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Impact of Nutritional Education Intervention in Patients with Metabolic Steatotic Liver Disease: Randomized Clinical Trial

Impacto da Intervenção Nutricional Educativa em Pacientes com Doença Hepática Esteatótica Metabólica: Ensaio Clínico Randomizado

Abstract

Introduction: Metabolic dysfunction-associated steatotic liver disease (MASLD) is one of the most common liver diseases in individuals who are overweight or obese. This condition is associated with an increased risk of overall mortality, specifically due to liver and cardiovascular complications. Nutritional status and its aggravating factors, such as central visceral fat, play a major role in the health and clinical outcomes of MASLD. The Nutrition Care Process is an important tool used to incorporate and monitor changes in dietary and nutritional behavior in individuals and groups. *Objective*: To analyze the effect of educational nutritional intervention for people with MASLD using the Nutrition Care Process Terminology. *Methods*: This was a randomized clinical trial with 64 people diagnosed with MASLD, treated by a nutritionist at a specialized outpatient clinic in a public hospital in southern Brazil, from February 2023 to September 2024. The intervention group (n=45) received nutritional interventions based on the Nutrition Care Process terminology, with nutrition consultations (at baseline, 180 days, and 360 days), in addition to monthly telephone contacts. The control group (n=19) received routine outpatient counseling and two nutrition consultations, one at baseline and one at 360 days, at the end of follow-up. *Results*: Among the randomized patients, 67.85% were women, with a mean age of 62.9 years and a mean MASLD diagnosis duration of 4 years. In the intervention group (n=45), reductions in liver enzymes, body weight, and body mass index (BMI) were observed throughout follow-up. Adherence to the agreed goals was higher in the first six months in the intervention group. In the control group, no significant differences were identified in the variables analyzed. *Conclusion*: The nutritional intervention using the Nutrition Care Process terminology enabled adherence to goal-setting and reduction of aggravating factors of MASLD.

Keywords: Metabolite-induced liver disease. Health education. Food and nutrition education. Obesity. Chronic disease. Steatotic liver disease associated with metabolic dysfunction.

Resumo

Introdução: A doença hepática esteatótica associada à disfunção metabólica (DHEM), é uma das doenças hepáticas mais comuns em indivíduos com sobrepeso ou obesidade. Sua condição está associada a um risco aumentado de mortalidade geral, especificamente por complicações hepáticas e cardiovasculares. O estado nutricional e seus agravos, como gordura visceral centrípeta, têm papel preponderante na saúde e nos desfechos clínicos de DHEM. O Processo de Cuidado em Nutrição é um importante instrumento utilizado para incorporar e monitorar mudanças no comportamento alimentar e nutricional em indivíduos e coletividades. *Objetivo:* Analisar o efeito da intervenção nutricional educativa para pessoas com DHEM com a utilização da Terminologia do Processo de Cuidado em Nutrição. *Método:* Ensaio clínico randomizado com 64 pessoas diagnosticadas com DHEM, atendidas por nutricionista em ambulatório especializado em um hospital público da região sul do Brasil, de fevereiro de 2023 a setembro de 2024, foram randomizadas. O grupo de intervenção (n=45) recebeu interposições nutricionais baseadas na terminologia do processo de cuidado em nutrição, com consulta de nutrição (no início, em 180 dias e 360 dias da intervenção), além de contatos telefônicos mensais. O grupo controle (n=19) recebeu orientação habitual do ambulatório e duas consultas de nutrição, uma no início e outra, em 360 dias, ao término do acompanhamento. *Resultados*: Entre os pacientes randomizados, 67,85% eram mulheres, com idade média de 62,9 anos e tempo médio de diagnóstico de DHEM de 4 anos. No grupo intervenção (n =45) observou-se redução de enzimas hepáticas, do peso corporal e do índice de massa corporal (IMC) ao longo do acompanhamento. A adesão às metas pactuadas foi maior nos primeiros seis meses no grupo de intervenção. No grupo controle, não foram identificadas diferenças significativas nas variáveis analisadas. *Conclusão*: A intervenção nutricional utilizando a terminologia do processo de cuidado em nutrição possibilitou a adesão à pactuação de metas e a redução de fatores agravantes da DHEM.

Palavras-chave: Doença hepática induzida por metabólito. Educação em saúde. Educação alimentar e nutricional. Obesidade. Doença crônica. Doença hepática esteatótica associada à disfunção metabólica.

INTRODUCTION

Metabolic dysfunction-associated steatotic liver disease (MASLD) is the leading cause of chronic liver disease and is closely associated with obesity, type 2 diabetes mellitus (T2DM), and cardiovascular diseases.[1] MASLD, especially its subtype—metabolic dysfunction-associated steatohepatitis—is a serious condition linked to increased overall mortality, particularly due to liver and cardiovascular complications.[2]

Estimated cardiovascular and liver-specific mortality rates were 479 and 77 per 100,000 person-years, respectively.[2] Nutritional status plays a key role in health and clinical outcomes of MASLD, as it is associated with obesity and overweight, leading to visceral fat accumulation, which is considered the most important predictor of MASLD occurrence.[3,4]

The first medication developed for MASLD-related liver fibrosis was approved and marketed in the USA in April 2024.[5] However, lifestyle changes remain the first and best option, as a 7–10% reduction in body weight can effectively reduce hepatic lipid levels and inflammation. Resmetirom, marketed as Rezdiffra, is a selective thyroid hormone receptor beta (THR-β) agonist. In MASLD, THR-β function in the liver is impaired, leading to reduced mitochondrial function and β-oxidation of fatty acids, along with increased fibrosis. A double-blind, randomized, placebo-controlled study evaluated the benefit of Resmetirom, following 966 patients with MASH confirmed by biopsy or elastography over 52 weeks. The drug is not yet available in Brazil. Nevertheless, inconsistent and insufficient food and nutrition education remains a challenge for lifestyle changes regardless of environment.

Time constraints, the physical food environment (such as accessibility and availability), and complex relationships with food are some of the barriers to achieving dietary and nutritional plans.[6] Healthy eating contributes to adequate nutritional status, which is essential for health and plays an important role in quality of life, especially in preventing various chronic non-communicable diseases and their complications.

Food choices result from a complex interaction of individual, community, and global factors, including social and cultural context, food availability and access, public policy formulation, marketing strategies, product cost, and population knowledge level. These influence and determine ongoing adaptations in eating habits.[3]

In this scenario, the Nutrition Care Process (NCP) stands out as an important tool for planning, implementing, and monitoring interventions aimed at promoting and tracking changes in dietary and nutritional behavior, either individually or collectively.

The Nutrition Care Process and Model, as defined by the Academy of Nutrition and Dietetics, is a client-centered approach to dietary intervention, including a gradual process starting with nutritional assessment, leading to a nutritional diagnosis that is then intervened upon and subsequently monitored and evaluated.[7] To carry out this process, a standardized list of terminologies (NCPT) is used. A nutrition diagnosis is a nutritional problem that can be resolved or improved through nutritional intervention. The nutrition diagnosis differs from the medical diagnosis and changes as the client responds to the nutritional intervention.[8]

Standardizing the NCP helps manage workflow. Standardized practice improves productivity, effectiveness, and service quality.[4] In this sense, nutritional education within the NCP approach is an important tool for reducing and mitigating MASLD-related complications, especially considering that the disease has reached alarming proportions, affecting 25–30% of the world's population.[8] Thus, nutrition education through the NCPT can be considered a set of experiences designed to facilitate the voluntary adoption of behavior changes related to nutrition.

Objective

To analyze the effects of nutritional intervention for people with metabolic dysfunction-associated steatotic liver disease.

Method

Randomized controlled clinical trial with 64 participants diagnosed with MASLD, treated at the hepatology outpatient clinic of a public hospital in southern Brazil. To describe the follow-up steps, the recommendations of the Consolidated Standards of Reporting Trials (CONSORT) were followed.[9]

Sample Recruitment and Allocation

Participants were recruited after a medical consultation in the hepatology clinic and referred to a consultation with a nutritionist. Included were people aged 18 years or older with a medical diagnosis of MASLD.

Allocation to intervention was carried out using the following sample randomization technique: 8 envelopes (four marked INTERVENTION, four CONTROL), ensuring a 50% chance of belonging to either group.[10] The envelopes were shuffled and placed on the table for participants to select, allowing for allocation to the intervention group (IG) or control group (CG). There was no blinding of participants or researcher due to the nature of the intervention.[11] The Intervention Group (IG) included 45 participants and the Control Group (CG) 19.

Table 1. Sociodemographic and nutritional diagnosis data for the control and intervention groups. Curitiba, PR, 2024.

Variable	Classification	CG n	CG %	IG n	IG %	p*
Status (age)	Adult	8	42.1	10	22.2	0.133
	Elderly	11	57.9	35	77.8	
Sex	Female	12	63.2	25	55.6	0.782
	Male	7	36.8	20	44.4	
Schooling (years)	< 9	12	63.2	27	60.0	0.135
	9 to 12	3	15.8	15	33.3	
	> 12	4	21.1	3	6.7	
Marital status	Single	5	26.3	6	13.3	0.348
	Married/stable union	8	42.1	28	62.2	
	Widowed	2	10.5	6	13.3	
	Separated/divorced	4	21.1	5	11.1	
Social class	B1	2	10.50	5	11.10	0.965
	B2	5	26.30	10	22.20	
	C1	6	31.60	17	37.80	
	C2	6	31.60	13	28.90	
Nutrition diagnoses	Obesity Grade I	6	31.5	16	35.5	-
	Obesity Grade II	2	10.5	7	15.5	
	Obesity Grade III	1	5.2	2	4.4	

Data Collection

A sociodemographic and clinical questionnaire was used to collect data from both groups, including variables such as education (in completed years), marital status (married/consensual union/widowed/separated/divorced) and family income (in reais per month and its equivalent in US dollars). Clinical variables measured were weight (kilograms - kg), height (centimeters - cm), body mass index (BMI - kg/m²), and waist circumference (WC - cm).

Data were collected from February 2023 to August 2024 during three nutritionist consultations and monthly telephone calls for the IG. During the in-person consultation, body weight was measured with a Welmy® clinical scale (0–150 kg) and height with an anthropometric stadiometer (2.00 m, 0.5 cm increments).

BMI was calculated and classified according to the World Health Organization cut-off points: <18.5 kg/m² (underweight), 18.5–24.9 kg/m² (normal), 25.0–29.9 (overweight), ≥30 kg/m² to 34.9 (obesity grade I), ≥35 kg/m² to 39.9 (grade II), and ≥40 kg/m² (grade III).[12]

WC classification followed criteria from the Brazilian Society of Endocrinology and Metabolism: high fat accumulation was >80 cm (women) and >94 cm (men); very high was >88 cm (women) and >102 cm (men).[13,14]

Monthly income classification used the Brazil Economic Classification Criterion (CCEB)[14]: Class A: >R$22,000 (USD $3,800); Class B: R$7,100–22,000 (USD $1,226–3,800); Class C: R$2,900–7,100 (USD $500–1,226); Classes D/E: ≤R$2,900 (USD $500), using March 2025 exchange rates.[15]

Education data were collected per the Institute of Applied Economic Research (IPEA) criteria: below 9 years (incomplete primary), 9–12 years (complete primary), above 12 years (complete secondary).[16] A nutrition literacy questionnaire was also applied.

Physical activity (PA) was assessed via open questions regarding daily minutes and weekly frequency. During the semi-structured interview, sedentary was defined as no PA; "Low active" as light PA (walking/aerobics) <30 min, or 30–60 min ≤4 days/week, or ≥60 min ≤2 days/week; "Active" as moderate-to-vigorous PA (running, weight training, etc.) <90 min/week.[17] Use of chronic medications and hypothyroidism was also recorded.

Nutritional Interventions

IG participants received individualized nutrition education during in-person consultations at baseline (T0), 180 days (T180), and 360 days (T360), plus monthly phone or instant messaging contact (T30, T60, T90, T120, T150, T210, T240, T270, T300, T330) to answer questions and remind them of upcoming appointments. Goals based on the NCP were set regarding energy, carbohydrates, proteins, fats, fiber, and water intake.

All nutrition diagnoses and interventions were based on the Nutrition Care Process Terminology (NCPT). For diagnoses such as "excessive fat intake" or "suboptimal protein intake," three dietary intervention actions were agreed upon. Three goals were set for each participant (e.g., reduced simple carbohydrates, reduced energy, reduced cholesterol).[8] Goals were monitored over the months and identified as Goal 1, 2, and 3.

The CG also had nutrition diagnoses established but without dietary intervention actions or goal setting. CG received standard written dietary guidance on reducing certain foods. Clinical, anthropometric, and sociodemographic data were collected during IG nutrition consultations.

Primary clinical outcomes expected for the IG were 5–10% weight loss, reduction in WC, dietary pattern changes (24h recall), increased nutrition literacy, and improvement in anthropometric indices at 180 and 360 days.

Data Analysis

Data were organized in Excel® and analyzed with Stata/SE v.14.1 (StataCorpLP, USA) with statistical support. Descriptive analysis of quantitative variables included mean, standard deviation, median, minimum and maximum. Categorical variables were described by absolute and percentage frequency. For comparison between Intervention and Control groups, Student's t-test for independent samples and the non-parametric Mann-Whitney test were used for quantitative variables.

For categorical variables, Fisher's exact test was used. To compare three evaluation times for quantitative variables, ANOVA and the non-parametric Friedman test were used. Two-time comparisons used Student's t-test for paired samples or Wilcoxon's non-parametric test. Categorical variables were evaluated with Stuart-Mawell's symmetry test.

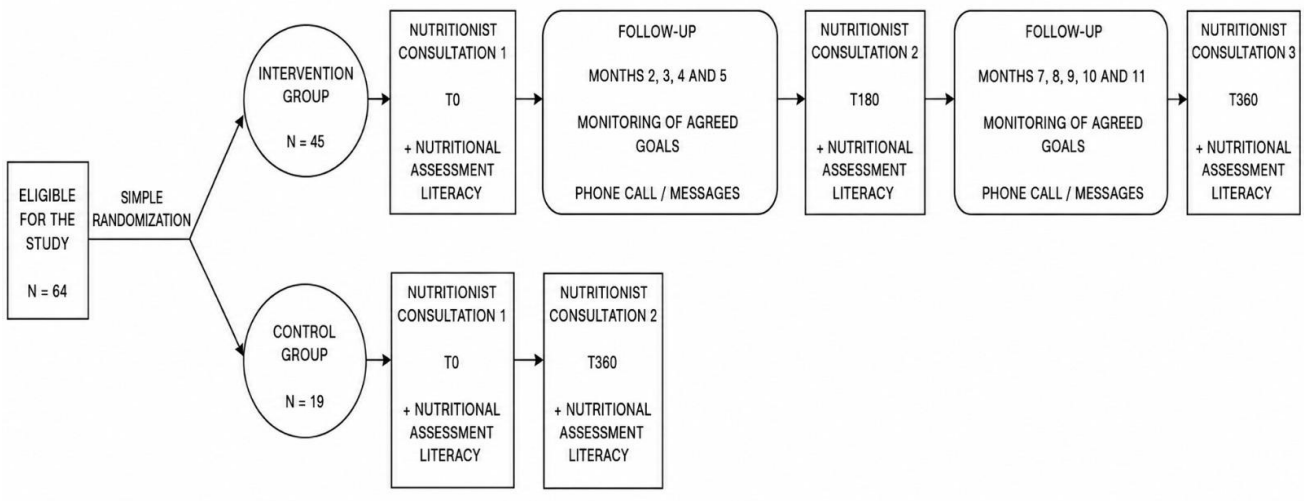
Cut-off points for weight and waist circumference variables, according to goals (not achieved vs. achieved), were determined using ROC curves. The significance of the area under the curve (AUC) was evaluated. Normality of continuous variables was analyzed by the Kolmogorov-Smirnov test. p-values <0.05 were considered statistically significant.

For each quantitative variable, the null hypothesis of equal results in both groups was tested versus the alternative of different results. The same hypothesis applied to categorical variables; the null was that distributions were equal in both groups, the alternative that distributions differed.

Ethical Aspects

The study was approved by the Ethics and Research Committee of a Public University in Southern Brazil (CAEE 65562322.7.0000.0096, opinion no. 5.903.351/2023). All participants signed the Informed Consent Form after the objectives were explained. The trial was registered in the Brazilian Clinical Trials Registry (ReBEC) as RBR-4wsbmjf and in ClinicalTrials.gov as NCT05946330 and WHO Universal Trial Number U1111-1298-0634.

Figure 1. Research flowchart



Source: The author (2024).
Legend: T0 – Time zero – beginning; T360 – After one year – end.

RESULTS

The following analysis was based on data from 64 patients: IG with 45 participants and CG with 19.

Comparison of Groups Regarding Assessed Variables

Participants were predominantly female, elderly, married, with grade I obesity, less than 9 years of schooling, social class C, and family income less than R$7,100 (USD 1,183). Mean age was 62.9 years. Thirty-nine did not complete primary education. More than 60% had low education and belonged to Social Class C. Mean family income was about R$3,000 (USD 550) for both groups (see Table 2).

Table 2. Comparison of anthropometric variables of weight, weight reduction, BMI, waist circumference, and difference in waist circumference between the intervention and control groups. Curitiba, PR, 2024.

Variable	Group	n	Mean	SD	Median	Min	Max	p
Consultation T0 - Weight (kg)	Control	19	87.6	25.9	83	54	159	0.724(a)
	Intervention	45	87.0	18.8	86	51	150	
Consultation T360 - Weight (kg)	Control	19	86.6	26.3	83	54	160	
	Intervention	45	85.0	18.5	81.9	51.1	150	
Weight reduction T360 (T360-T0)	Control	19	-0.9	2.7	0	-7	5	-
	Intervention	45	-1.9	4.0	-0.8	-11.1	4	
Consultation T0 - BMI (kg/m²)	Control	19	32.7	6.9	31.6	24.3	50.5	0.734(b)
	Intervention	45	32.2	4.8	31.4	22.4	46.8	
Consultation T360 - BMI (kg/m²)	Control	19	32.2	7.1	30.4	24.3	50.5	-
	Intervention	45	31.4	4.7	30.7	22.6	46.8	
Consultation T0 - Waist circumference (cm)	Control	19	108.0	15.9	101	79	145	0.836(b)
	Intervention	45	108.8	13.9	108	85	148	
Consultation T360 - Waist circumference (cm)	Control	18	104.5	12.6	100	79	122	-
	Intervention	45	107.1	13.6	108	85.5	148	
Difference CC T360 (cm) (T360-T0)	Control	18	-3.5	4.0	0	-9	5	-
	Intervention	45	-1.7	4.5	-1	-13	10.5	

Both the intervention and control groups showed weight reduction between T0 and T360 consultations, with no statistical difference ($p > 0.05$). For waist circumference, the IG showed a mean reduction of 3.5 cm (Table 2). Most participants had waist circumference above cardiovascular risk thresholds.

In the intervention group, comparison across the three nutritionist visits (T0, T180, T360) revealed significant reductions in weight and BMI ($p=0.001$). Although the reduction in waist circumference was not statistically significant, there was a mean decrease of 1.6 cm in this group (Table 3).

Table 3. Classification by weight, body mass index, and waist circumference in the Intervention Group. Curitiba, PR, 2024.

Variable	Time	N	Mean	SD	Median	Min	Max	p* (1x2x3)	Mean reduction (1-2)	Mean reduction (1-3)	Mean reduction (2-3)
Weight (kg)	T0	44	87.0	19.0	86	51	150		1.4	2.0	0.6
Weight (kg)	T180	44	85.6	18.9	82.5	51.5	150	<0.001	p=0.024	p<0.001	p=0.631
Weight (kg)	T360	44	85.0	18.5	81.9	51.1	150				
BMI (kg/m²)	T0	44	32.1	4.9	31.3	22.4	46.8		0.5	0.7	0.2
BMI (kg/m²)	T180	44	31.6	4.8	30.7	22.9	46.8	<0.001	p=0.021	p<0.001	p=0.696
BMI (kg/m²)	T360	45	31.4	4.7	30.7	22.6	46.8				
Waist circumference (cm)	T0	45	108.7	14.2	108	85	148		1.2	1.6	0.4
Waist circumference (cm)	T180	45	107.5	13.8	108	85.5	148	0.061	-	-	-
Waist circumference (cm)	T360	45	107.1	13.6	108	85.5	148		-	-	-

When analyzing abdominal fat accumulation in the IG at T0 and T180, participants reduced cardiovascular risk and the development of obesity-related chronic diseases (Table 4).

Table 4. Nutritional Risk Classification due to Abdominal Fat Accumulation in the Intervention Group. Curitiba, PR, Brazil. 2024.

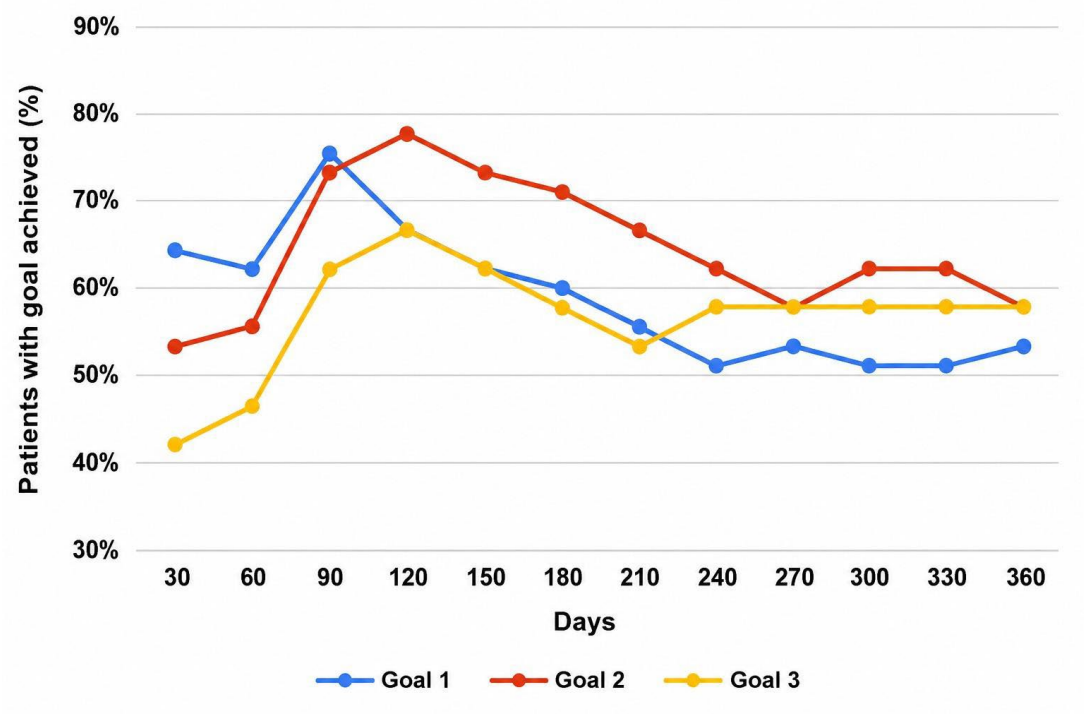
Nutritional risk*	T0 assessment		T180 assessment	
	n	%	n	%
No nutritional risk	-	-	1	2,2
High accumulation	4	8.9	7	15.6
Very high accumulation	41	91.1	37	82.2
Total	45	100	45	100

Legend: T0 – Time zero – baseline; T180 – After six months.
Note: Classification according to the Brazilian Obesity Guidelines, 2016(16).

In the intervention group, better goal outcomes were observed in the first 120 days of follow-up (Figure 2).

When goal adherence frequencies were analyzed in the IG after NCP diagnosis, more than 50% adherence was observed for all three goals, ranging from 53.3% to 71.1%. However, a reduction in adherence was seen between T180 and T360.

Figure 2. Percentages of patients who achieved the goal, at each of the 30- to 360-day time points, restricted to the intervention group.



DISCUSSION

Most participants were elderly, married women with grade I or II obesity, less than nine years of schooling, and from social class C. More than half achieved the goals set at the first consultation (G1, G2, and G3), resulting in significant changes in weight and BMI in the intervention group at T0, T180, and T360. A small change in WC was observed, but without statistical significance. Although MASLD is more prevalent in males,[18] in this study most participants were females with varying degrees of obesity. Gonçalves, 2023, found a similar profile in a cross-sectional study of 56 adults with MASLD.[19]

Another study with 2,627 Americans with MASLD found 9.8% had completed high school and 31.4% had at least a college degree, differing from previous findings.[20] In this sample, education was below 9 years, attributed to the sociodemographic profile of service users.[18]

Regarding income, 12.2% of the sample had incomes below the poverty line. The 2023 National Household Sample Survey (PNAD)[21] reported a per capita income of R$1,271 (USD 250) in Brazil, and 50.3% of families had a monthly family income below the 2025 minimum wage (R$1,518).

Food insecurity may be an independent non-genetic risk factor for MASLD in low-income families,[19] as identified in this sample. However, there is a lack of current studies on SUS users' family income and MASLD.[22]

Both groups showed low reduction of body weight and waist circumference between initial and final consultations. WC reduction indicated reduced cardiovascular risk and risk of obesity-related chronic diseases.[12,16,18,20]

In goal setting, the IG showed better adherence in the first 120 days, with 60% adhering to all three goals (carbohydrate, fat, etc.) set at the initial consultation. The positive result can be attributed to therapeutic

adherence, enhanced by goal setting, behavioral change, and individualized nutrition care, compared to standard written guidance. Dietary behavior change is complex, requiring a multidisciplinary approach and reconstruction of information based on the individual's knowledge and experience—essential for forming and changing eating habits.

A study of 141 people with histological evidence of NAFLD found that women in the sample had visceral fat distribution correlating positively with severity, showing a higher likelihood of liver damage, especially fibrosis progression risk.[22]

WC is more sensitive for detecting visceral fat than BMI, and a 1% increase in visceral fat may triple the risk of fibrosis.[23] In this study, two-thirds of both males and females had WC above recommended values, consistent with the results presented, as more than two-thirds had elevated WC.

The link between MASLD and obesity is well established. Due to its global epidemic, MASLD is considered a hepatic manifestation of metabolic syndrome, given the strong relationship between them.[24] The present study found indicators similar to those seen in metabolic syndrome.

The analyzed sample had a profile similar to the general Brazilian population.[15] A 2018 meta-analysis [25] reported overweight/obesity prevalence and negative long-term prognosis. Nutritional intervention proved fundamental in improving these parameters, as obesity was linked to increased BMI and WC.

In clinical practice, anthropometric indicators are usual tools for assessing diet therapy success. In the Nutrition Care Process, managing these indicators involves continuous monitoring. For chronic conditions, greater nutritional follow-up is warranted. However, contemporary society tends to seek immediate solutions for major health issues. Additionally, the food system[a] contributes to abandoning long-term goals.

In this study, MASLD diagnoses were positively associated with diets high in energy and simple carbohydrates and low in fiber. In a similar study, higher intake of legumes, lentils, and beans (energy-adjusted) was linked to lower risk of MASLD, remaining significant after adjusting for all known risk factors.[26]

MASLD nutritional management may be very similar to that in Metabolic Syndrome, but there is consensus[13] that the approach should differ for obese and non-obese individuals. Obese patients, who usually consume excess carbohydrates and fats, tend to respond well to regulating daily intake of these macronutrients and replacing simple with complex carbohydrates and saturated with poly- and monounsaturated fats. Thus, dietary management with reduced carbohydrates, increased fiber, reduced total and saturated fat and cholesterol, increased protein, and reduced sodium can promote weight loss and correct the vicious cycle of hepatic lipid metabolism.[28]

Implementing the NCPT and nutritional screening and assessment tools improves nutrition service effectiveness. Despite ongoing difficulties in health services, NCPT implementation can ensure quality care, improve outcomes, enhance communication between professionals and institutions, optimize priority setting in intervention planning, facilitate realistic and measurable goal setting, assist with medical record documentation, help manage services and understand results, support payment for services, identify the nutritionist's specific contributions to health care, and improve the professional's visibility within teams and communities.[29]

[a] The food system encompasses all processes and actors involved in the production, transportation, distribution, storage, sale, purchase, and consumption of food, including losses and waste.[27]

A study with clinical nutritionists[30] also highlights the important association between implementing the four-step NCP terminology and documenting goals and outcomes. Thus, standardization in nutrition means major advances in practice, related education, research, and regulation. It is a more effective way to demonstrate the influence of nutrition care on the health of people with acute or chronic liver diseases.

The importance of language standardization should be clear, as proposed by the Academy of Nutrition and Dietetics. This is supported by a nursing study,[31] which concluded that using standardized terminology in the profession improved continuity of care and produced data for effectiveness analysis to support policy decisions.

Standardized terminology can improve the quality of assessment and patient outcomes. Reaching this point is an important step toward advancing the nutritionist profession; this study clearly shows that results can be demonstrated when language standardization is available.

Conversely, standardization brings inevitable changes to practice. It is important for clinical judgment and facilitates documentation and management of nutrition care-related outcomes. Standardization also facilitates data collection and analysis automation, easing the intersection of technology and practice.[29]

The NCP requires documentation, which is a necessary data source for monitoring and evaluating care, as well as supporting the outcome management system.[30] Standardized documentation optimizes quality management and provides technical safety in managing cases and patient prognosis.[7]

Limitations encountered included small sample size and the semi-annual medical return protocol, which extended data collection and reduced goal adherence during follow-up, not compatible with recommended nutritional monitoring protocols and potentially influencing intervention outcomes. Patient commitment levels (liver injury and/or fibrosis) varied. Recruitment was by convenience.

Despite these limitations, the study provides data to help nutritionists focus on goal setting according to the NCP to improve MASLD and other chronic disease treatment success.

FINAL CONSIDERATIONS

There was adherence to goal setting, as well as reductions in weight and BMI and a trend toward reduction in WC. Although there were no statistically significant differences between IG and CG, significant weight loss was observed in the IG, especially in the first 180 days. Nutritional intervention using the nutrition care process reduced aggravating MASLD factors. The NCP allows consideration of individual needs and values, aligning them with the best available evidence for decision-making.

The use of the NCP considers individual needs and values, using the best available evidence for decision-making. Nutritional therapy is fundamental in MASLD and should be planned according to obesity status and with quantitative and qualitative dietary adjustments. A multidisciplinary team can increase treatment effectiveness, since lifestyle modifications are recommended.

It is suggested that nutritionists use care standardization in nutrition services, especially in chronic disease treatment and nutrition undergraduate education. Standardization in electronic health records can enable structured documentation, facilitate results management, increase care efficiency, and improve nutrition outcome effectiveness

REFERENCES

1. Younossi ZM, Golabi P, Paik JM, Henry A, Van Dongen C, Henry L. The global epidemiology of nonalcoholic fatty liver disease (NAFLD) and nonalcoholic steatohepatitis (NASH): a systematic review. Hepatology [online]. 2023. 77(4):1335-1347. https://doi.org/10.1097/hep.0000000000000004

2. Riazi K, Azhari H, Charette JH, Underwood FE, King JA, Afshar EE, et al. The prevalence and incidence of NAFLD worldwide: a systematic review and meta-analysis. Lancet Gastroenterol Hepatol [internet] 2022 sep; Fev. 21;7(9):851-861. https://doi.org/10.1016/s2468-1253(22)00165-0

3. Borges CA, Gabe KT, Canella DS, Jaime PC. Characterization of barriers and facilitators for adequate and healthy eating in the consumer's food environment. Cad Saúde Pública [internet]. 2021. https://doi.org/10.1590/0102-311X00157020

4. Malago Júnior W, Rubiatti AMM, Toniolo CFC, Schneider VC. [Nutritional Effects and Biochemical Mechanisms in Non-alcoholic Fatty Liver Disease]. Rev Assoc Bras Nutr [internet]. 2021;12(1):195–214. https://doi.org/10.47320/rasbran.2021.1436.

5. FDA. Resmetirom, Integrated Review. [Acesso em 14 setembro 2024]. Disponível em: https://www.accessdata .fda.gov/drugsatfda_docs/nda/2024/217785Orig1s000IntegratedR.pdf

6. Kim D, Chung GE, Kwak M-S, Seo HB, Kang JH, Kim W, et al. Body fat distribution and risk of incident and regressed nonalcoholic fatty liver disease. Clin Gastroenterol Hepatol [online]. 2016;14(1):132-8.e4. https://doi.org/10.1016/j.cgh.2015.07.024

7. Academy Of Nutrition And Dietetics. Electronic Nutrition Care Process Terminology (eNCPT): Dietetics Language for Nutrition Care [site]. 2019. [Acesso em 06 setembro 2024]. Disponível em: http://www.ncpro.org.

8. Lacey K, Pritchett E. Nutrition care process and model: ADA adopts a road map to qualitycare and outcomes management. J Am Diet Assoc [online]. 2003. 103(8):1061-1072. https://doi.org/10.1016/s0002-8223(03)00971-4

9. Schulz KF, Altman DG, Moher D, for the CONSORT Group. CONSORT 2010 Statement: updated guidelines for reporting parallel group randomised trials. PLoS Med [internet]. 2010;7(3):e1000251. https://doi.org/10.1371/journal.pmed.1000251

10. Pildal J, Chan AW, Hrobjartsson A, Forfang E, Altman DG, Gotzsche PC. Comparison of descriptions of allocation concealment in trial protocols and the published reports: cohort study. BMJ [online]. 2005;330(7499):1049. http://doi.org/10.1136/bmj.38414.422650.8F

11. Schulz KF, Grimes DA. Allocation concealment in randomised trials: defending against deciphering. Lancet [internet]. 2002;359(9306):614-8. http://doi.org/10.1016/S0140-6736(02)07750-4

12. World Health Organization. Obesity: preventing and managing the global epidemic. Report of a World Health Organization Consultation. Geneva: World Health Organization; 2000. Technical Report Serie n. 28

13. Moreira RO, Valerio CM, Villela-Nogueira CA, Cercato C, Gerchman F, Lottenberg AMP, et.al. Brazilian evidence-based guideline for screening, diagnosis, treatment, and follow-up of metabolic dysfunction-associated steatotic liver disease (MASLD) in adult individuals with overweight or obesity: A joint position statement from the Brazilian Society of Endocrinology and Metabolism (SBEM), Brazilian Society of Hepatology (SBH), and Brazilian Association for the Study of Obesity and Metabolic Syndrome (Abeso). Arch. Endocrinol. Metab [internet]. 2023;67(6):e230123. https://dx.doi.org/10.20945/2359-4292-2023-0123

14. Associação Brasileira de Empresas de Pesquisa (BR). Critério Brasil [site]. 2022. [Acesso em 14 janeiro 2023]. Disponível em: www.abep.org.

15. Associação Brasileira para o Estudo da Obesidade e da Síndrome Metabólica (ABESO). Diretrizes Brasileiras de Obesidade. 4th ed. São Paulo: ABESO; 2016.

16. Instituto de Pesquisa Econômica Aplicada - IPEA; Instituto Brasileiro de Geografia e Estatística – IBGE (BR). Relatório econômico. Brasília: IPEA, IBGE; 2014.

17. Pate RR, Pratt M, Blair SN, Haskel WL, Macera CA, Bouchard C, et al. Physical activity and public health: a recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. JAMA [online]. 1995;273(5):402-7. https://doi.org/10.1001/jama.273.5.402

18. Nagral A, Bangar M, Menezes S, Bhatia S, Butt N, Ghosh J, et al. Gender Differences in Nonalcoholic Fatty Liver Disease. Euroasian. J Hepato-Gastroenterol [internet]. 2022;12(Suppl 1): S19–S25. https://doi.org/10.5005/jp-journals-10018-1370

19. Gonçalves LD, Silva Júnior SMG, Moia LJMP, Farias LR, Santos IBD, Ribeiro EC, et al. [Non-alcoholic fatty liver disease: clinical and Anthropometric profile]. Rev Eletr Acervo Saúde [internet]. 2023;23(10):e13906. https://doi.org/10.25248/reas.e13906.2023.

20. Sheth SG, Chopra S. Epidemiology, clinical features, and diagnosis of nonalcoholic fatty liver disease in adults [internet]. Waltham (MA): UpToDate, 2017. [Acesso em 12 dezembro 2024]. Disponível em: https://medicowise.com/wp-content/uploads/2023/10/Epidemiology-clinical-features-and-diagnosis-of-nonalcoholic-fatty-liver-disease-in-adults-UpToDate.pdf

21. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional por Amostra de Domicílios PNAD [online] 2017. [Acesso em 08 março 2023]. Disponível em: https://www.ibge.gov.br/estatisticas/sociais/populacao/9127-pesquisa-nacional-por-amostra-de-domicilios.html?=&t=destaques

22. Subramanian V, Johnston RD, Aithal GP. Regional anthropometric measures associated with the severity of liver injury in patients with non-alcoholic fatty liver disease. Aliment Pharmacol Ther [internet]. 2013;37(4):455-63. https://doi.org/10.1111/apt.12198

23. Instituto Brasileiro de Geografia e Estatística (BR). Pesquisa Nacional de Saúde: 2019: atenção primária à saúde e informações antropométricas. Rio de Janeiro: IBGE; 2020.

24. Golovaty I, Tien P, Price J, Sheira L, Seligman H, Weiser S. Food Insecurity May Be an Independent Risk Factor Associated with Nonalcoholic Fatty Liver Disease among Low-Income Adults in the United States. J Nutr [internet] 2020;Jan 1.150(1): 91-98. https://doi.org/10.1093/jn/nxz212

25. Lu F-B, Hu E-D, Xu L-M, Chen L, Wu J-L, Li H, *et al.* The relationship between obesity and the severity of non-alcoholic fatty liver disease: systematic review and meta-analysis. Exp Rev Gastroenterol Hepatol [internet]; 2018;12(5):491–502. https://doi.org/10.1080/17474124.2018.1460202

26. Bahrami A, Teymoori F, Eslamparast T, Sohrab G, Hejazi E, Poustchi H, Hekmatdoost A. Legume intake and risk of nonalcoholic fatty liver disease. Indian J Gastroenterol [internet]; 2019;38(1):55-60. https://doi.org/10.1007/s12664-019-00937-8

27. Sustentarea. O que são sistemas alimentares? [Internet]. 2023. [Acesso em 11 outubro 2023]. Disponível em: https://www.fsp.usp.br/sustentarea/2023/02/15/o-que-sao-sistemas-alimentares/

28. Kanwal F, Shubrook JH, Younossi Z, Natarajan Y, Bugianesi E, Rinella ME, *et al.* Preparing for the NASH epidemic: a call to action. Metabolism [internet]. 2021;122: 154822. https://doi.org/10.1016/j.metabol.2021.154822

29. Martino J, Eisenbraun C, Hotson B, Hanning, RM, Lövestam E, Lieffers JRL. Use of the Nutrition Care Process and Terminology in Canada: A National and Regional Update. Can J Diet Pract Res [internet]. 202;83(1):2-9. https://doi.org/10.3148/cjdpr-2021-017

30. Al-Adili L, Boström A-M, Orrevall Y, Lang NR, Peersen C, Persson I, *et al.* Self-reported documentation of goals and outcomes of nutrition care – A cross-sectional survey study of Scandinavian dietitians. Scand J Caring Sci [internet] 2023 Jun; 37:472-485. https://doi.org/10.1111/scs.13131

31. Keenan G, Aquilino ML. Standardized nomenclatures: Keys to continuity of care, nursing accountability and nursing effectiveness. Out Manag Nurs Pract. 1998;2(2):81-6.

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