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Research Article

Metabolic Profile of Aged and Non-Aged Alcoholics Interned in Psychiatric Hospital in Brazil

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Abstract

Context: Considering the vast dimension of Brazil, presenting large regional diversity it is necessary to broaden the evaluation of the extension and severity of the alcoholism, and of the associated metabolic alterations, through the implementation of multicenter initiatives.

Objective: To compare the metabolic alterations of carbohydrates, lipids, proteins and uric acid of aged (≥ 60 years old) and non-aged (< 60 years old) alcoholics, hospitalized to a psychiatric hospital.

Methods: Cross-sectional study involving 100 male chronic alcoholics, being 50 in each group of aged and non-aged.

Results: The average ages of patients in the groups of aged and non-aged were 64.7 ± 5.3 years and 47.0 ± 9.9 years, respectively. Patients belonged to the lower social classes, D and E, and had low level of schooling. Daily amount of alcohol intake was higher in the non-aged group. Duration of alcohol consumption was higher in the aged group. Among the aged an non-aged, the high rates of the substances studied were, respectively: Glycemia, 12% vs 20%; Total Cholesterol, 8% vs 4%; LDL-cholesterol, 8% vs 2%; HDL-cholesterol, 12% vs 20%; Triglycerides, 6% vs 12% and Uric acid, 10% vs 6%, respectively. Serum levels of LDL-cholesterol and uric acid were significantly lower among non-aged, but the level of HDL-cholesterol is higher between the aged.

Conclusion: In both groups the prevalence of elevated glycemia, lipids, proteins and uric acid did not differ or were below those observed in the Brazilian population. The prevalence of LDL-cholesterol and triglycerides were low in both groups.

Keywords: Alcoholism; Alcoholics; Nutrition Assessment; Liver; Aged

Introduction

Some aspects and characteristics of alcoholism and of the alcoholics are universal while other may differ between groups in consequence of the interaction between causal factors of each of the aspects under the influence of alcohol abuse. Statistical surveys have shown an increase in the production of alcoholic beverages of all kinds, and also provide evidence for the per capita alcohol consumption [1]. Such increment in the abusive ingestion of alcohol as severe individual, social and economic consequences, which motivates a growing number of investigations.

The World Health Organization (WHO) classifies as aged, in developing countries, individuals higher than 60 years of age. The fraction of aged in the Brazilian population has grown from 4.8% in 1991 to 5.8% in 2000 and 7.4% in 2010 [2]. It is known that there are differences in the patterns of alcoholism according to the age segments, especially between the aged and non-aged groups [3].

According to the WHO, the average Brazilian consumption is around 8.7 liters of pure alcohol per person per year, while the world the average is 6.2 liters [4].

In Brazil, about 12% to 15% of the male population is considered alcoholics. Statistical data collected in the year 2005 indicated that about 19 million Brazilians were dependent on alcohol [5].

Workers in Brazilian institutions dedicated to the care of abusers of alcohol have observed an increase in the prevalence of alcohol dependency among the aged, the reasons for this being varied. While the aged present lower rates of problems related to alcoholism than the young, around 6% to 11% of aged patients admitted in hospitals show manifestations of alcohol dependency. In the 'rest houses' the rates rise to 49% [5].

It is observed that individuals, in the ´third age´, which already consumed alcohol at younger ages increased the consumption, as well as others that did not use to consume it, engaged in the regular consumption. It is admitted that the main triggers for the initiation or the increase in alcohol usage would be the installation of loneliness and of inactivity regimes, depressive mood and the sensations of losses and abandonment [5].

In general terms, it is said that the pleasure or the relief from the displeasure would be motive forces to induce and install the habit of searching for alcohol [4].

A survey promoted by the Psychiatry Institute of the São Paulo Clinics Hospital (USP) reported that the general rate of alcohol abuse among the aged was of 9.1%. This category was partitioned among social strata: A 7%, B 3.1%, C 8.8%, D 16.6%, E 18.3%. The general level was slightly higher (13%) among the married, and still higher among males (20%) [5].

The liver lesion provoked by alcohol can interfere with the mechanisms of production and utilization of carbohydrates, as well as those of synthesis and transport of lipids and proteins. Products formed along alcohol metabolism and the excess of reducing equivalents generated during the oxidation of ethanol are responsible for various metabolic abnormalities involving other substances, including the purines [6].

It is most common in studies evaluating the metabolic disturbances occurring in chronic alcoholics the utilization of groups of patients with exuberant clinical manifestations. Studies are scarce involving patients in stages where the clinical manifestations are absent or very discreet, which is the purpose of the present study.

To compare aged (≥ 60 years old) and non-aged (< 60 years old) of adult alcoholics, the present study evaluates the prevalence and magnitude of alterations on the metabolism of glucose, cholesterol, triglycerides, albumin, globulins and purines in chronic asymptomatic or oligosymptomatic alcoholics. We also correlate these data with the nutrient metabolic state.

Material and Methods

Patients were forwarded from the First Attendance and Screening Center of the city's Clinics Hospital where they were submitted to medical exams and, considered apt for psychiatric treatment under hospital admittance regime.

Two groups were completed in the period between January 2017 – July 2018, 50 in each of the aged and non-aged.

When the patient is hospitalized, he/she receives a fixed number of individual record, and another number, for the hospitalization record in each hospitalization to which he/she is submitted. The constitution of the sample of this study followed the dynamics: for each hospitalized aged patient, a non-aged patient was included with the number of hospitalization immediately following the number of hospitalization record of the aged. In order to discriminate homonymous patients and to avoid repeated enrollment of patients during the time of the survey, a list was drawn up stating the patient's name and age, as well as the names of the patient's parents.

At admittance, patients answered questions in a specified form sheet dedicated to the collection of demographic, psychiatric and clinical data, plus the alcoholism pattern. They were submitted to clinical examination, always by the same physician and inside the first 24 hours from hospitalization.

A blood sample was collected from a vein of an upper member for determination of laboratory parameters. Patients were inside the first 24 hours of internship and under at least 8 hour fast. Exams included: blood count (hematimetric), fasting blood glucose (enzymatic- colorimetric), cholesterol total plus low density lipoprotein (LDL-cholesterol) and high density cholesterol (HDL- cholesterol) (enzymatic-colorimetric), triglycerides (enzymatic-colorimetric), total and fractions of proteins (colorimetric) and uric acid (enzymatic).

The nutritional status of the patients was evaluated through the Quetelet index. The amount of alcohol ingested (in grams, g) per day was calculated through the equation: daily volume of the distilled drink taken in (milliliters, ml) x percent (%) of alcohol in the drink x density of alcohol (0.8)/100. The amount of alcohol in 100 ml of the Brazilian sugarcane liquor varies between 40 and 43 grams [7].

The patients were duly informed on the objectives of the study and gave their consent for participating in it through filling and signing the Term of Free and Clarified Consent (TFCC). Anonymity and confidentiality were guaranteed to them, as well as all the norms of the Helsinki Declaration. This study was approved by the Ethics Committee (CAAE: 27564714.1.0000.5413) – Opinion substantiated of CEP: 626.044 (Faculdade de Medicina de Marília – SP, Brazil).

Patients included were alcoholics older than 18 years, satisfying the alcoholism criteria of the International Disease Code (CID 10), and consenting in participation in the study. Patients excluded did not consent to participate or did not having complete documentation, presented indications of mental deficiency, showed delirium tremens, had manifestations considered as indicators of cardiac, hepatic or renal insufficiency or used illicit drugs or medications that could modify the values of the variables under study.

Continuous variables are presented as averages and standard deviation. Statistical comparisons utilized the chi-squared test or Fisher's exact test and the Student t-test, at the 5% significance level.

Results

Average age of patients in the aged group was 64.7 years and in the non-aged group was 47 years; the mode of preparing the groups promoted statistical significance of the difference of average ages ($p = 0.001$). Correlated data were the higher prevalence of patients with a job among the non-aged ($p = 0.006$), the higher

prevalence of retired in the aged (p = 0,001), and the higher average salary among the non-aged (p = 0.024) (Table 1).

	Aged	Non-aged	
	≥ 60 years	< 60 years	p
Number of patients	50	50	
Average age	64,7 ± 5,3	47,0 ± 9,9	0,001
Civil status			
Married	17 (34%)	8 (16%)	0,060
Single	11 (22%)	18 (36%)	0,186
Separated	6 (12%)	11 (22%)	0,286
Divorced	5 (10%)	4 (8%)	1.001
Legally separated	4 (8%)	1 (2%)	0,362
Living to gether	2 (4%)	7 (14%)	0,159
Widower	5 (10%)	1 (2%)	0,204
Skin color			
White	35 (70%)	31 (62%)	0,526
Brown	10 (20%)	15 (30%)	0,355
Black	5 (10%)	4 (8%)	1,001
General condition			
Good	34 (68%)	40 (80%)	0,254
Regular	16 (32%)	3 (6%)	0,101
Bad	-	2 (4%)	-
Body Mass Index			
Average	23,0 ± 3,1	22,7 ± 3,7	0,651
Underweight	5 (10%)	2 (4%)	0,436
Normal	29 (58%)	35 (62%)	0,297
Overweight	15 (30%)	10 (20%)	0,355
Obese	1 (2%)	3 (6%)	0,617
Social class			
A and B	-	-	-
C	-	2 (4%)	-
D	4 (8%)	9 (18%)	0,234
E	46 (92%)	39 (78%)	0,090
Labor activity			
Yes	25 (50%)	42 (69%)	0,006
Retired	23 (46%)	1 (4%)	0,001
No	2 (14%)	5 (5%)	0,436
Pension (ISS)	0	2 (8%)	0,494
Average income (Brazilian Reais $)	747 ± 413	1082 ± 943	0,023

Table 1: Demographic aspects of aged and non-aged alcoholics.

The difference between average ages of starting alcohol usage in the groups was not significant. Average duration of alcohol consumption was higher among the aged (p = 0.001) while the daily amount consumed was higher in the non-aged (p = 0.001).

Between the aged, there was a reduction in the volume of alcohol consumed per day from 59 years of age (p < 0.05). Starting from 40 years of consumption, there was a reduction of the volume of alcohol consumed in both groups (p < 0.05). Prevalence of tobacco smoking was similar in both groups (Table 2).

	Aged	Non-aged	
	≥ 60 years	< 60 years	p
Number of patients	50	50	
Average age at beginning of usage	21,3 ± 9,5	20.4 ± 8,7	0.622
Average duration of consumption (years)	43.3 ± 10.0	23.6 ± 10.7	0.001
Daily consumption (grams)	503 ± 390	853 ± 618	0.001
Age range (years) and consumption (grams)	n	n	
20 to 29	-	2 (1080 ± 1301)	-
30 to 39	-	11 (1017 ± 854)	-
40 to 49	-	23 (912 ± 474)	-
50 to 59	-	14 (820 ± 486*)	-
60 to 69	42 (504 ± 339*)	-	0.070
70 to 80	8 (283 ± 169*)	-	0.004
Duration of consumption (years) and daily consumption (grams)			
< 10	1 (300 ± 0)	5 (952 ± 915)	-
10 to 19	0	13 (722 ± 539)	-
20 to 29	3 (567 ± 379)	15 (909 ± 641)	0.202
30 to 39	5 (682 ± 552)	13 (1178 ± 446)	0.582
40 to 49	29 (462 ± 309)	4 (675 ± 207*)	0.040
50 to 59	10 (402 ± 265*)	-	0.001
60 to 63	2 (456 ± 260*)	-	0.040
Tobacco smoking			
Yes	31 (62%)	39 (78%)	0.126
No	19 (38%)	11 (22%)	0.126
* Statistical comparison between cells.			

Table 2: Pattern of alcoholism of aged and non-aged alcoholics.

Body Mass Index did not detect differences between the groups. In both groups, the average values of fasting glycemia were in the normal range, while total cholesterol and triglyceride levels were below the normal range. There were no significant differences between the groups with respect to the rates of elevated blood glucose, cholesterolemia and triglyceridemia. Average LDL-cholesterol levels were below the reference values in both groups, but the non-aged group showed a deeper fall than the aged (p = 0.003).

There were no differences in the rates of normal or elevated LDL-cholesterol. The average value of HDL-cholesterol among non-aged was above the normal upper limit and significantly higher than in the group of aged (p = 0.001). No differences were observed with respect to the rates of normal or elevated HDL-cholesterol.

The average value of uric acid was higher in the aged group (p = 0.024) but no difference was observed between groups with respect to the rates of normal or elevated values (Table 3).

	Aged	Non-aged	
	≥ 60 years	< 60 years	
Number of patients	50	50	p
Body Mass Index (BMI)			
Average	23.0 ± 3.1	22.7 ± 3.7	0.651
Underweight	5 (14%)	2 (4%)	0.436
Healthy	29 (58%)	35 (62%)	0.297
Overweight	15 (30%)	10 (20%)	0.355
Obese	1 (2%)	3 (6%)	0.617
Glycemia at fast (70 to 110 mg%)	89.3 ± 15.5	97.3 ± 35.6	0.148
Normal	40 (80%)	37 (74%)	0.634
Elevated	10 (20%)	13 (26%)	0.634
Low	0 -	0 -	-
Total Cholesterol (200 to 240 mg%)	172.2 ± 30.9	181.6 ± 29.8	0.125
Normal	46 (92%)	48 (96%)	0.667
Elevated	4 (8%)	2 (4%)	0.667
LDL-cholesterol (130 to 160 mg%)	112.6 ± 22.9	99.0 ± 22.1	0.003
Normal	46 (92%)	49 (98%)	0.362
Elevated	4 (8%)	1(2%)	0.362
HDL-cholesterol (35 to 55 mg%)	46.6 ± 7.4	63.3 ± 11.3	0.001
Normal	44 (88%)	40 (80%)	0.413
Elevated	6 (12%)	10 (20%)	0.413
Triglycerides (150 to 200 mg%)	112.6 ± 39.9	121.3 ± 59.8	0.841
Normal	47 (94%)	44 (88%)	0.487
Elevated	3 (6%)	6 (12%)	0,487
Uric acid (3.4 to 7.0 mg%)	5.1 ± 1.2	4.5 ± 1.4	0.024
Normal	45 (90%)	47 (94%)	0.714
Elevated	5 (10%)	3 (6%)	0.714

Table 3: Metabolic alterations in aged and non-aged alcoholics.

The occurrence of hepatosplenomegaly with portal hypertension in the aged and non-aged groups was 10% and 14%, respectively.

Comments

It is common that the alcoholic does not get fed adequately due to the caloric value of alcohol [8]. The quantity of calories in the drinks are enough to substitute an important fraction of what should be derived from the dietary components, leading to the reduction of the necessity of ingesting food [8]. Inadequate ingestion of proteins and other nutrients is an important factor in the generation of liver lesion. Concomitantly, hepatocyte lesion is accompanied by reduction in the synthesis of proteins and other substances. The outcome is the establishment of a vicious cycle where liver dysfunction is accentuated.

In countries under development, especially among the less favored economic strata, undernourishment is a relatively common occurrence, independently from alcoholism, to the point of not making observable some statistically significant difference in the degrees of undernourishment between alcoholics and non-alcoholics [9]. A possible explanation for such observation would be that the malnutrition does not show up more intensely among alcoholics in consequence of their frequent hospitalizations motivated by a greater frequency of alcoholic intoxication due to a reduction of the metabolic tolerance [10]. During the periods of hospitalization there is an interruption of alcohol consumption, improvement in quality and quantity of feeding and correction in vitamin deficiencies, which allow for recovery of nutritional deficiencies of many patients. The nutritional condition of patients in this study was considered good to regular in 100% to 86% of them, in the respective groups of aged and non-aged. The average values of the Body Mass Index were located inside the 'healthy' category. Only 10% of the aged and 4% of the non-aged were underweight and, only 16% of the aged and 24% of the non-aged were anemic.

It is inside the socioeconomically less privileged strata of populations that the most intense and more widespread rates of alcoholism are observed [11,12]. According to this, patients forming our study groups belonged to the strata D (29%) and E (71%), with low income and school attendance rate. Some studies question the influence of school attendance effects. It is admitted that some of these inconsistencies would reflect systematic biases that are common in field studies and may be intensified according to the kinds of population studied [13].

The most commonly cited risk factors for liver alcoholic disease are age, age at starting the use, duration of the usage, pattern of drinking, gender, obesity, dietary and genetic factors and tobacco smoking habit [14].

With respect to age, in Brazil, there is a new demographic pattern transforming the age structure with a significant increase in the aged component [15], but it is possible that there might be local or temporal fluctuations in this trend. The number of aged patients admitted into the psychiatric hospital where our study was installed has not varied significantly in the last 5 years.

The age at the start of alcohol usage was similar in the aged and non-aged groups. As expected, the average duration of the con-

sumption was longer among the aged. The average daily consumption of alcohol was higher among the non-aged. In both groups, after 39 years of the habit, there was a trend towards reduction of the daily consumption.

For long time been believed that the metabolic alterations accompanying alcoholism were a consequence from inadequate ingestion or from disturbed digestion or absorption of nutrients. It is now established that the metabolic alterations that follow abusive usage of alcoholic beverages are determined mainly by the hepatotoxicity of ethanol [6].

Carbohydrate

Chronic alcohol usage is considered a potential risk factor for diabetes mellitus type 2 (DMT2) through its participation in increasing insulin resistance and dysfunction of pancreatic β cells [16,17]. Alcoholics with minimal liver lesions and asymptomatic show diminished serum insulin levels [17]. The pancreatic endocrine dysfunction shows up about 4 years after the structural liver lesion [18].

The prevalence of hyperglycemia classified as diabetes type 2 is geographically variable across the Brazilian territory in consequence of distinct dietary traditions, culturally acquired lifestyles in the different populations of the states and, further, different laboratory methods for measuring the blood glucose level. It is accepted that ethnic, socioeconomic and cultural characters influence the occurrence of type 2 diabetes not only in the Brazilian population. According to directions given by the Brazilian Association of Diabetes, the prevalence of diabetes type 2 in the male adult Brazilian population stayed around 5.4% [19]. Clinical data relating the amount of alcohol ingested and the incidence of DMT2 are not easily available in the bibliography.

This study found fasting glycemia in the normal range in 80% of the individuals of both groups. Hyperglycemia was observed in 12% of the aged and 20% of the non-aged, while hypoglycemia was entirely absent. Our data on hyperglycemia rates among chronic alcoholics, aged and non-aged, do not depart from surveys on the general Brazilian population (2.3% and 36.3%, respectively) [19].

Lipids

The prevalence of dyslipidemia in the general Brazilian population is variable in view of the diverse socioeconomic, ethnic and cultural characteristics, plus the dietary traditions of our people. A national survey in 2013 indicated 54.7% of males to have body weights above the ideal and, among them, 17.5% were obese [20]. The proportion in the obese range increased markedly with age, being 4-fold higher beyond 40 years of age than between the 20-29 years range [21]. A review of the Brazilian bibliography found prevalence of alcohol abuse or alcoholism varying between 2.9% and 45.4%, the overweight rates were 25.7% to 51.6%, and the general obesity prevalence 7.9% to 20.8% [22]. Among a sample of 912 military police, mostly men – only 6% females, it was reported: 50% overweight, 18% diabetes mellitus type 2, 3% and 28% elevated cholesterol [23].

Prolonged alcohol consumption determines increased synthesis of cholesterol through induction of liver microsome oxidases [24]. The situation is more complex in the chronic alcoholics where plasma cholesterol levels maybe found normal or reduced in dependency of the type of liver lesion. In general, it is observed that levels are higher in patients that did not reach the cirrhosis stage [25]. In some cirrhotic patients, levels of HDL-cholesterol may be reduced due to lower production [24]. A further complication is the balance with nutritional state, malnutrition not being uncommon in the chronic alcoholics [8].

Our sample had the great majority in both groups inside the ideal bodyweight range. Total cholesterol and LDL-cholesterol elevated indices were observed in only 2% of cases. Significant was the elevation of HDL-cholesterol, in 44% of the non-aged and 14% of the aged.

There is a quite complex relationship between the amount of alcohol ingested and the incidence of arterial vascular lesion. When these two variables are arranged as cartesian coordinates, there is a resulting U-shaped curve. The disease incidence is reduced when the ingestion is low to moderate (30 to 40 g/day for males) and follows a linear increase rate in the range of moderate to elevated intake (beyond 60 to 80 g/day) [26,27].

Light-to-moderate alcohol intake is associated with enhanced insulin sensitivity in men and, leads to a decrease in LDL-cholesterol and increase in HDL-cholesterol in plasma [28,29]. In our study the alcohol intake was heavy but nonetheless the lipid levels, except HDL-cholesterol, were below the minimum reference values, in the majority of patients. The behavior of triglycerides follows the inverse trend, their increases being related to the heavy alcohol consumption [30]. Again, an apparent discrepancy with expectations shows up, the hypertriglyceridemia being low in our sample of both groups.

Proteins

Serum albumin and globulin levels are highly relevant in the clinics for evaluation of liver function. Albumin is synthetized exclusively in the liver and its serum levels are indicators of the liver functional state. Low albumin levels, except when resulting from low ingestion of proteins or from intestinal or renal losses, indicate deficiency in liver synthesis, besides being useful for following the progression, morbidity and mortality of liver disease [31]. Among globulins, only the alpha category is synthetized in the liver.

In acute hepatitis, except in very intense or prolonged forms, the levels of plasma proteins either do not vary or vary with small

expressiveness. In chronic hepatitis and cirrhosis, in parallel with the intensification of the cellular structural damage, the trend is for decreases in the albumin levels and increase in the globulins, so that the albumin/globulin ratio is inverted from the normal, growing to >1 values [32].

In this study, patients with low levels of albumin were 70% among the aged and 40% among the non-aged.

Among aged and non-aged patients, about 14% and 4% were located inside 'underweight', respectively. Hepatomegaly with portal hypertension, a condition compatible with chronic liver disease, was observed in 10% and 14% of aged and non-aged patients, respectively. In view of these observations we are left with the conjecture that the albumin alteration in the two groups are consequent to dietary problems and not to liver synthesis dysfunction.

Uric acid

Some studies consider the upper limit of the normal uric acid serum concentration to be 6.8 mg%, which would be the limit of urate solubility [33]. The majority of authors adopt otherwise the 7 mg% cutoff value, above which would hyperuricemia be indicated.

The increase in the prevalence rates of hyperuricemia in the population is related to the higher longevity, characteristics of dietary standards and obesity [33].

Causes of hyperuricemia would be: a reduction of the urinary excretion of uric acid (85% to 95%), increased synthesis of urate starting with activation of nucleotides, and the degradation of various nitrogenous substances, mainly purines (10% to 15%), while these mechanisms may be combined [6,34]. In alcoholics, the main component in elevation of serum uric acid seems to be the activation of nucleotides [34].

Our sample follows the results obtained in other studies, showing no alteration of uricemia (34).The hyperuricemia rates observed in the aged (6%) or non-aged (4%) were lower than in the reports of Rodrigues., *et al.* (16%) and Baaklini., *et al.* (12.5%) [33,35].

Conclusion

Considering the vast, nearly continental, dimension of Brazil, presenting large regional diversity in cultural, social and economic characteristics, it is necessary to expand the evaluation of the extension and severity of the alcoholism problem, and of the associated metabolic problems associated with it, possibly through the implementation of multicenter initiatives.

This study contributed with mainly some baseline clinical data, mainly due to the sample characteristics, of male adults and male aged, both with scarce symptoms and signs, admitted into a psychiatric hospital for treatment of intoxication episodes.

It is expected that this study will be found useful for further studies.

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