Lifestyle and Risk Factors Related to Metabolic Syndrome in Administrative Workers: Universidad Nacional de Trujillo, Perú

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Abstract

Objective: To characterize the lifestyle and risk factors related to Metabolic Syndrome of administrative workers at the Universidad Nacional de Trujillo. Method: A total of 168 administrative workers from the main campus of the Universidad Nacional de Trujillo were selected in accordance with stratified random method. Results: In the Lifestyle Profile according to Pender (1996), 65.5% of the participants have a low level of exercise, and 82.1% manifest sufficient personal habits. Adults accounted for 67.9%, and the majority were overweight (47.6%). Regarding metabolic status, 54.2% were healthy, while 45.8% were identified with Metabolic Syndrome. In addition, the risk of becoming ill, according to waist circumference, was very high in 42.9% (72) of cases. Likewise, the risk of cardiovascular disease is higher in healthy people, while it is very high in workers with Metabolic Syndrome (p < 0.001). Moreover, workers with normal weight have a low risk of becoming ill, on the contrary, for those who are overweight it is high and those who are obese have a very high risk (p < 0.001). Conclusion: In terms of lifestyle, there was a low level of exercise, and most of the participants only had sufficient personal habits. Regarding the components linked to Metabolic Syndrome in the authoritative staff of Universidad Nacional de Trujillo, both men and women presented abdominal obesity, and the values of systolic and diastolic blood pressure, fasting glucose and triglycerides were altered. Furthermore, the women had HDL values below what was desirable. Regarding the risk of cardiovascular disease, it is very high in syndromic workers, those who are overweight are high, and obese workers are at very high risk.

Keywords: *Lifestyle, physical activity, Syndrome X, cardiovascular risk, obesity.*

Introduction

Metabolic Syndrome (MS) primarily was mentioned in 1988 by 'Gerald Reaven'; by associating insulin resistance (IR), high blood pressure and lipid alteration, under the name of Syndrome X (Córdova-Pluma et al, 2014), then the World Health Organization (WHO) and the European Group for the Study of Insulin Resistance (EGIR) called it Metabolic Syndrome (World Health Organization, 1999; Kassi et al, 2011; Al-Oraini et al., 2024).

The National Cholesterol Education Program in the third report of its executive summary (NCEP-ATP III) defines the term MS as a conglomerate of emerging risk factors and habits. These are abdominal obesity, dyslipidemia, IR, and hypertension, in addition to prothrombotic and proinflammatory states. Similarly, for the American Diabetes Association, the description of Metabolic Syndrome is: "a set of specific risk factors for cardiovascular disease (CVD) related to insulin resistance" (Kahn et al, 2005; Mohammad et al., 2024; Hijjawi et al., 2023).

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Regarding the pathophysiology of MS, its development is mainly due to insulin resistance, and in turn, the cause of this is abdominal obesity. Consequently, abdominal fat produces adipokines that trigger the constitution of the components of the syndrome (Lizarzaburu, 2013; Zuhri et al., 2023). Thus, abdominal obesity becomes the first risk factor; by exceeding the production of free fatty acids (FFAs) in the blood derived from: lipolysis of reserve triglycerides by the action of cAMP-dependent lipase (cyclic adenosine monophosphate) or lipoproteins lysed by lipoprotein lipase (LPL) (Laclaustra et al, 2005; Al-Zyadat et al., 2022).

Hyperinsulinemia and obesity are also related to hypertriglyceridemia and low HDL cholesterol levels. Moreover, the fatty tissue of visceral fat releases pro-inflammatory and prothrombotic adipokines, which lead to the generation of IR, increased insulin levels, endothelial dysfunction and failure in fibrinolysis (Grundy, 2016; Pereira-Rodríguez, 2016; Al-Nawafah et al., 2022). Likewise, free fatty acids are able to reduce the generation of nitric oxide in the endothelium of blood vessels, mediated by insulin, which can lead to hypertension (Gómez-Romero et al, 2017; Rahamneh et al., 2023).

The diagnosis of 'Metabolic Syndrome according to ATP III (Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults, 2001)', considers about 3 of trailing measures: "serum glucose ≥ 110 mg/dl (can be applied ≥ 100 mg/dl), waist circumference > 102 cm in men and > 88 cm in women, serum triglycerides ≥ 150 mg/dL, HDL cholesterol < 40 mg/dl in men and < 50 mg/dl in women, and blood pressure $\geq 130/85$ mmHg."

According to the WHO (2006), unhealthy lifestyles such as smoking, sedentary lifestyle, stress or an unbalanced diet are the circumstances that condition the progress of long-term diseases, highlighting Obesity and Type 2 Diabetes Mellitus (DM) as twin epidemics. Therefore, the International Diabetes Federation (IDF) states that the increase in patients with MS is related to the expansion of these global epidemics (Dunstan et al, 2008; Alsaraireh et al., 2022); syndromic people have a two- and three-times increased probability of suffering a cardiac arrest, stroke and death, respectively.

For this reason, the priority of the research lied in characterizing lifestyle and threat elements related to Metabolic Syndrome of administrative workers at the Universidad Nacional de Trujillo.

Materials and Methods

Type and Design of Research

This research was descriptive, relational and cross-sectional.

Population and Sample

The sampling comprised workers from the UNT, La Libertad region (Peru). The finite population formula with a conviction level of 95% was used and an outcome of 168 people was obtained. Women were aged 43.13 ± 11.92 years as well as males 49.09 ± 8.83 years.

Data Collection Instruments

The instrument was a questionnaire adapted from the Lifestyle Profile (PEPS-I) (Pender, 1996)

Metabolic Profile

Anthropometric and biochemical evaluations were carried out considering the state of fasting, avoiding physical exercise and without consumption of stimulants. Thus, the data was collected in a tab and stored in Excel.

Anthropometric Evaluation

Weight was determined with a digital scale (200 kg capacity) and height was measured with a metal height monitor (2 m high) and BMI (body mass index) was calculated. The abdominal circumference was determined with a tape measure (200 cm long).

For the threat of cardio-related illness with respect to the waist circumference, the values are "in men; low < 94 cm, high ≥ 94 cm and very tall ≥ 102 cm, in women; under < 80 cm, high ≥ 80 cm and very tall ≥ 98 cm" (Aguilar Esenarro et al, 2012). Systolic and diastolic blood pressure was also noted with an arm digital sphygmomanometer with automatic insufflating (1 mmHg sensitivity) (Bezares et al, 2014).

Biochemical Evaluation

The time for blood sample collection was from 7:00 to 9:00 am, using the BD Vacutainer method. The tubes with the collected blood were processed in the research facilities of the Faculty of Biological Sciences of the UNT using the colorimetric enzymatic method; recording glucose, triglycerides, and HDL cholesterol readings, with respect to criteria of ATP III.

Data Analysis

In terms of lifestyle, a descriptive analysis was carried out of the distribution of sex, age group (3 groups according to life stages: youth, adult and elderly) (Ministerial Resolution No. 538-2009/MINSA, 2009), weight status, metabolic status, risk of disease and the components of the Lifestyle Profile. The mean, standard deviation and 95% confidence intervals of the metabolic profile were also calculated.

Categorical variables were then assessed using nonparametric tests; For the comparison between the 3 age groups, the Kruskal-Wallis H testing method was utilized. In turn, the Risk of cardiovascular disease was compared between metabolic status (2 groups) and weight status (3 groups) using the Mann-Whitney U and Kruskal-Wallis H analysis, respectively.

All non-paramétrica testas were preformad at a significantes level of 5%, he data were processed with tue IBM SPSS Statistics version 26 program, and the tables were constructed with the Excel 2021 program.

Ethical Aspects

The evaluation of scrutiny was managed by the Research Ethics Committee of the Faculty of Biological Sciences, which handed over a favorable report. The research took into account the Declaration of Helsinki (World Medical Association, 2013; Azzam et al., 2023).

Results

Table 1. Distribution of sex, age group, weight status (taking BMI into account) and metabolic status and possibility of illness of administrative workers at the Universidad Nacional de Trujillo, 2022.

Variable	Scale	Administrative	Administrative %
		fi	*%hi*
Sex	Female	92	54.8
	Male	76	45.2
Age Group	Young	30	17.9
	Adult	114	67.9
	Older Adult	24	14.3
Weight status	Thin	0	0.0
	Normal weight	44	27.4
	Overweight	80	47.6
	Obese	42	25.0

Metabolic Status	Healthy	91	54.2
	Metabolic Syndrome	77	45.8
Risk of cardiovascular disease	Low	43	25.6
	High	53	31.5
	Very high	72	42.9

Table 1 highlights that 54.8% (92) women and 45.2% (76) men were the administrative staff surveyed. Adults accounted for 67.9%, and the majority were overweight (47.6%). Regarding metabolic status, 54.2% were healthy, while 45.8% were identified with Metabolic Syndrome. In addition, the risk of becoming ill, according to abdominal circumference, was very high in 42.9% (72) of cases.

Table 2. Distribution of the Lifestyle Profile, according to Pender (1996), of administrative workers at the Universidad Nacional de Trujillo, 2022.

Variable	Scale	Administrative	Administrative %
		fi	*%hi*
Feeding	Suitcase	16	9.5
	Acceptable	104	61.9
	Healthy	48	28.6
Exercise	Low	110	65.5
	Acceptable	44	26.2
	Recommended	14	8.3
Health Care	Insufficient	74	44.0
	Regular	86	51.2
	Responsible	8	4.8
Stress Management	Low	74	44.0
	Moderate	76	45.2
	Good	18	10.7
Interpersonal relations	Low	14	8.3
	Moderate	118	70.2
	Good	36	21.4
Personal Fulfillment	Limited	2	1.2
	Regular	70	41.7
	Optimal	96	57.1
PEPS-I	Handicapped	8	4.8
	Enough	138	82.1
	Healthy	22	13.1

Table 2 presents the Lifestyle Profile, according to Pender (1996), of the administrative workers of the Universidad Nacional de Trujillo; where 61.9% have an acceptable diet, 65.5% have a low level of exercise, 51.2% have regular health care, 45.2% have moderate stress management. As for the level of their interpersonal relationships, for 70.2% it is moderate, while 57.1% consider themselves to be optimally self-actualized. In sum, 82.1% of the participants manifested sufficient personal habits in the Lifestyle Profile (PEPS-I).

Table 3. Features comprising aspects of Metabolic Syndrome relating to ATP III of Administrative Staff of the Universidad Nacional de Trujillo (2022), according to metabolic status.

Metabolic Status	Factors	Sex	Average	S	Lower bound CI	Upper bound CI	CV
Healthy	Waist circumference (cm)	Female	82.06	3.57	80.81	83.3	4.35%*
		Male	94.15	2.07	93.22	94.99	2.20%*
	SBP (mmHg)	Both	122.88	7.23	121.02	124.75	5.88%*
	DBP (mmHg)	Both	73.82	4.53	72.65	74.99	6.14%*

	Fasting glucose (mg/dL)	Both	94.52	8.57	92.3	96.73	9.07%*
	Triglicéridos (mg/dl)	Both	105	17.68	100.43	109.57	16.84%*
	HDL (mg/dl)	Female	50.88	2.9	49.87	51.89	5.7%*
		Male	48.12	2.85	46.97	49.27	5.92%*
Metabolic Syndrome	Waist circumference (cm)	Female	107.93	5.57	105.85	110.01	5.16%*
		Male	111.57	7.36	108.22	114.92	6.60%*
	SBP (mmHg)	Both	155.1	4.34	153.88	156.32	2.80%*
	DBP (mmHg)	Both	89.2	6.11	87.48	90.91	6.85%*
	Fasting glucose (mg/dL)	Both	158.29	32.15	149.25	167.34	20.31%*
	Triglicéridos (mg/dl)	Both	231.9	33.46	222.49	241.31	14.43%*
	HDL (mg/dl)	Female	43.7	2.79	42.66	44.74	6.39%*
		Male	42.76	2.91	41.44	44.09	6.81%*

*homogeneous distribution (CV<30%)

Table 3 depicts that healthy administrative workers showed 95% CI: waist circumference in women 80.81 – 83.3 cm, and in men 93.22 – 94.99 cm, systolic blood pressure (SBP) 121 – 124.75 mmHg, and diastolic blood pressure (DBP) 72.65 – 74.99 mmHg, fasting glucose 92.3 – 96.73 mg/dl, HDL colesterol in women 49.87 – 51.89 mg/dl and in men 46.97 – 49.27 mg/dl. On the other hand, syndromic administrative workers had 95% CI: waist circumference in women 105.85 – 110.01 cm, and in men 108.22 – 114.92 cm, SBP 153 – 153.32 mmHg, and DBP 87.48 – 90.91 mmHg, fasting glucosa 149.253 – 167.34 mg/dl, HDL cholesterol in women 42.66 – 44.74 mg/dl and in men 41.44 – 44.09 mg/dl.

Figure 1. Weight status, according to body mas index (BMI), among the age groups of the administrative staff of the Universidad Nacional de Trujillo, 2022.
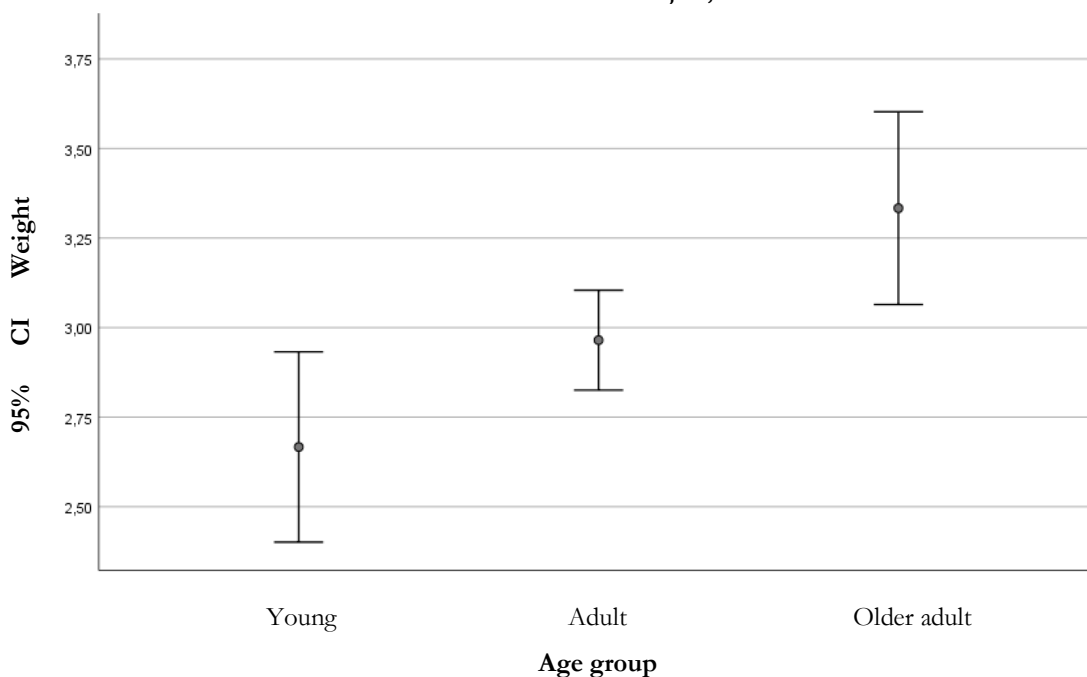

H = 11,074 (p = 0,004)

Figure 1 shows that the weight status, according to the body mass index, of administrative staff is different according to the age group of administrative staff of the Universidad Nacional de Trujillo, 2022. Thus, young people are mostly of normal weight, while older adults are overweight and obese.

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Figure 2. Level of the Lifestyle Profile (Pender, 1996) among the age groups of the staff of the Universidad Nacional de Trujillo, 2022.
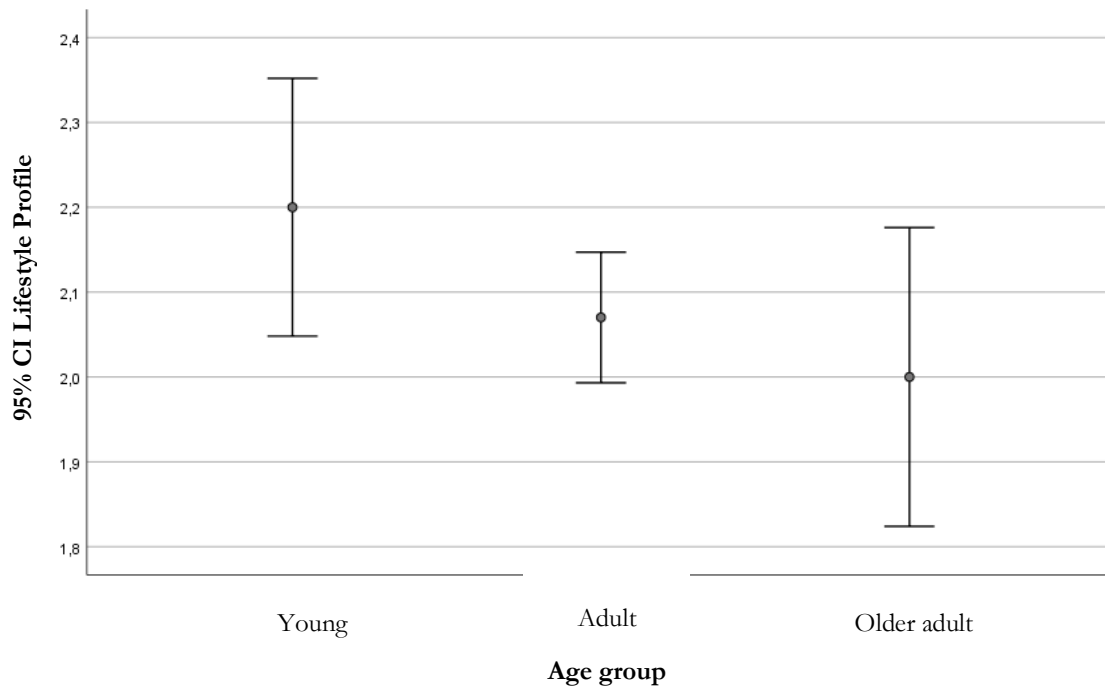
H = 3,371 (p = 0,185)

Figure 2 informs that there are no differences between the level of the lifestyle profile of administrative staff, according to the age group to which they belong.
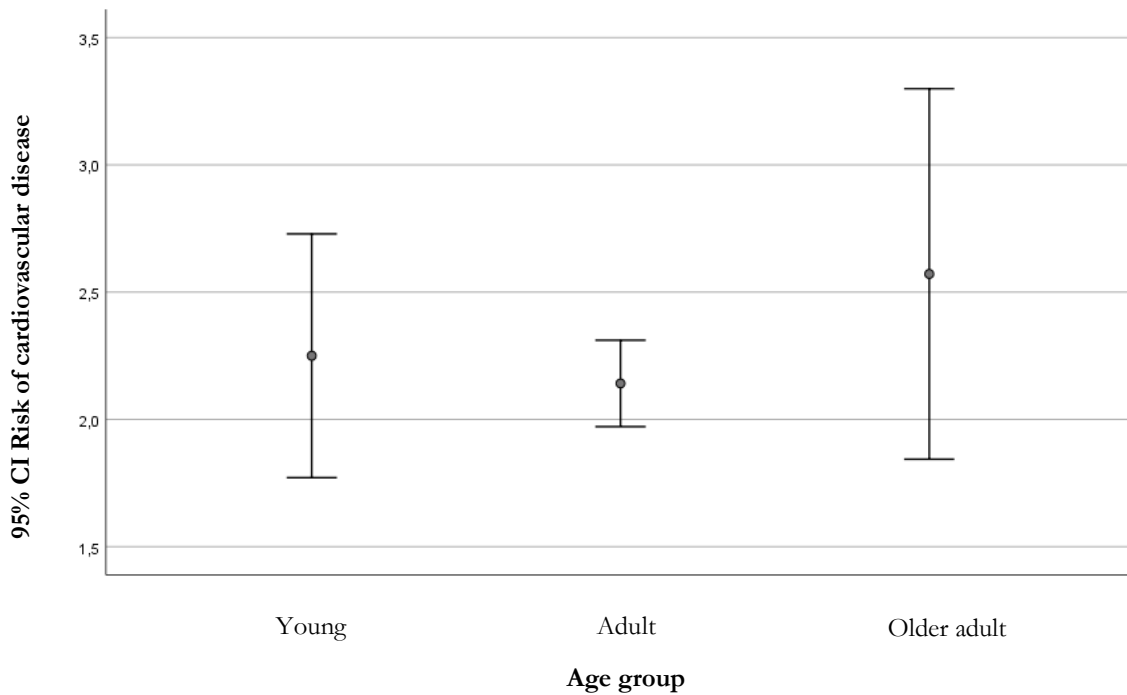
Figure 3. Metabolic status among the age groups of the administrative staff of the Universidad Nacional de Trujillo, 2022.
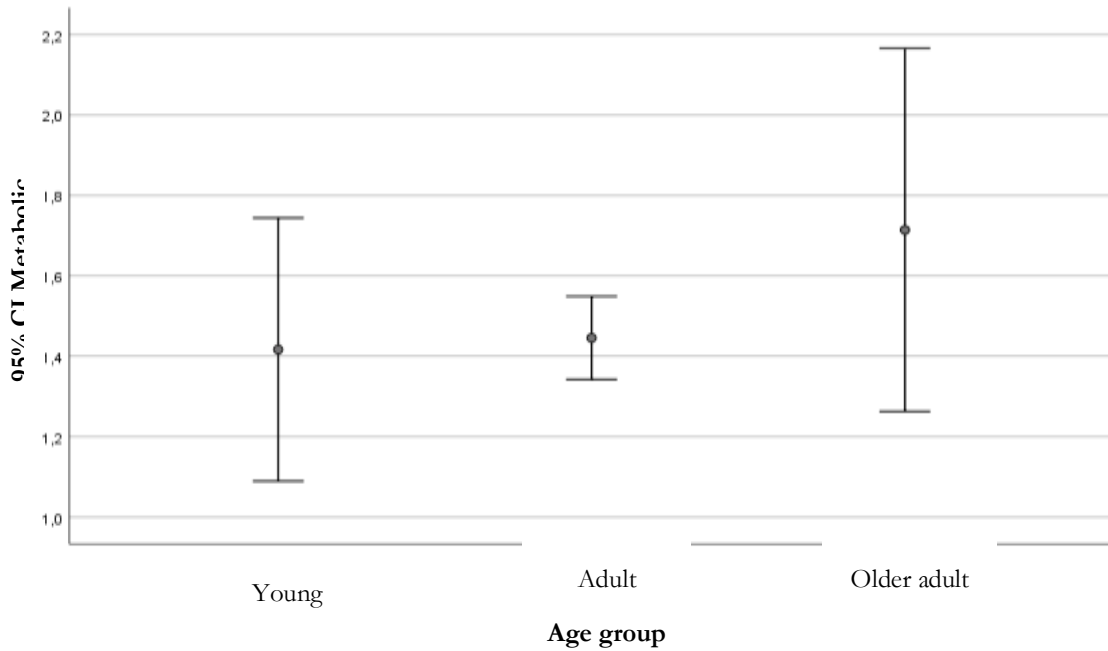
H = 1,971 (p = 0,373)

Figure 3 aligns that at Universidad Nacional de Trujillo there are no differences between the metabolic status of administrative staff, according to the age group to which they belong.

Figure 4. Danger of cardiovascular illness (according to waist circumference) among the age groups of staff of the Universidad Nacional de Trujillo, 2022

H = 2,038 (p = 0,361)

Figure 4 depicts that at the Universidad Nacional de Trujillo there are no differences between the probability of heart ailment, according to the waist circumference, of the administrative staff according to the age group to which they belong.

Table 4. Threat of heart ailments (according to waist circumference) among the metabolic states of administrative staff at the Universidad Nacional de Trujillo, 2022.

Risk of cardiovascular disease	Metabolic Status				Total	
	Healthy		Metabolic Syndrome			
	n	%	n	%	n	%
Low	43	47.3%	0	0.0%	43	25.6%
High	46	50.5%	7	9.1%	53	31.5%
Very high	2	2.2%	70	90.9%	72	42.9%
Total	91	100.0%	77	100.0%	168	100.0%

U= 89.5 (p < 0.001)

Table 4 depicts that the risk of cardiovascular disease, according to waist circumference, is different according to the metabolic status. Thus, a surged Risk of cardiological ailment is paramount in healthy people, while it is very high in workers with Metabolic Syndrome.

Figure 5. Probability of cardiovascular ailment (according to waist circumference) among the weight status (according to BMI) of University staff (2022).
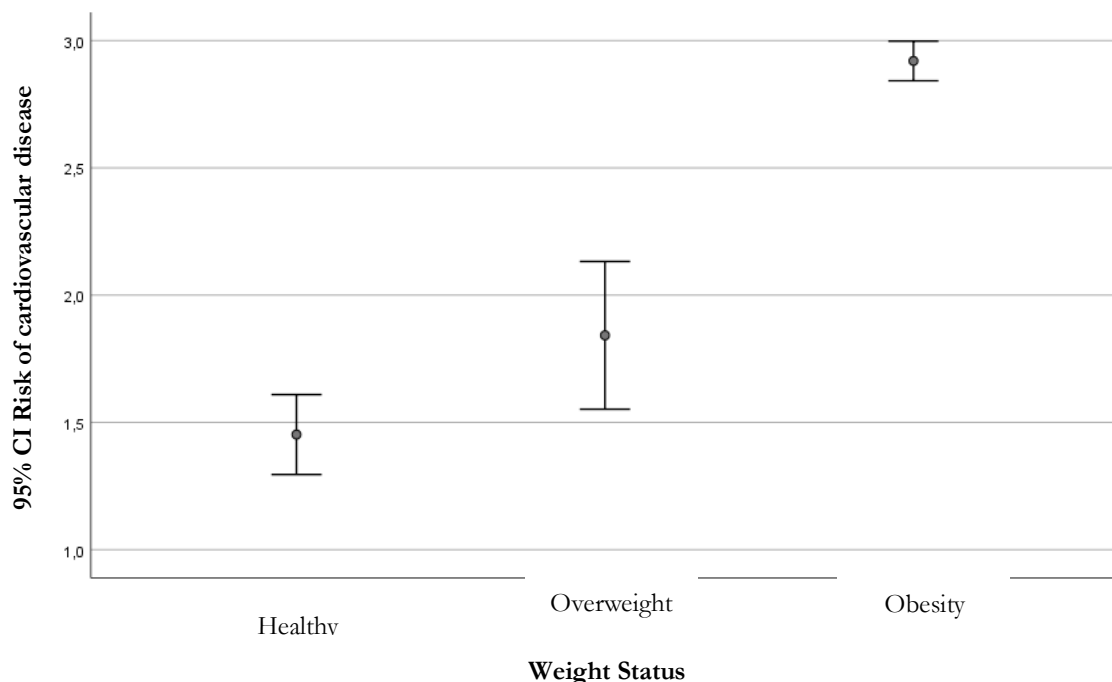
H = 82,569 (p < 0,001)

Figure 5 infers that at the Universidad Nacional de Trujillo there are differences between the threat of cardiological ailment, relating to the waist circumference, of administrative staff according to the weight status to which they belong. Thus, workers with normal weight have a low risk of cardiovascular disease, on the contrary, for those who are overweight it is high and those who are obese have a very high risk.

Discussion

❖ Chalapud-Narváez et al (2022), investigated the Lifestyle Profile (PEPS-I) in the university population (students and teachers) of Popayán, Colombia, where the participants were 53.8% women and 46.2% men.

❖ They found that 74.2% have sufficient personal habits, with nutrition and exercise being inadequate. Likewise, in the hospital administrative area, it has been reported that workers have poor eating habits (Seijas & Torres, 2013). These investigations are consistent with the results obtained in Tables 1 and 2; where the majority were women (54.8%), 61.9% had an acceptable diet and 82.1% of the participants manifested sufficient personal habits in the Lifestyle Profile (PEPS-I).

❖ Regarding Table 3, Ninatanta-Ortiz et al (2016) state that the most prevalent factors are a low level of HDL cholesterol (72.4%) and hypertriglyceridemia (38.4%). Thus, the profile of Metabolic Syndrome in adult women was evidenced by dyslipidemia and a high frequency of abdominal obesity. On the other hand, in a research carried out in the Canary Islands; Threeout of four people met some MS criteria. Thus, men showed a high level of triglycerides, hypertension and hyperglycemia, on the contrary; women had high intra-abdominal fat and low HDL cholesterol levels (Leon et al, 2003).

❖ Table 1 shows that the majority of administrative workers at the Universidad Nacional de Trujillo are overweight (47.6%), and Figure 1 shows that it is mostly young people who have a normal weight, while older adults are overweight and obese.

❖ According to Alegría et al (2005), the components of the Metabolic Syndrome are more prevalent in men, with the exception of HDL. Moreover, the prevalence increases with age and male sex. Obesity, hypertension and diabetes were also reported. On the other hand, the prevalence of conditions associated with MS were abdominal obesity (51.6%), obesity (43.3%) and overweight (35.8%), while HDL cholesterol was low (42.2%), hypertriglyceridemia (35.3%), hyperglycemia (14.1%) and hypertension (overweight, abdominal obesity and high cholesterol predominated in women).

❖ Figures 2, 3 and 4 show that the level of the lifestyle profile, metabolic status and risk of disease (according to waist circumference), in the order given, is similar in the age groups of the participants.

❖ Regarding risk markers, Table 4 shows that a soaring risk of cardiological ailment is higher in healthy population, while it is very high in workers with Metabolic Syndrome. Moreover, Figure 5 shows that workers with normal weight have a low risk of becoming ill, while those who are overweight have a high risk and those who are obese have a very high risk.

❖ According to Peralta and Andrade (2022), waist circumference and its relationship with cardiovascular and metabolic diseases should be assessed in order to timely detect risk factors; for early intervention. It has been shown that there is a tendency for the percentage of lipid to increase with senescence, even if the individual is within the normal BMI range. This difference helps in the critical appraisal of the tendencies of comorbidities caused by obesity. (Lucas et al, 2020; Al-Husban et al., 2023). Similarly, Duarte et al (2023) have observed an increase in waist circumference in individuals with higher pericardial fat indexes and therefore a higher cardiovascular risk.

Conclusions

➢ The Lifestyle Profile shows a low level of exercise among the administrative staff of the Universidad Nacional de Trujillo.

➢ In the aspects linked to Metabolic Syndrome in the administrative staff of the Universidad Nacional de Trujillo, both men and women presented abdominal obesity, and the values of blood pressure, fasting

glucose and triglycerides were altered. In addition, the women had HDL values below what was desirable.

➢ As far as the risk of cardiovascular disease is concerned, it is high in healthy people, while it is very high in workers with Metabolic Syndrome. Moreover, workers with normal weight have a low risk of cardiovascular disease, on the contrary, for those who are overweight it is high and those who are obese have a very high risk.

Reverence

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