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IMPACT OF WEIGHT LOSS ON HEPATIC TRANSAMINASES IN OBESE PATIENTS

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ABSTRACT

Objective: To evaluate possible associations between weight loss and changes in hepatic transaminases in obese patients treated with a very low-calorie diet, comparing possible differences associated to sex and age group.

Method: This retrospective cohort analyzed medical records of 777 patients with severe obesity (grades II or III) treated with a 500–800 kcal/day diet between 2016 and 2022. Bioimpedance and laboratory tests were evaluated after 3 months of in-hospital intervention. The sample included individuals over 12 years old, totaling 1,142 hospitalized patients.

Results: The comparison between admission and discharge measurements revealed significant changes in body composition and in the GGT and ALT concentrations of the study participants. The reduction in body weight and fat mass in obese patients on a very low-calorie diet was directly and weakly associated with a reduction in liver transaminases, suggesting an improvement in liver function.

Conclusions: Hospital treatment for severe obesity was effective in promoting improvements in anthropometric measures after three months. The very low-calorie diet and lifestyle changes also provided evidence of improved liver function in patients, highlighting the importance of holistic management with multidisciplinary supervision.

Keywords: Weight loss. Hospital admission. Hepatic transaminases. Obesity.

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IMPACTO DA PERDA PONDERAL SOBRE AS TRANSAMINASES HEPÁTICAS EM PACIENTES COM OBESIDADE

RESUMO

Objetivo: Avaliar associações entre a perda de peso e alterações nas transaminases hepáticas em pacientes obesos tratados com dieta de muito baixo valor calórico, comparando possível diferenças associadas ao sexo e à faixa etária.

Método: Este é um estudo de coorte retrospectiva analisou prontuários de 777 pacientes com obesidade grave (graus II ou III) tratados com dieta de 500-800 kcal/dia entre 2016 e 2022. Foi avaliado por meio da bioimpedância e exames laboratoriais após 3 de internação para tratamento. A amostra incluiu indivíduos acima de 12 anos, totalizando 1.142 pacientes internados.

Resultados: A comparação entre as medidas na admissão e na alta hospitalar mostrou alterações significantes na composição corporal e na concentração de GGT e TGP dos participantes do estudo. A redução de peso corporal e de massa gorda em pacientes obesos em dieta de muito baixo valor calórico esteve direta e fracamente associada à redução das transaminases hepáticas, sugerindo melhora na função hepática.

Conclusões: O tratamento hospitalar para obesidade grave foi eficaz para promover melhorias nas medidas antropométricas após três meses. A dieta de muito baixas calorias e mudanças de estilo de vida também promoveu evidências de melhor função hepática nos pacientes, destacando a importância do manejo holístico com supervisão multidisciplinar.

Palavras-chave: Perda de peso. Internamento hospitalar. Transaminases hepáticas. Obesidade.

IMPACTO DE LA PÉRDIDA PONDERAL SOBRE LAS TRANSAMINASAS HEPÁTICAS EN PACIENTES CON OBESIDAD

RESUMEN

Objetivo: Evaluar las asociaciones entre la pérdida de peso y los cambios en las transaminasas hepáticas en pacientes obesos tratados con una dieta de muy bajo valor calórico, comparando posibles diferencias según el sexo y el grupo etario.

Método: Esta cohorte retrospectiva analizó los registros médicos de 777 pacientes con obesidad grave (grado II o III) tratados con una dieta de 500-800 kcal/día entre 2016 y 2022. Se evaluaron la bioimpedancia y los exámenes de laboratorio después de 3 meses de hospitalización para tratamiento. La muestra incluyó individuos mayores de 12 años, totalizando 1.142 pacientes hospitalizados.

Resultados: La comparación entre las mediciones al ingreso y al alta hospitalaria reveló cambios significativos en la composición corporal y en la concentración de GGT y TGP de los participantes del estudio. La reducción del peso corporal y de la masa grasa en pacientes obesos bajo dieta de muy bajo valor calórico estuvo directa y débilmente asociada con la disminución de las transaminasas hepáticas, lo que sugiere una mejoría en la función hepática.

Conclusiones: El tratamiento hospitalario para la obesidad grave fue eficaz para promover mejoras en las medidas antropométricas después de tres meses. La dieta de muy bajas calorías y los cambios en el estilo de vida también promovieron evidencia de mejor función hepática en los pacientes, destacando la importancia del manejo holístico con supervisión multidisciplinaria.

Palabras clave: Pérdida de peso; Hospitalización; Transaminasas hepáticas; Obesidad.

INTRODUCTION

Obesity is a multifactorial and complex condition associated with a high risk of metabolic, cardiovascular, and hepatic comorbidities, such as nonalcoholic fatty liver disease (NASH) (MENEGHEL; PINTO; RUSSO, 2022). The global prevalence of obesity has increased dramatically in recent decades, driven by factors such as a sedentary lifestyle and excessive consumption of ultra-processed foods (GUTIÉRREZ-FISAC et al., 2012). Among the associated metabolic complications, liver dysfunction, evidenced by elevated levels of transaminases (ALT, AST, GGT), is one of the most prevalent and relevant in clinical management (BERNÁ; ROMERO-GOMEZ, 2020). Weight loss has been shown to be an effective strategy for improving liver function in obese patients, promoting a reduction in hepatic transaminases. Recent studies suggest that dietary interventions, particularly very low-calorie diets (VLCDs), can result in significant improvements in markers of liver injury (POUWELS et al., 2022). VLCDs, diets that restrict daily caloric intake to up to 800 kcal (RONDANELLI et al., 2021), promote rapid and substantial weight loss, which has been associated with reduced levels of hepatic transaminases, in addition to decreased body and liver fat (HAIGH et al., 2022).

In addition, the loss of visceral fat, associated with caloric restriction, plays a critical role in the treatment of liver damage associated with severe obesity (HARRINGTON et al., 2022). The impact of VLCDs is particularly relevant in patients with severe obesity, for whom short-term weight loss can lead to significant clinical benefits, including reduced risk of liver disease progression (D'ABBONANZA et al., 2020). However, adopting a multidisciplinary approach to treatment, with medical and nutritional supervision, is essential to ensure the safety and efficacy of these interventions (BISCHOFF; SCHWEINLIN, 2020).

There is some evidence in the scientific literature that liver changes in obese individuals are more prevalent in females (LUDWIG et al., 1980). In addition, most studies focus on young populations, so knowledge about the impact of obesity on liver changes in the elderly is still limited (GAN et al., 2011). Knowledge about the influence of sex and age on liver transaminases in obese individuals undergoing multidisciplinary treatment with DMBC will contribute to the development of safe and effective interventions for this population.

OBJECTIVE

The objective of this study was to evaluate associations between weight loss and changes in liver transaminases in obese patients (grades II and III) hospitalized for 3 months, undergoing supervised multidisciplinary treatment involving a very low-calorie diet and intensive changes in lifestyle habits. The aim was also to compare possible differences associated with sex and age group.

METHOD

This is a retrospective cohort study with a quasi-experimental design that evaluated secondary data from medical records of patients with severe obesity (grades II or III) treated at a specialized hospital between 2016 and 2022. The research protocol was approved by the Research Ethics Committee of the State University of Bahia (UNEB) under CAAE number: 65578822.1.0000.0057.

Participants underwent a very low-calorie diet program (500-800 kcal/day) and intensive lifestyle changes, with monitoring by a multidisciplinary team. Data were obtained from 777 patients who remained hospitalized for 3 months, of both sexes, aged over 12 years and diagnosed with obesity grade II by body mass index (BMI) (between 35 and 39.9 kg/m2) or III (≥40 kg/m²) at admission. Patients with incomplete data in the electronic medical record and those who remained hospitalized for less than 3 months were excluded.

The study participants were assessed for body composition by tetrapolar bioimpedance (with 8 tactile electrodes, InBody 570, Seoul, Korea) and had their blood collected for biochemical analysis at admission and discharge. The gamma-glutamyl transferase (GGT) levels were obtained by the colorimetric enzymatic method, and the oxaloacetic transaminase (AST) and pyruvic transaminase (AST) levels were obtained by the UV kinetic method. All analyses were performed using automatic equipment in the same laboratory.

The data were analyzed using SPSS v.29 for Windows. They were treated with descriptive statistics (means and standard deviations), and the comparison of admission and discharge data was performed by the paired t-test or the Wilcoxon test. The percentage of variation in each variable was calculated by subtracting the initial value (admission) from that obtained after three months of hospitalization. This difference was divided by the admission value and multiplied by 100 to express the percentage change. The percentage values were compared between the groups of men and women, as well as between elderly (people aged 60 years or older) and non-elderly (people under 60 years of age), using the unpaired t-test. The associations between the variables were tested using the Pearson correlation test and classified as follows: 0.0 to 0.19 - very weak correlation; 0.2 to 0.39 - weak correlation; 0.4 to 0.69 - moderate correlation; 0.7 to 0.89 - strong correlation; 0.9 to 1.0 - very strong correlation. In all cases, the significance level adopted was 5%.

RESULTS

Among the 777 participants in the present study, the majority (70.4%) were women, sedentary individuals (82.5%) and with hepatic steatosis (75.8%) and other comorbidities associated with obesity, as shown in table 1 below:

Table 1. Clinical-epidemiological data (n=777).

	Mean ± Standard Deviation	**n (%)**
Age	45.4 ± 16.4	
Female		546 (70.3%)
Elderly		598 (76.9%)
Smoking		172 (22.1%)
Alcoholism		393 (50.6%)
Sedentary lifestyle		641 (82.5%)
Diabetes Mellitus		269 (34.6%)
Hypertension		412 (53%)
Hypercholesterolemia		344 (44.3%)
Hypertriglyceridemia		240 (30.9%)
Hypothyroidism		119 (15.3%)
Coronary artery disease		124 (16%)
Sleep apnea		585 (75.3%)
Fat liver disease		589 (75.8%)
Depression		239 (30.8%)

The comparison between measurements at admission and discharge from hospital (after 3 months of hospitalization) revealed significant changes in body composition and in the concentration of GGT and TGP of the study participants (Table 2):

Table 2. Comparison of body composition and liver transaminases before and after treatment (n=777).

	Admission	After 3 months	p
BMI (kg/m2)	40.9 (39.1-44.5)	36.4 (34.7-39.4)	<0.001
Fat mass (kg)	55.7 (50.4-63.9)	45.8 (40.6-52.3)	<0.001
Lean mass (kg)	31.3 (27.3-36.9)	28.9 (24.8-34.4)	<0.001
GGT (mg/dL)	35.0 (23.5-56.0)	25.0 (17.0-41.0)	<0.001
OAT (mg/dL)	22.3 (18.0-29,9)	23.1(18.7-30.2)	0.282
PT (mg/dL)	24.5 (17.3-37.0)	27.2 (18.7-40.6)	0.001

Data expressed as medians (interquartile intervals).
BMI: Body mass index, GGT: gama-glutamil transferase, OAT: oxaloacetic transaminase, PT: piruvic transaminase.

When analyzing the sample separated by sex (Table 3), differences were noted between men and women regarding anthropometric variables. There was a greater reduction in fat mass in men and a greater loss of lean mass in women (p<0.001).

Table 3. Comparison between men and women (n=777) after 3 months of inpatient treatment.

	Men (n=231)	Women (n=546)	p
% reduction in BMI	12.9 (11.1-14.7)	10.4 (8.9-12.0)	<0.001
% reduction in FM	25.3 (19.6-30.0)	15.2 (12.3-18.5)	<0.001
% reduction in LM	3.8 (1.4-6.4)	5.9 (7.3-8.3)	<0.001

Data expressed as medians (interquartile intervals).
BMI: body mass index, FM: fat mass, LM: lean mass.

Comparison of elderly and non-elderly individuals revealed that there was a greater reduction in BMI and fat mass in the non-elderly, while the elderly lost significantly more lean mass than the non-elderly participants (Table 4).

Table 4. Comparison between elderly and non-elderly individuals (n=777) after 3 months of inpatient treatment.

	Elderly (n=598)	Non-elderly (n=179)	p
% BMI reduction	10.2 (8.4-12.1)	11.4 (9.6-13.0)	<0.001
FM reduction (kg)	4.9 (2.8-9.7)	7.3 (4.1-12.4)	<0.001
LM reduction (kg)	5.9 (3.7-8.1)	5.2 (2.3-7.7)	0.026

Data expressed as medians (interquartile intervals).
BMI: body mass index, FM: fat mass, LM: lean mass.

The reduction in body weight and fat mass was directly and weakly associated with the reduction in GGT, and a very weak but significant association was also observed between the reduction in fat mass and the reduction in PT in the total sample (Table 5). When analyzing

men and women separately, very weak and significant associations remained between GGT and BMI and fat mass, and between elderly and non-elderly individuals, in addition to the weak or very weak significant associations between the same variables, a direct association (very weak but significant) was again observed between fat mass and PT.

Table 5. Association between changes in body composition and liver transaminase levels (n=777).

		All (n=777)		**Men (n=231)**		**Women (n=546)**		**Elderly (n=598)**		**Non-elderly (n=179)**	
		r	**p**	**r**	**p**	**r**	**p**	**r**	**p**	**r**	**p**
GGT	BMI	**0.22**	**<0.001**	**0.17**	**0.010**	**0.10**	**0.023**	**0.17**	**0.020**	**0.19**	**<0.01**
	Fat Mass	0.26	**<0.001**	**0.17**	**0.010**	**0.13**	**0.002**	**0.24**	**0.001**	**0.23**	**<0.01**
	Lean Mass	-0.02	0.562	0.03	0.588	-0.02	0.528	-0.01	0.850	-0.01	0.672
OAT	BMI	0.02	0.436	0.77	0.245	-0.02	0.628	0.04	0.598	0.01	0.820
	Fat Mass	0.07	0.046	0.07	0.267	0.04	0.339	0.09	0.200	0.06	0.165
	Lean Mass	-0.05	0.159	0.01	0.812	-0.08	0.050	-0.01	0.863	-0.06	0.142
PT	BMI	0.07	0.045	0.03	0.634	-0.04	0.353	0.12	0.106	0.06	0.160
	Fat Mass	0.13	**<0.001**	0.06	0.391	0.02	0.647	**0.18**	**0.012**	**0.12**	**0.004**
	Lean Mass	-0.08	0.017	-0.33	0.622	0.07	0.072	-0.01	0.920	-0,01	0.016

BMI: body mass index, MG: fat mass, MM: lean mass.
GGT: gamma-glutamyl transferase, TGO: oxaloacetic transaminase, TGP: pyruvic transaminase.

DISCUSSION

The aim of this study was to evaluate associations between weight loss and changes in liver transaminases in obese patients treated with a very low-calorie diet. The main results show that, after 3 months of inpatient treatment, patients showed significant reductions in body weight, fat percentage and concentration of some liver transaminases.

It is known that obesity can contribute to the development and progression of liver diseases, therefore, effective interventions for the management of obesity are desirable and urgent (HUI et al., 2022). Lifestyle interventions, including restrictive diet and regular physical activity, represent the main treatment not only for obesity, but also for non-alcoholic fatty liver disease (YOUNOSSI, et al., 2023).

A study on predictors of success in weight reduction in lifestyle interventions (CHOPRA et al., 2021) revealed that, in addition to individual factors such as being male and having cardiometabolic comorbidities, adherence to lifestyle changes is associated with greater success in weight reduction. In this sense, inpatient interventions have greater potential for success compared to those that involve guidance to be incorporated into the patients' routine lives, which explains the good results presented by the patients in this study, who lost an average

of 9.9 kg of fat in 3 months, that is, just over 25% of the fat mass of men and 15% of the fat mass of female patients.

Interventions of this nature, with a very-low calorie diet, generally involve some loss of lean mass as well. Another important finding of the present study is that the loss of lean mass was relatively low, less than 4% among men and less than 6% among women, 6 kg on average. This value is much lower than that presented by patients who undergo bariatric surgery, for example (NUIJTEN et al., 2022).

The greater reduction in fat mass in men and greater loss of lean mass in women is a physiologically expected data, as is the greater reduction in BMI and fat mass in younger patients compared to the elderly, who, in this study, presented significantly more loss of lean mass than non-elderly participants.

The association between reduction in body weight and fat mass and reduction in hepatic transaminases has also been observed. Altalebi et al. (2023) observed changes in hepatic transaminases in obese patients in childhood and adolescence and recommend early treatment of obesity and non-alcoholic hepatic steatosis. Thus, the systematic review by Varkaneh et al. (2022) recommends the use of low-calorie diets when there is an intention to reduce body weight and liver enzymes.

CONCLUSION

Inpatient treatment for severe obesity was effective in promoting improvements in anthropometric measurements after three months. A very low-calorie diet and lifestyle changes also provided evidence of improved liver function in patients, highlighting the importance of holistic management with multidisciplinary supervision in the inpatient setting.

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