

During the study period we evaluated 440 students on stress and cardiovascular risk factors. We made a convenient sampling, and all study level were represented (Figure 1).

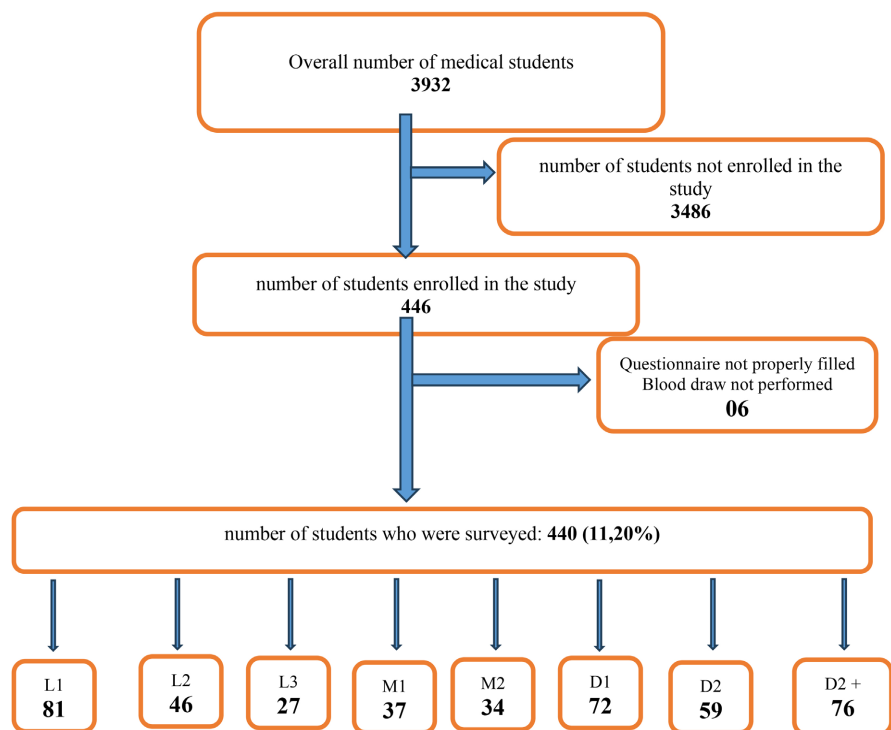


Figure 1. Diagram on student selection.

Sociodemographic characteristics of students

The average age was 23.74 ± 1.62 years ranging from 18 years to 35 years. The age range 18 to 24 years represented 60.45 % of participants. The number of female students was 199 (45.23%) and that of male students 241 (54.77%) giving a sex ratio of 1.21. Students who were single represented 90% and 35 students (7.95%) were married. The average number of children among students was 0.12 ± 0.49 with a minimum of 0 and a maximum of 5 children. Students with no children represented 91.60% while 5.68% had one child.

Students still living with their parents represented 41.82 %, followed by those living alone (20.91%). The main income source was scholarship (40.68%), loans

(28.18%), parents (21.13%) and self-support (10%). One hundred and fifty-five students (35.23%) had extra-curricular socio-professional activities.

The average class (study year) retake was 0.34 ± 0.72 with a minimum of 0 and a maximum of 4 study years retaken. The majority (76.59%) had not failed any class, 15.23% had retaken 01 class, 7.95% and 0.23% had respectively retaken 2 to 3 classes and 04 classes.

Personal past medical and family history

Fifteen students (3.4%) had at least one cardiovascular risk factor such as overweight or obesity (3.2%) and hypertension (0.2%) before starting college. On hundred and two students (23.18%) had a family history of hypertension and 6.59% had a family history of diabetes mellitus.

Perceived stress scale

The students had an average PSS (Perceived Stress Scale) score of 20.67 ranging from 4 to 37 with a standard deviation of 7.23. The perceived stress level was high in 32.5 % of students, while 44.80% and 22.70% had respectively medium and low perceived stress levels.

Eating habits and life style

Our study showed that 71.6% of students eat fruits and vegetables only once or twice a week and that 65.7% did not have regular physical activity. The energy beverages were consumed 67.9% (with 30.2% frequently) and alcohol was occasionally consumed in 24.8% of students (**Table 1**).

Table 1. Distribution of students according to their eating habits and their life styles.

Factors	Number (N = 440)	Percentage
Smoking		
No	426	96.8
Yes	14	3.2
<1 pack-year	8	1.8
1 pack-year	5	1.2
2 pack-year	1	0.2
Alcohol consumption		
No	296	67.2
Occasionally	109	24.8
Yes	35	8
Consumption of energy drinks		
No	141	32.1
Occasionally	166	37.7
Yes	133	30.2
Salty diet		
No	212	48.2
Occasionally	95	21.6

Continued

Yes	133	30.2
Intake of hypnotic drugs		
No	433	98.4
Occasionally	4	0.9
Yes	3	0.7
Intake of antidepressive drugs		
No	423	96.1
Occasionally	10	2.3
Yes	7	1.6
Intake of traditional medicine (phytotherapy)		
No	288	65.5
Occasionally	87	19.8
Yes	3	14.8
Consumption of fruits and vegetables weekly		
1 to 2 times	315	71.6
3 to 4 times	70	15.9
Never	46	10.4
5 times or more	9	2.1
Practice of regular physical activity		
No	289	65.7
Yes	151	34.3
Practice of high-level sports		
No	421	95.7
Yes	19	4.3
Football	16	3.7
Martial arts	1	0.2
Badminton	1	0.2
Basketball	1	0.2

Weight profile

The average weight was 62.99 ± 11.09 Kg with extremes at 39 and 108 Kg. The average height was 1.70 ± 0.08 m with height ranging from 1.48 to 1.93 m.

The mean BMI was 21.73 ± 3.41 Kg/m² with BMI ranging from 14.30 to 33.7 Kg/m² (**Table 2**).

The average waist circumference was 74.03 ± 8.96 cm with extremes at 55 and 107 cm.

The students who had a normal waist circumference (<90 cm) represented 95% of our sample and 5% of the students had an abnormal waist circumference (≥ 90 cm).

Table 2. Distribution of students according to BMI.

Weight profile	Number	Percentage
	(N = 440)	
Underweight (<18.5 Kg/m ²)	42	9.55
Normal BMI (18.5 - 24.9 Kg/m ²)	336	76.36
Overweight (25 - 29.9 Kg/m ²)	46	10.45
Obesity (≥30 Kg/m ²)	16	3.64

Blood pressure profile

The average systolic blood pressure was 118.19 ± 31.02 mmHg with extremes at 90 and 179 mmHg.

The average diastolic blood pressure was 77.38 ± 10.08 mm Hg with extremes of 51 and 114 mmHg.

Table 3 shows the distribution of students according to their blood pressure value.

Table 3. Distribution of students according to blood pressure levels.

Blood pressure	Number (N = 440)	Percentage
Normal blood pressure	399	90.68
Systolo-diastolic hypertension (HTN) HTN	19	4.32
Grade 1	12	2.73
Grade 2	4	0.91
Grade 3	3	0.68
Isolated systolic HTN	4	0.91
Grade 1	4	0.91
Grade 2	0	0
Grade 3	0	0
Isolated diastolic HTN	18	4.09
Grade 1	17	3.86
Grade 2	1	0.23
Grade 3	0	0

Glycemic profile

The average glycemia was 1.02 ± 0.63 g/L with extremes of 0.59 and 1.4 g/L. The students that had normal glycemia (<1.26 g/L) represented 96.6% of our sample while 3.4% had hyperglycemia (≥1.26 g/L).

Lipid profile

The average cholesterol level was 1.47 ± 0.32 g/L with extremes of 1 and 2.67 g/L.

The average level of HDL-c was 0.47 ± 0.13 g/L with extremes of 0.28 and 1 g/L.

The average level of LDL-c was 0.88 ± 0.56 g/L with extremes of 0.27 and 1.65 g/L.

The average level of triglycerides was 0.98 ± 0.35 g/L with extremes of 0.49 and 2.77 g/L.

Table 4 reflects the distribution of students according to lipid profile.

Table 4. Distribution of students according to lipid profile.

Lipid profile	Number (N = 440)	Percentage
Total cholesterol		
Normal	412	93.6
Abnormal	28	6.4
HDL cholesterol		
Normal	151	34.3
Abnormal	289	65.7
LDL cholesterol		
Normal	417	94.8
Abnormal	23	5.2
Triglycerides		
Normal	403	91.6
Abnormal	37	8.4

Factors associated with stress levels and blood pressure profile

In our study, there was a significant link between the level of stress and the following factors: age ($p = 0.000$), level of education ($p = 0.0000$), class retake ($p = 0.0000$), alcohol consumption ($p = 0.0005$) and antidepressive drugs ($p = 0.03$), regular practice of physical activity ($p = 0.00001$), weight profile ($p = 0.004$), and waist circumference (0.04) (**Table 5**).

Table 5. Association between several factors and the perceived stress level.

Variables	Perceived stress level		P-value
	Low/moderate (%)	high (%)	
Age			0.000
18 - 24 years	156 (35.45)	110 (25.00)	
25 - 29 years	52 (11.82)	107 (24.32)	
>30 years	6 (1.36)	9 (2.05)	
Level of education			0.0000
License	101 (24.32)	61 (13.86)	
Master	37 (8.41)	33 (7.50)	
Doctorate	53 (12.05)	155 (35.23)	

Continued

Number of retaken classes			0.0000
0	174 (39.55)	164 (37.27)	
1	11 (2.50)	56 (12.73)	
2	5 (1.14)	17 (3.86)	
03 and more	3 (0.68)	10 (2.27)	
Consumption of alcohol			0.0005
Yes	11 (2.50)	24 (5.45)	
No	149 (33.86)	147 (33.41)	
Occasionally	5 (1.14)	104 (23.64)	
Intake of antidepressive drugs			0.03
Yes	5 (1.14)	5 (1.14)	
No	188 (42.73)	235 (53.41)	
Occasionally	0 (00)	7 (1.59)	
Practice of regular physical activities (at least 3 times a week)			0.00001
Yes	88 (20.00)	63 (14.32)	
No	105 (23.86)	184 (41.82)	
Weight profile			0.004
Underweight	28 (6.36)	14 (3.18)	
Normal weight	165 (37.5)	171 (38.86)	
Overweight	16 (3.64)	30 (6.82)	
Obesity	3 (0.68)	13 (2.95)	
Waist circumference			0.04
Normal (<90 cm)	187 (42.5)	231 (52.50)	
Abnormal (≥90 cm)	5 (1.14)	17 (3.86)	

A significant link was reported between the hypertension profile and the following factors: age ($p = 0.016$), level of education ($p = 0.000$), practice of extra-curricular activities ($p = 0.004$), consumption of tobacco ($p = 0.001$) and energy beverages ($p = 0.000$), salty diet ($p = 0.000$), weight profile ($p = 0.03$) and waist circumference ($p = 0.028$) (**Table 6**).

Table 6. Association between several factors and HTN profile among students.

Variables	HTN profile		P-value
	Normal (%)	Abnormal (%)	
Age			0.016
18 - 24 years	243 (55.23)	23 (5.23)	
25 - 29 years	159 (36.14)	16 (3.64)	
>30 years	13 (2.95)	2 (0.45)	

Continued

Level of education			0.000
License	144 (32.73)	18 (4.09)	
Master	66 (15.00)	4 (0.91)	
Doctorate	189 (42.95)	19 (4.32)	
Income generating socio-professional activities			0.004
Yes	141 (32.05)	14 (3.18)	
No	258 (58.64)	27 (6.14)	
Consumption of tobacco			0.001
Yes	12 (2.73)	2 (0.45)	
No	387 (87.95)	39 (8.86)	
Consumption of energy drinks			0.000
Yes	122 (27.73)	11 (2.50)	
No	127 (28.86)	14 (3.18)	
Occasionally	150 (34.09)	16 (3.64)	
Salty diet			0.000
Yes	121 (27.50)	11 (2.50)	
No	191 (43.41)	21 (4.77)	
Occasionally	86 (19.55)	9 (2.05)	
Weight profile			0.03
Underweight	38 (8.64)	4 (0.91)	
Normal weight	304 (69.09)	32 (7.27)	
Overweight	43 (9.77)	3 (0.68)	
Obesity	14 (3.18)	2 (0.45)	
Waist circumference			0.028
Normal (<90 cm)	379 (86.14)	39 (8.86)	
Abnormal (≥90 cm)	20 (4.55)	2 (0.45)	

After multivariate analysis, the factors that were significantly associated with a high level of stress were age above 30 year ($p = 0.041$, OR = 2.58, CI at 95% = [1.02 - 6.53]), doctorate level of studies ($p = 0.001$, OR = 2.48, CI at 95% = [1.01 - 6.12]), class retake ($p = 0.018$; OR = 1.54; CI at 95% = [1.07 - 2.20]), practice of regular physical activities ($p = 0.000$; OR = 2.23; CI at 95% = [1.55 - 3.47]), obesity ($p = 0.006$; OR = 5.68; CI at 95% = [1.96 - 16.47]), waist circumference above 90 cm ($p = 0.002$; OR = 3.96; CI at 95% = [2.02 - 9.24]) (**Table 7**).

We reported many factors significantly associated with an abnormal blood pressure profile such as: age above 30 years ($p = 0.007$; OR = 1.45; CI at 95% = [0.22 - 0.96]), doctorate level of education ($p = 0.015$; OR = 2.06; CI at 95% = [1.21 - 3.52]), practice of extra-curricular activities ($p = 0.043$; OR = 1.98; CI at 95% =

[1.81 - 2.25]), consumption of tobacco (p = 0.007; OR = 2.05; CI at 95% = [1.72 - 3.88]), consumption of energy drinks (p = 0.034; OR = 1.24; CI at 95% = [1.01 - 1.77]), obesity (p = 0.001, OR = 3.28, CI at 95% = [3.06 - 5.98]) and waist circumference above 90 cm (p = 0.041, OR = 2.84, CI at 95% = [1.98 - 7.22]) (Table 8).

Table 7. Association between several factors and high level of perceived stress among students.

Variables	High level of stress	
	OR [CI at 95%]	P-value
Age		
18 - 24 years	Ref	
25 - 29 years	1.26 [0.08 - 1.51]	0.800
>30 years	2.58 [1.02 - 6.53]	0.041
Level of education		
License	Ref	
Master	3.17 [1.45 - 4.04]	0.061
Doctorate	2.48 [1.01 - 6.12]	0.001
Number of retaken classes		
00 class	Ref	
01 class	1.54 [1.07 - 2.20]	0.018
02 classes	1.96 [0.82 - 5.45]	0.36
03 classes and more	0.58 [1.66 - 4.84]	0.088
Practice of regular physical activity		
No	Ref	
Yes	2.23 [1.55 - 3.47]	0.000
Weight profile		
Normal	Ref	
Overweight	1.47 [1.09 - 2.23]	0.22
Obesity	5.68 [1.96 - 16.47]	0.006
Waist circumference		
Normal	Ref	
Abnormal	3.96 [2.02 - 9.24]	0.002

Table 8. Association between several factors and the high level of perceived stress among students.

Variables	Abnormal HTN profile	
	OR [CI at 95%]	P-value
Age		
18 - 24	Ref	
25 - 29 years	0.48 [0.18 - 1.25]	0.150
>30 years	1.45 [0.22 - 0.96]	0.007

Continued

Level of education		
License	Ref	
Master	1.91 [1.61 - 1.48]	0.35
Doctorate	2.06 [1.21 - 3.52]	0.015
Income generating socio-professional activities		
No	Ref	
Yes	1.98 [1.81 - 2.25]	0.043
Consumption of tobacco		
No	Ref	
Yes	2.05 [1.72 - 3.88]	0.007
Consumption of energizing beverages		
No	Ref	
Yes	1.24 [1.01 - 1.77]	0.034
Occasionally	1.06 [1.22 - 2.03]	0.53
Weight profile		
Normal	Ref	
Overweight	2.16 [0.56 - 3.66]	0.064
Obesity	3.28 [3.06 - 5.98]	0.001
Waist circumference		
Normal	Ref	
Abnormal	2.84 [1.98 - 7.22]	0.041

4. Discussion**Study flaws**

- The cross-sectional survey is a single capture and only gives a picture of the phenomenon at a given time.
- The questionnaire was self-administered: this type of questionnaire could lead to comprehension and an interpretation bias regarding a number of items.
- The influence of local environment: although the results are informative, they could be specific to the city of Ouagadougou and cannot be systematically extended to other populations.

Socio-demographic characteristics

The average age in our sample (23.74 ± 1.62 years with extremes at 18 and 35 years) is comparable to results of a study that was conducted by Bonogo in 2019 among 1093 students at JKZU and reported an average age of 23.56 ± 2.78 with extremes at 18 and 48 [6]. Malik and Coll, in Cote d'Ivoire, similarly found an average age of 22.77 ± 2.55 years with extremes at 17 and 35 years [7]. In facts, those means in Burkina Faso could be explained by the fact that mandatory age of admission in primary school is set at 6 years and the schooling from primary to

secondary school had an average length of 13 years. Therefore, the average years while entering medical school is 19 years and medical studies last 8 years setting the years of completing medical school at 27 years.

Female students were 199 (45.23%) and 241 were male (54.77%) giving a sex ratio of 1.21. These results corroborate with the statistics of the HS/TRU and the JKZU that have female respectively representing 38% and 38.7% of their population [8]. These characteristics are in line with the study conducted in Cote d'Ivoire, a neighboring country of Burkina Faso, which reported a male predominance (sex-ratio = 1.4) [7]. In contrast, a female predominance was observed in Tunisia, Morocco, and France with respective sex-ratios of 0.9, 0.73, and 0.64 [9]-[11]. These variations can be explained by cultural and societal differences, influencing the access of women to university studies in general and medical school in particular.

In our study, the average class retake was 0.34 ± 0.72 with a minimum of 0 and a maximum of 4 classes retaken. Students who retook one class represented 15.23% of our sample. These studies are perfectly in line with the overall statistics of HS/TRU in the years 2022-2023 that showed a success rate of 63.5% in medical school with 19.7% of students being people retaking the class [8]. This situation highlights the academic challenges that medical students often face. This considerable rate could be an indicator of stress that may be inherent to medical school.

Perceived stress

The average stress score in our study was 20.67 on the PSS with a standard deviation of 7.23 and extremes of 4 and 37. These extremes values show significant differences in the manner that stress is endured by students. In fact, this could reflect the disparities in terms of personal adaptation, access to social support or socio-economic conditions.

The prevalence of high stress was 32.5%, which is lower than what was reported in Sousse (63.9%), in Egypt (59.9%) and in Syria (52.6%) [10] [12] [13].

However, the prevalence of high level of stress is greater in Burkina (32.5%) than what was reported in Morocco (6.5%) [9]. This disparity could be explained in one part by economics. On the other hand, the Burkinabe students could face difficult learning conditions, namely the lack of teaching tools and the massification of workforce.

Eating habits and lifestyle

In our current study, 76.1% of students reported that they didn't consume fruits and vegetables on a regular basis but only once or twice a week while only 2.1% did it more than five times weekly. These results do contrast with those that were reported in Cote d'Ivoire in 2024, where 33.88% of medical students consumed fruits and vegetables once or twice a week and 20.76% did it at least 5 times weekly [7]. The socio-economic context is one of the main reasons for such a contrast. In fact, the students in Burkina Faso consume less fruits and vegetable due to the high prices of the items, and the low cost readily available fast foods which avoid taking too much time to cook balanced food. Moreover, the climate in Cote d'Ivoire

is favorable for the culture of several fruits and vegetables and eating habits specific to each countryside.

Our study reported 67.9% of energy drink consumption (37.7% occasionally and 30.2% frequently). These proportions were higher than those reported by Oteri and Coll in Messine (48.4%) [14]. The results can be explained by the fact that energy drinks are largely affordable in Burkina Faso due to their low cost and availability on market places; but also, by attracting publicity for young people that presents the beverages as products capable of increasing intellectual performance.

Sedentary lifestyle was reported in 65.7% of medical students. This percentage is higher than the ones reported by Ewane in Cameroon (41.73 %) and Malik in Côte d'Ivoire (33.74 %) [5] [7]. This difference can be related to the high hourly volume that hinders the practice of regular physical activity.

Factors associated with high level of stress

- **Age above 30 years**

The results in our study showed that older students (>30 Years) had 2.58-fold more chance of reporting a high level of stress ($p = 0.041$; OR = 2.58). This can be due to extra-curricular responsibilities such as family or financial ones. Moreover, the time pressure can be more intense on these students who feel the urgent need of completing their studies and quickly starting their professional life.

- **Doctoral level of education**

The students in their doctoral years of education had 2.48-fold chances of being under stress ($p = 0.001$; OR = 2.48), probably due to increased academic demands but also research constraints and the need to plan a career. In fact, besides their in-class courses, they do have more internships in hospitals compared to their younger fellows. Moreover, they go through a period of uncertainty with regard to their upcoming professional career, which requires the making of important decisions. These situations constitute supplementary stress factors for the students at the end of their training time.

- **Class retake due to failure of passing teaching examinations**

The fact of retaking a class would multiply by 1.54-fold the risk of having a high level of stress ($p = 0.018$; OR = 1.54). This result suggests that retaking a class leads medical students to be more vulnerable to stress. This could be explained by the fact that the retake of class due to failure to pass examinations could be perceived as academic failure, which leads to psychological pressure caused by the fear of failure. Moreover, students retaking a class often increase their personal study time. Therefore, it is important to put in place strategies that would accompany students with academic difficulties through a counseling and academic orientation committee.

- **Regular practice of physical activities**

The student who practiced physical activities on a regular basis reported 2.23-fold risks of being under high level of stress ($p = 0.000$; OR = 2.23). Contrarily to these findings, Raglin showed a reverse relation between physical activity and stress, showing sports as being a protecting factor [15]. This contrast could be

explained by the fact that students in our study do recognize their state of stress and use sports as a mechanism for stress management. The practice of physical activity is, therefore, an adaptative response to stress rather than an aggravative factor.

- **Obesity and high waist circumference**

Obesity and abdominal fats (assessed by the waist circumference) were significantly associated with high stress level with respectively 5.58-fold ($p = 0.006$; OR = 5.68) and 3.96-fold ($p = 0.002$; OR = 3.96) increased risks. This is probably due to the bidirectional relationship between chronic stress and unbalanced eating habits that could lead to weight gain. Epel and Coll reported that chronic stress could favor the onset of obesity through hormonal and behavioral mechanisms [16].

Factors associated with an abnormal blood pressure profile

- ❖ **Age above 30 years**

The students who were older than 30 years had 1.45-fold increased risk of having abnormal blood pressure ($p = 0.007$; OR = 1.45). This observation corroborates with studies conducted in general population in which older age was identified as an important risk factor for Hypertension [17]. In an academic setting, older students could be more exposed to chronic stress factors, sedentary life due to a long academic path, underlying non diagnosed pathologies or simply physiologic changes related to aging.

- ❖ **Doctoral level of studies**

The advanced level of studies, especially the doctoral level multiplied by 2.06 folds the risk of developing abnormal blood pressure profile ($p = 0.015$; OR = 2.06). This reflects a likely accumulation of academic stress throughout the years, often linked to the pressure caused by academic and professional responsibilities, associated with unhealthy lifestyle habits such as reduced physical activity or unbalanced diet.

Medical students complete practical internships in healthcare facilities. They also learn how to manage suffering, illness, and often death. Even the most sophisticated medical technology does not prevent professionals from encountering this, and the relational and emotional aspect is constantly present, which can be an additional source of stress, outside of medical studies [18].

- ❖ **Practice of extra-curricular activities**

The practice of extra-curricular activities increases 1.98-fold the risk of having abnormal blood pressure ($p = 0.043$; OR = 1.98). Although these activities are required for a number of students in order to meet their needs, they are potential causes of stress. In fact, those activities increase the workload and decrease the time spent resting. All these factors will contribute to an increase of stress and consequently an increase in blood pressure.

- ❖ **Consumption of tobacco**

The consumption of tobacco increased 2.05-fold the risk of having high blood pressure ($p = 0.007$; OR = 2.05), confirming smoking as a recognized cardiovas-

cular risk factor [18]. In Guinea Conakry, Conté and Coll found a significant association between hypertension and smoking ($p = 0.02$) [19]. Although the prevalence of smoking was relatively low among sub-Saharan students, its correlation with hypertension remains troubling, require a special focus.

❖ Consumption of energy drinks

The consumption of energy drinks multiplied by 1.24-fold the risk of having high blood pressure ($p = 0.034$; OR = 1.24). The significant link that was identified between the two factors in our study is coherent with international data. These beverages, rich in caffeine and sugar, do increase the heart rate and the blood pressure in the short term [20]. In Burkina Faso, the increases consumption of such beverages could explain these findings.

❖ Obesity and elevated waist circumference

Our study showed that obesity and abdominal fats increased the risk of having high blood pressure with respectively 3.28-fold ($p = 0.001$; OR = 3.28) and 2.84-fold ($p = 0.041$; OR = 2.84) more risk.

These results are in accordance with international studies that acknowledge these two factors as classic determinants of hypertension. In Kinshasa, during the 2018-2019 academic year, Mupepe and Coll found that obese students had 5.32 fold more risk of having Hypertension [21]. In the settings of Burkina Faso, the nutritional transition and the increased sedentary lifestyle could explain this tendency in young adults [22].

5. Conclusion

This current study helped reveal a significant prevalence of stress among medical students at Joseph KI-ZERBO University, associated with demographic and academic factors, and linked to life style. The multivariate analysis confirmed the importance of several specific factors, such as advanced age, high level of education, class retake, practice of physical activity, weight profile, in predicting high level of stress. These results are similar to those in international studies that underline the key role of stress in the lives of medical students as well as their impact on cardiovascular and overall health. However, a number of contextual specificities such as the contradictory association between physical activity and stress, require a deeper insight in order to better understand the specific dynamics of this group.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Xavier (2024) Stress : Définition du stress selon l'OMS. <https://www.stress.eu.com/comprendre-le-stress/definition-du-stress/>
- [2] Graziani, P., Hautekee, M., Rusinek, S., *et al.* (2001) Stress, anxiété et trouble de l'adaptation. Masson, 203 p.
- [3] Laraqui, O., Laraqui, S., Tripodi, D., Caubet, A., Verger, C. and Laraqui, C.H. (2008)

- Évaluation du stress chez le personnel de santé au Maroc: À propos d'une étude multicentrique. *Archives des Maladies Professionnelles et de l'Environnement*, **69**, 672-682. <https://doi.org/10.1016/j.admp.2008.06.014>
- [4] Frajerman, A. (2020) Quelles interventions pour améliorer le bien-être des étudiants en médecine? Une revue de la littérature. *L'Encéphale*, **46**, 55-64. <https://doi.org/10.1016/j.encep.2019.09.004>
- [5] Ewane, M.E., Mandengue, S.H., Priso, E.B., et al. (2012) Dépistage des maladies cardiovasculaires chez des étudiants de l'université de Douala et influence des activités physiques et sportives. *The Pan African Medical Journal*, **11**, Article 77.
- [6] Bonogo, Z. (2019) Troubles de l'humeur: Prévalence et facteurs associés. Cas des étudiants de médecine de l'université Joseph KI-ZERBO. Thèse de médecine, Université Joseph KI-ZERBO, 157 p.
- [7] Malik, K., Maiga, S., Pilabré, W.E., et al. (2024) Facteurs de risque cardiovasculaires et consommation des fruits et légumes chez les étudiants en médecine. *Revue marocaine de santé publique*, **11**, 13-17.
- [8] Université Joseph KI-ZERBO (2023) Annuaire statistique UJKZ 2022-2023, 152 p.
- [9] El Madani, H., Yazghich, I. and Berraho, M. (2024) 5-4—Le stress perçu et la qualité de vie des étudiants en médecine au Maroc: Étude transversale. *Journal of Epidemiology and Population Health*, **72**, Article 202578. <https://doi.org/10.1016/j.jep.2024.202578>
- [10] Amamou, B., Saida, I.B., Bejar, M., et al. (2022) Stress, anxiété et dépression chez les étudiants à la faculté de médecine de Sousse. *La Tunisie Médicale*, **100**, 346-352.
- [11] Ladner, J. and Tavolacci, M.P. (2014) Prévalence de l'épuisement professionnel (EP), stress et facteurs associés chez les étudiants en médecine. *Revue d'Épidémiologie et de Santé Publique*, **62**, S204. <https://doi.org/10.1016/j.respe.2014.06.107>
- [12] Fawzy, M. and Hamed, S.A. (2017) Prevalence of Psychological Stress, Depression and Anxiety among Medical Students in Egypt. *Psychiatry Research*, **255**, 186-194. <https://doi.org/10.1016/j.psychres.2017.05.027>
- [13] Al Saadi, T., Zaher Addeen, S., Turk, T., Abbas, F. and Alkhatib, M. (2017) Psychological Distress among Medical Students in Conflicts: A Cross-Sectional Study from Syria. *BMC Medical Education*, **17**, Article No. 173. <https://doi.org/10.1186/s12909-017-1012-2>
- [14] Oteri, A., Salvo, F., Caputi, A.P. and Calapai, G. (2007) Intake of Energy Drinks in Association with Alcoholic Beverages in a Cohort of Students of the School of Medicine of the University of Messina. *Alcoholism: Clinical and Experimental Research*, **31**, 1677-1680. <https://doi.org/10.1111/j.1530-0277.2007.00464.x>
- [15] Raglin, J.S. (1990) Exercise and Mental Health. Beneficial and Detrimental Effects. *Sports Medicine*, **9**, 323-329. <https://doi.org/10.2165/00007256-199009060-00001>
- [16] Epel, E.S., McEwen, B., Seeman, T., Matthews, K., Castellazzo, G., Brownell, K.D., et al. (2000) Stress and Body Shape: Stress-Induced Cortisol Secretion Is Consistently Greater among Women with Central Fat. *Psychosomatic Medicine*, **62**, 623-632. <https://doi.org/10.1097/00006842-200009000-00005>
- [17] Kearney, P.M., Whelton, M., Reynolds, K., Muntner, P., Whelton, P.K. and He, J. (2005) Global Burden of Hypertension: Analysis of Worldwide Data. *The Lancet*, **365**, 217-223. [https://doi.org/10.1016/s0140-6736\(05\)17741-1](https://doi.org/10.1016/s0140-6736(05)17741-1)
- [18] Laraqui, O., Laraqui, S., Tripodi, D., Caubet, A., Verger, C. and Laraqui, C.H. (2008) Évaluation du stress chez le personnel de santé au Maroc: À propos d'une étude multicentrique. *Archives des Maladies Professionnelles et de l'Environnement*, **69**, 672-

682. <https://doi.org/10.1016/j.admp.2008.06.014>

- [19] World Health Organization (2021) Global Report On trends in Tobacco Smoking 2000-2025. 4th Edition, WHO, 150 p.
- [20] Conté, N., Diakité, F., Barry, I.S., *et al.* (2021) Prévalence et facteurs associés à l'hypertension artérielle chez les travailleurs de l'usine TOPAZ à Conakry. *Cardiologie Tropicale*, **165**, 20-24.
- [21] Higgins, J.P., Babu, K., Deuster, P.A., *et al.* (2018) Energy Drinks: A Contemporary Issue. *Drug and Alcohol Dependence*, **190**, 1-10.
- [22] Mupepe, D.M., Kayembe, J.M.N., Nkodila, A.N., *et al.* (2020) Hypertension and Associated Cardiovascular Risk Factors among Candidates Enrolled at Kinshasa University for the Academic Year 2018-2019. *Annales Africaines de Medecine*, **13**, 13-18.