

COMPARATIVE STUDY OF BIOCHEMICAL HEALTH MARKERS, IN TWO GROUPS OF UNIVERSITY PROFESSORS OF THE SAME AGE GROUP, 2017

ESTUDIO COMPARATIVO DE MARCADORES BIOQUÍMICOS DE SALUD, EN DOS GRUPOS ETARIOS DE DOCENTES UNIVERSITARIOS, 2017

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ABSTRACT

Objective: Compare the values of biochemical markers in blood: uric acid, creatinine, glucose, cholesterol, and triglycerides, between two groups of seemingly healthy university professors. **Methods:** The first group, formed by 58 professors from 60 to 64 years old, and the second group formed by 35 professors from 75 to 81 years old; to evaluate if there is a significant statistical difference between these two groups. **Results:** Uric acid values in group I were between 2.50 mg/dL and 8.20 mg/dL, and in group II between 2.50 mg/dL and 8.63 mg/dL, with significant difference ($p = 0.035$). The creatinine values in group I were between 0.64 mg/dL and 1.56 mg/dL, and in group II between 0.80 mg/dL and 1.61 mg/dL, with significant difference ($p = 0.004$). The glucose values in group I were between 63 mg/dL and 188 mg/dL, and in group II between 60 mg/dL and 297 mg/dL, without finding significant difference ($p = 0.671$). The cholesterol values in group I were between 125 mg/dL and 265 mg/dL, and in group II between 107 mg/dL and 244 mg/dL, without finding significant difference ($p = 0.053$). The triglyceride values in group I were between 58 mg/dL and 507 mg/dL, and in group II between 68 mg/dL and 314 mg/dL, without finding significant difference ($p = 0.104$). **Conclusion:** There is a significant difference in the biochemical markers of uric acid and creatinine between both age groups; however, the markers of glucose, cholesterol, and triglycerides, showed no significant difference between both age groups.

Key words: Health of the elderly; Biochemical markers; College professor. (source: MeSH NLM)

RESUMEN

Objetivo: Comparar los valores de los marcadores bioquímicos sanguíneos: ácido úrico, creatinina, glucosa, colesterol y triglicéridos, entre dos grupos de docentes universitarios aparentemente sanos. **Métodos:** El primer grupo, formado por 58 docentes de 60 a 64 años y, el segundo por 35 docentes de 75 a 81 años; para evaluar si hay diferencia estadística significativa entre ambos grupos. **Resultados:** Los valores de ácido úrico en el grupo I estuvieron entre 2,50 mg/dL y 8,20 mg/dL, y en el grupo II entre 2,50 mg/dL y 8,63 mg/dL, con diferencia significativa ($p=0.035$). Los valores de creatinina en el grupo I estuvieron entre 0,64 mg/dL y 1,56 mg/dL, y en el grupo II entre 0,80 mg/dL y 1,61 mg/dL, con diferencia significativa ($p=0.004$). Los valores de glucosa en el grupo I estuvieron entre 63 mg/dL y 188 mg/dL, y en el grupo II entre 60 mg/dL y 297 mg/dL, sin encontrar diferencia significativa ($p=0.671$). Los valores de colesterol en el grupo I estuvieron entre 125 mg/dL y 265 mg/dL, y en el grupo II entre 107 mg/dL y 244 mg/dL, sin encontrar diferencia significativa ($p=0.053$). Los valores de triglicéridos en el grupo I estuvieron entre 58 mg/dL y 507 mg/dL, y en el grupo II entre 68 mg/dL y 314 mg/dL, sin encontrar diferencia significativa ($p=0.104$). **Conclusión:** En los marcadores bioquímicos de ácido úrico y creatinina hay diferencia significativa entre ambos grupos etarios. En cambio, en los marcadores de glucosa, colesterol y triglicéridos, no se demuestra diferencia significativa entre ambos grupos etarios.

Palabras clave: Salud de la persona mayor; Marcadores bioquímicos; Profesor universitario. (fuente: DeCS BIREME)

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INTRODUCTION

To assess the health status of a person, doctors usually incorporate a procedure called "diagnostic help" into their general clinical examinations. A group of them are laboratory tests, which allow the determination of specific biochemical substances in the peripheral blood of the patient, and which express the functional status of a particular organ. For this, tables have been drawn up, with figures showing levels of these biochemical substances in the minimum and maximum range, with the corresponding units of measurement. These tables also show the normality variables¹.

To interpret the clinical meaning of the value of a biochemical substance that is outside the range established as the standard, the context of the clinical history of the patient needs to be considered.

The biochemical markers selected in this study are uric acid, creatinine, glucose, cholesterol, and triglycerides. A brief explanation of the importance of each of them will be made:

Uric acid is a chemical compound that is the final product of purine catabolism, it is not metabolized by human cells, and it is ionized in the blood as monosodium urate. The surpluses form crystals causing the clinical syndrome called Gout.

Creatinine is a product of the catabolism of striated muscle proteins, which is secreted by glomerular filtration, and it is why it is beneficial to assess renal function.

Glucose is the biochemical compound and the energy source of cellular metabolism. The glucose blood level is regulated by insulin, the purpose of the cell cytoplasmic membrane, and the metabolism of the adipose tissue. The alteration of these mechanisms causes Diabetes Mellitus, expressed by endovascular hyperosmolarity and vascular endothelial damage. Cholesterol is a steroid lipid compound, the basis for the origin of bile acids, steroid hormones and vitamin D. It is an essential molecule for the cytoplasmic membrane of human cells. The excesses of this compound are related to obesity and atherosclerosis.

Triglycerides are molecules formed by glycine with the three hydroxyls esterified with fatty acids. They are lipid storage compounds and are metabolized in the liver and fat cells. Elevated levels cause dyslipidemias, with a compromise of the vascular endothelium.

In recent decades, the tendency to perform medical examinations with preventive criteria is becoming more frequent. It is even mandatory when entering

certain labor entities. The Labor Law² establishes the biannual evaluation carried out by a specialist in Occupational Medicine. The faculty of the Ricardo Palma University is constituted by a significant percentage of older adults (over 65 years old), and it is thought that a percentage of them may have altered figures of biochemical markers used to evaluate health. There is a veiled concern that some of the faculty are having biochemical markers with values out of the ordinary, and this might be interfering with their professional duties. Therefore, the present study has been elaborated, with the objective of comparing the median of these values, and the tendency towards higher values than normal. Also to test if there is a statistical difference of the biochemical markers between the two populations of seemingly normal individuals at the university: young old from 60 to 64 years of age and middle old from 75 to 81 years of age.

METHODS

The present study is of a transversal, observational and descriptive type. The participants correspond to the professors who attended the call for the Occupational Health evaluation, during the second school semester of 2016. The samples were processed in the Clinical Laboratory of the Polyclinic FAMURP of the Human Medicine Faculty "Manuel Huamán Guerrero," University Ricardo Palma. The inclusion requirements were: a) No symptoms, no previous diagnosis of disease, and b) be between the ages of 60 to 64 years old (mature adult) and 75 to 81 years (middle old age). For biochemical blood tests, patients were seen on an empty stomach. The process was carried out in the "Chamry" analyzer, with enzymatic methodology reagents. The brand "Elitech" was used to determine uric acid, with normal ranges between 3.5 to 7.2 mg/dL in men and 2.6 to 6.0 mg/dL in women. The alkaline picrate of the brand "Valtek" was used to determine creatinine, with normal ranges between 0.7 to 1.4 mg/dL. in men and 0.6 to 1.2 mg/dL. in women. The "Elitech" brand was used to determine glucose, with normal ranges between 75 to 110 mg/dL. The brand "Elitech" was used to determine cholesterol, with normality ranges between 150 to 200 mg/dL. The brand "Elitech" was used to determine triglycerides, with normality ranges lower than 150 mg/dL in men and less than 130 mg/dL in women.

The statistical analysis, in the present study, used the program Excel to store data; formulas necessary to obtain distribution and dispersion of data; and the U-test of Mann Whitney was used to get the significant difference at level 0.05, between both groups.

RESULTS

During the evaluation, 58 professors between 60 and 64 years old attended (15 were female, and 43 were male), which formed the group I. Also, 35 professors between ages ranging from 75 to 81 years attended (3 were female, and 32 were male), which formed group II. Table 1.

The level of uric acid in group I was between 2.50 mg/dL and 8.20 mg/dL, with a median of 4.68 mg/dL. In group II, the level was between 2.50 mg/dL and 8,63 mg/dL, with a median of 4,00 mg/dL. A case was detected, in each group with a figure greater than normal, representing 1.7% and 2.8% respectively. Tables 2 and 3. Figure 1.

The creatinine level in group I was between 0.64mg/dL and 1.56 mg/dL, with a median of 1.05 mg/dL. In group II, the level was between 0.80 mg/dL and 1.61 mg/dL, with a median of 1.20 mg/dL. Professors with figures above normal were detected, as follows: four cases in group I, which represent 6.8%, and five cases in group II, which represent 14.2%. Tables 2 and 3. Figure 2.

The glucose level in group I was between 63 mg/dL and 188 mg/dL, with a median of 92.50 mg/dL. In group II, the level was between 60 mg/dL and 297 mg/dL, with a median of 94 mg/dL. In both groups professors with higher than normal figures were found, thus: seven cases in group I, which represent 12.0%, and six cases in group II, which represent 17.1%. Tables 2 and 3. Figure 3.

The level of cholesterol in group I was between 125 mg/dL and 265 mg/dL, with a median of 196.50 mg/dL. In group II, the level was between 107 mg/dL and 244 mg/dL., with a median of 182 mg/dL. In both groups professors were found with figures above normal, thus: 24 cases in group I, representing 41.3%, and 10 cases in group II, representing 28.5%. Table 2 and 3. Figure 4.

The level of triglycerides in group I was between 58mg/dL and 507mg/dL., with a median of 147.50 mg/dL. In group II, the level was between 68 mg/dL and 314 mg/dL, with a median of 132 mg/dL. In both groups professors with higher than normal figures

were found, thus: 31 cases in group I, which represent 53.4%, and 10 cases in group II, representing 28.5%. Table 2 and 3. Figure 5.

DISCUSSION

The amount of uric acid in blood depends, to a great extent, on the hyperproteic diet and/or on endogenous factors, which allow its increase. Although most of the professors studied have figures in the normal range, we only found one professor in each group with a higher than normal number (8.20 and 8.63 mg/dL respectively). Group I shows a slight increase, which the Mann Whitney U statistical test, table 4, considers as a significant difference between both groups ($p = 0.035$). Possibly the population with middle old age has a conservative diet, which explains the lower levels of uric acid. It should be noted that the study by Cheng W.³ demonstrates a significant relationship between hyperuricemia and arterial hypertension, in a population of 1,082 people between 41 to 70 years old. Likewise, Luo DL.⁴, points to hyperuricemia as a predictive factor of severe cases of pulmonary hypertension, frequent entities in older adults.

Creatinine is a metabolite that makes a blood level quite stable over time; therefore, it is a useful marker that is used clinically to evaluate renal function. The median creatinine, in both groups, was in the normal range; although group II values were 20% higher, with a maximum of 1.6 mg/dL. This small increase in group II has a statistical significance ($p = 0.004$) in the Mann Whitney U test, table 4. Our results are following what was indicated by Sebastiani P.⁵, who after evaluating 5,000 elderly adults, finds that non-protein nitrogen and cystatin (protein that measures glomerular filtration) increase with age. The medians of the blood glucose figure of both groups are similar, and there is no statistical difference ($p = 0.671$), table 4. Seven professors were found in Group I (12%) and in Group II six professors (17%) with glucose levels higher than normal; levels that require complementary

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Table 1. Distribution of the sample of university professors according to comparison groups and sex.

SEX	SAMPLE	GROUPS	
		GROUP I	GROUP II
Male	75	43	32
Female	18	15	3

Table 2. Descriptive statistics of biochemical markers, according to comparison groups.

COMPARISON GROUPS	MÍN.	MÁX.	MEDIA	DES. EST.	MEDIAN
Groups I					
Uric acid (mg/dl)	2,50	8,20	4,89	1,34	4,68
Creatinine (mg/dl)	0,64	1,56	1,05	0,22	1,05
Glucose(mg/dl)	63,00	188,00	96,45	20,33	92,50
Cholesterol (mg/dl)	125,00	265,00	196,47	36,22	196,50
Triglycerides (mg/dl)	58,00	507,00	167,88	89,64	147,50
Grupo II					
Uric Acid (mg/dl)	2,50	8,63	4,36	1,50	4,00
Creatinine (mg/dl)	0,80	1,61	1,21	0,25	1,20
Glucose (mg/dl)	60,00	297,00	106,77	49,23	94,00
Cholesterol (mg/dl)	107,00	244,00	180,09	35,03	182,00
Triglycerides (mg/dl)	68,00	314,00	138,71	58,39	132,00

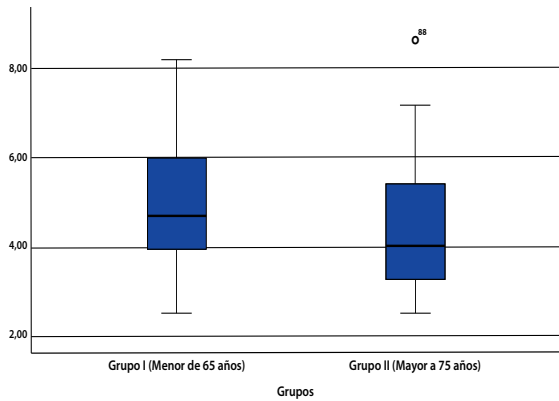
Table 3. Comparative table of medians of biochemical markers and abnormal values between both groups.

BIOCHEMICAL MARKERS	GROUP I			GROUP II		
	MEDIAN	ABNORMAL		MEDIAN	ABNORMAL	
		N°	%		N°	%
Uric acid (mg/dL)	4,68	1	1,7	4,00	1	2,86
Creatinine (mg/dL)	1,05	4	6,8	1,20	5	14,2
Glucose (mg/dL)	92,5	7	12	94	6	17
Cholesterol (mg/dL)	196	24	41,3	182	10	28,5
Triglyceride (mg/dL)	147,5	31	53,4	132	10	28,5

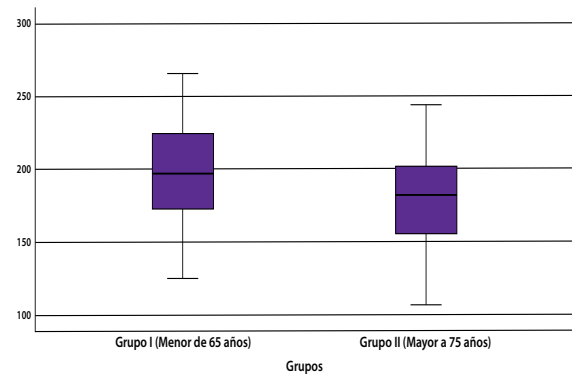
Table 4. Mann Whitney U-test for biochemical markers according to comparison groups.

BIOCHEMICAL MARKERS	COMPARISON GROUPS	AVERAGE RANGE	U OF MANN WHITNEY	P VALUE
Uric acid (mg/dl)	Group I	51,59	748,500	0,035 *
	Group II	39,39		
Creatinine (mg/dl)	Group I	40,83	657,000	0,004 *
	Group II	57,23		
Glucose (mg/dl)	Group I	46,08	961,500	0,671
	Group II	48,53		
Cholesterol (mg/dl)	Group I	51,20	771,500	0,053
	Group II	40,04		
Triglycerides (mg/dl)	Group I	50,53	810,000	0,104
	Group II	41,14		

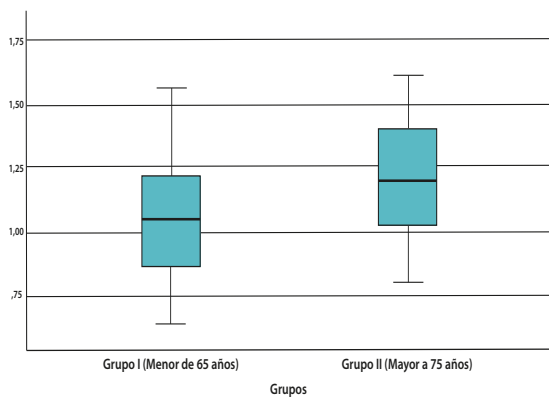
* Significant or at a level of 0.05



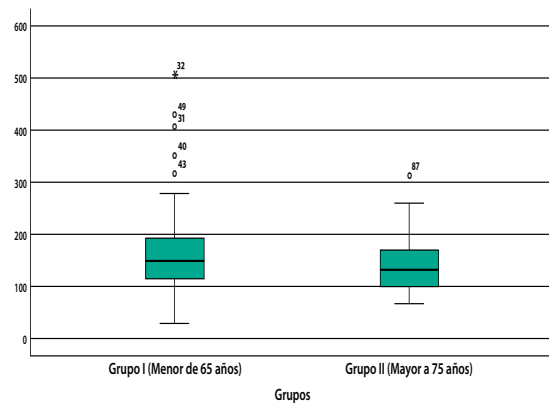
Graph 1. Uric acid levels (mg / dl) according to comparison groups



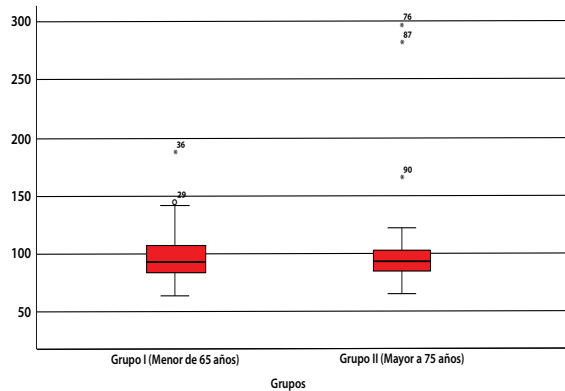
Graph 4. Glucose levels (mg / dl) according to comparison groups.



Graph 2. Creatinine levels (mg / dl) according to comparison groups.



Graph 5. Triglyceride levels (mg / dl) according to comparison groups.



Graph 3. Glucose levels (mg / dl) according to comparison groups.

studies to diagnose Diabetes Mellitus (DM). The Villena JE⁶ communication mentions that DM affects 7% of the population in Peru and that the prevalence of metabolic syndrome in the elderly is much higher than in other human groups. The blood level of cholesterol is a frequent concern of older adults since it is directly related to obesity⁷, arterial hypertension⁸, osteoporosis⁹ and the state of the vascular endothelium.

The medians of the cholesterol number in group I and II are in the range of normality, and there is no statistical difference ($p = 0.053$) in the Mann Whitney U test, table 4. But, 24 (41.3%) teachers of group I, and 10 (28.5%) of group II have cholesterol figures above the normal range; possibly related to community eating habits. Although, Zanchetti A.⁸, evaluating 5,376 patients older than 64 years old, finds a prevalence

of hypercholesterolemia with arterial hypertension, which justifies knowing the blood cholesterol level. The triglycerides that are determined in peripheral blood are, mostly, coming from the daily intake¹⁰; therefore, the high triglyceride levels are an expression of food disorder, which leads to dyslipidemia. The triglyceride medians, in both groups, are below the normal upper limit, and there is no statistically significant difference ($p = 0.104$) in the Mann Whitney U test, Table 4. Even so, in group I, there was 31 (53.4%) professors, and in group II, 10 (28.5%) of professors with figures above normal. The clinical importance of the triglyceride blood levels in older adults is valid. In addition to the dyslipidemia syndrome, and malnutrition as indicated by Amador-Licona N.¹¹, which finds 93% of lack of nutrition in older adults (65 to 85 years old) with hip fracture, and low muscle strength, associated with the metabolic syndrome. On the other hand, Choi HJJ¹², evaluated the cognitive activity of 59 older adults who had hypertriglyceridemia, finding a particular association, which suggests that the high level of triglycerides plays some role in cerebral amyloidosis. The evaluation of health that is made to the professors measures the functional status of various organs, but it does not measure the mental qualifications necessary to exercise satisfactory teaching jobs.

CONCLUSION

In the biochemical markers of uric acid and creatinine, there is a significant difference between both age groups. Uric acid levels are higher in group I, while creatinine levels are higher in group II. Although most of the determinations were in the normal range in both groups.

For glucose, cholesterol and triglyceride markers, no significant difference between the two age groups was determined. Despite the percentage of higher than normal figures were observed: 12%, 41.3%, and 53.4% respectively, in group I; and 17%, 28.5%, and 28.5% respectively, in group II.

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