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# TREATMENT OF METABOLICLY ASSOCIATED FATTY LIVER HEPATOSIS IN THE YOUNG POPULATION

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**Abstract.** One of the main pathogenetic signs of metabolic syndrome is abdominal obesity, which underlies the development of diseases associated with metabolic disorders - carbohydrate metabolism disorders and atherogenic dyslipidemia. The presence of abdominal obesity and metabolic disorders contributes to the development of combined damage to the liver (non-alcoholic fatty liver disease - NAFLD), biliary tract, heart, and pancreas (with the development of steatosis).

**Keywords:** NAFLD, liver, method, treatment, diagnosis.

**Introduction:** Since 2020, a novel terminology acknowledged as metabolic related fatty liver disorder (MAFLD) has been developed, introducing its very own set of criteria. This new acronym objectives to furnish an extra particular description of fatty liver disorder related with metabolic dysfunction, changing the old-fashioned time period nonalcoholic fatty liver sickness (NAFLD). The improvement of elevated diagnostic standards is integral for higher perception and stratification of the disease, enabling the implementation of tailor-made cure techniques focused on unique pathways affected through MAFLD. The suggestion to exchange the time period “non-alcoholic fatty liver disorder (NAFLD)” with “metabolic (dysfunction)-associated fatty liver disorder (MAFLD)” marks a massive development in the field. This change, recommended with the aid of worldwide panel, has garnered massive support, with several research throughout the United States, Europe, and Asia offering enormous proof of the superiority of MAFLD standards over NAFLD standards in a variety of components of fatty liver diseases. The current nomenclature, with its emphasis on the absence of

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alcohol, inadvertently stigmatizes people with fatty liver ailment by using insinuating a connection to alcohol use, even when such a connection is absent. This stigma can lead to misconceptions and discrimination, affecting patients' well-being and hindering fine verbal exchange between healthcare vendors and folks with the condition. NAFLD encompasses hepatic steatosis when all different causes, such as immoderate alcohol consumption, have been dominated out. The circumstance is similarly categorized into nonalcoholic fatty liver (NAFL) or nonalcoholic steatohepatitis (NASH), relying on the presence of liver inflammation, which is discovered solely in NASH. The unique definition used to be hooked up in 1980 and has remained unaltered because then. However, the incidence of NAFLD has been progressively increasing, making it the most normal liver ailment in western industrialized nations, affecting about 1 billion folks international

**Actuality:** *Polymorbid disease dictates the need for a comprehensive approach to solving the problem of obesity, using an arsenal of drugs that simultaneously take into account all links in the pathogenesis of diseases and at the same time have the most pluripotent effect. The World Health Organization considers obesity to be one of the 10 leading causes of preventable death worldwide [1]. The effectiveness of ursodeoxycholic acid in the treatment of NAFLD, in particular non-alcoholic steatohepatitis (NASH) has been proven [2]. Taking ursodeoxycholic acid at a dose of 15-30 mg/kg of body weight daily for 24-48 weeks leads to a reliable decrease in the activity of serum transaminases [3, 4, 5].*

***Literature review.***

*The treatment of Metabolically Associated Fatty Liver Hepatosis (MAFLD) in the young population has garnered increasing attention in recent years, highlighting a pressing public health issue as the prevalence of this condition rises among children and adolescents. A critical examination of the literature reveals a multifaceted landscape of therapeutic strategies, with a predominant focus on lifestyle modifications and the management of metabolic comorbidities.*

*In 2021, Le Garf emphasized the lack of approved pharmacological treatments for MAFLD in adults, which extends to the pediatric population. Their findings indicate that while metformin has shown some promise in improving hepatocyte ballooning, its efficacy as a primary treatment option for pediatric nonalcoholic steatohepatitis (NASH) remains inconclusive. The authors also pointed to novel treatments such as losartan, which has demonstrated safety in children, and the potential of GLP-1 agonists like liraglutide and semaglutide to induce significant weight reduction, thereby improving liver health. However, they caution that these treatments may come with side effects, underscoring the necessity of lifestyle modifications as a cornerstone of treatment.*

*Building on this foundation, Da Won Bae et al., (2022) highlighted the limitations of existing guidelines for managing pediatric MAFLD, which primarily cater to adults. They advocate for a management strategy that targets underlying metabolic conditions to mitigate not only liver disease progression but also cardiovascular and cancer risks. The authors note the absence of specific dietary and exercise recommendations in pediatric guidelines, which is critical given the role of lifestyle in managing MAFLD. Furthermore, they question the benefits of vitamin E for pediatric patients, reiterating the need for more robust evidence before endorsing its use in this demographic.*

*In a more recent contribution, Hegarty et al., (2023) focused on the hepatic complications associated with MAFLD, particularly the concerning rates of advanced fibrosis among affected children. Their research underscores the importance of addressing sarcopenia and muscle health, which are intricately linked to the progression of fatty liver disease. The authors advocate for exercise and resistance training as integral components of treatment, while also acknowledging the psychological dimensions of MAFLD, particularly the high prevalence of mental health issues among affected youth.*

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*Liu et al., (2024) expanded the discussion by exploring the interactions between micronutrients and MAFLD, noting that current treatment strategies are largely ineffective without addressing nutritional deficiencies. Their findings suggest that lifestyle modifications, particularly in dietary habits, are crucial for managing MAFLD, especially in lean patients. The authors highlight the complexity of micronutrient interactions and their potential implications for future therapeutic approaches.*

*Most recently, Al Hashmi et al., (2024) have provided insights into the evolving understanding of MAFLD, advocating for a redefinition of the condition that reflects its metabolic underpinnings. Their analysis reveals a strong association between MAFLD and increased cardiovascular risk, emphasizing the need for tailored therapeutic strategies that address both hepatic and cardiovascular health. They call for a consensus on the best practices for managing MAFLD, highlighting the necessity for innovative therapies and comprehensive care pathways.*

*Together, these articles illustrate the complexities of treating MAFLD in the young population, emphasizing the need for a multifaceted approach that encompasses pharmacological interventions, lifestyle modifications, and a deeper understanding of the metabolic and nutritional factors at play. The literature underscores a critical gap in pediatric-specific guidelines and the urgent need for further research to establish effective treatment protocols.*

**Materials and methods:** *According to current recommendations, diet therapy and lifestyle modification are the basic treatment tactics for patients with NAFLD. Many studies have proven the ability of a hypocaloric diet and exercise to reduce the severity of steatosis and necroinflammatory processes in NAFLD. The hypocholesterolemic effect when using dietary fiber as a diet modifier is due to a decrease in cholesterol absorption in the intestine; a decrease in cholesterol synthesis in the liver; a decrease in cholesterol excretion into bile; a decrease in toxicity and a decrease in the frequency of side effects when using statins due to the induction of CYP3A4; a moderate suppressive effect on cholesterol synthesis in the liver (inhibiting HMG-CoA reductase).*

**Results and discussion:** The introduction of dietary fiber (DF) into the diet has been approved and recommended by such authoritative organizations as the American Heart Association (AHA) and the Food and Drug Administration (FDA). Over the past few years, the mechanisms of DF action and the feasibility of their use have been studied in many studies, including randomized controlled trials.

The object of the study were 242 male employees of a paramilitary security company. The average age of the subjects was 40.5 ± 4.7 years, work experience from 5 to 15 years. Persons under 22 and over 55 years of age, with less than 5 years of work experience and more than 15 years of work experience were excluded from the study.

During the examination, 180 patients were found to have an increased body mass index (BMI), of which 141 were found to have NAFLD. The Quetelet BMI in patients with NAFLD averaged 33.7 ± 0.44 kg/m². All patients with NAFLD had impaired carbohydrate tolerance to varying degrees, which is consistent with literature data. The laboratory research methods performed allowed us to establish the presence of metabolic syndrome in all patients with NAFLD: carbohydrate (impaired fasting glycemia) and lipid (atherogenic dyslipoproteinemia) metabolism disorders characteristic of this condition were noted.

Retrospective analysis of outpatient records of patients revealed annual detection of newly established diagnoses of obesity (up to 10 cases), hyperlipidemia (up to 16), arterial hypertension (up to 7), NAFLD (up to 6), impaired glucose tolerance (up to 5) during routine medical examinations, while at the time of employment all patients without exception had the 1st health group, served in the armed forces, had not previously been registered with a dispensary and had not visited a doctor at the place of residence. Patients were divided by composition into a study group (109 people) and a

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comparison group (71 people). The average age of patients in both groups was 41 ± 7.3 years. The control group, similar in gender and age composition, included 62 practically healthy people without diseases of the hepatobiliary system. A comprehensive clinical, laboratory and instrumental examination was performed at the beginning and end of therapy. The measurement accuracy was 0.1 kg. BMI was calculated according to the formula: BMI (kg/m²) = weight (kg)/height² (m²). When assessing the results, we used the classification of obesity by BMI (WHO, 1997): underweight with BMI < 18.0 kg/m²; normal weight — with BMI 18.0–24.9 kg/m²; overweight — BMI 25.0–29.9 kg/m²; grade 1 obesity — BMI 30.0–34.9 kg/m²; grade 2 obesity — BMI 35.0–40.0 kg/m²; grade 3 obesity — BMI over 40.0 kg/m².

Statistical data processing was performed using the Statistica 6.0 (StatSoft) software package. Standard methods of descriptive statistics (calculation of means, standard deviations, standard errors, etc.) and nonparametric significance tests (Fisher's F test, Mann-Whitney test) were used. The distribution of results was checked using the Kolmogorov-Smirnov test.

To describe the obtained quantitative characteristics, the data were presented as a median (Me) and the 25th and 75th percentiles. Differences between groups and the significance of the relationships between the indicators were considered significant at $p < 0.05$.

**Conclusion.** A statistically significant efficacy of using a combination of psyllium and ursodeoxycholic acid in patients with NAFLD for weight loss, normalization of transaminase levels, correction of lipid profile indicators, blood glucose, as well as in preventing new cases of obesity, dyslipidemia in situationally conditioned eating behavior disorders in patients with metabolic syndrome was revealed. The complex nature of therapy using a combination of ursodeoxycholic acid and factors of eating behavior modification is effective not only for treatment, but also for prevention of metabolic disorders in patients with NAFLD and obesity, ensuring a high quality of life when diet correction is necessary.

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