The Impact of Socioeconomic Status on the Prevalence and Management of Non-Alcoholic Fatty Liver Disease (NAFLD) in Patients with Obesity

Vivaan Pawar

Springfield, Missouri

ABSTRACT:

Objective

Non-alcoholic fatty liver disease (NAFLD) is an increasingly common ailment, affecting populations with obesity and low socioeconomic status (SES). Lifestyle and limited healthcare access, as well as disparities in income and education, can lead to higher prevalence and worse outcomes, especially in minority populations. This study is a qualitative literature review.

Methods

PubMed and Google Scholar were searched using the keywords: non-alcoholic fatty liver disease AND socioeconomic status, NAFLD AND obesity AND income disparities, low income AND liver disease, health disparities AND fatty liver, and access to care AND NAFLD to identify papers that reported on the relationship between SES, obesity, and NAFLD prevalence and management.

Results

People in low SES communities face a significantly higher risk of developing NAFLD, likely due to barriers like poor access to healthy food, exercise, education, and healthcare. These challenges are especially severe for minority populations, who often experience worse disease outcomes and fewer opportunities for early diagnosis and treatment.

Discussion

Socioeconomic factors impact both the development and management of NAFLD in patients with obesity by influencing access to resources and healthcare. Effective intervention strategies, such as apps or awareness strategies, can address these social determinants to improve outcomes in vulnerable populations.

INTRODUCTION:

Non-alcoholic fatty liver disease (NAFLD) is a liver disease affecting individuals without significant alcohol consumption [1]. NAFLD is especially prevalent in the United States (U.S.), with approximately 25-30 percent of American adults affected by NAFLD [1]. NAFLD is the second most common cause of liver-related deaths and is the most rapidly growing contributor to liver morbidity [2]. In the human body, the liver plays a crucial role in regulating energy, filtering toxins, and producing bile [1]. Typically, the liver does not store fat, as doing so can hinder its function. When fat cells accumulate in the liver, it is known as a fatty liver. Fat

deposition can lead to macrovesicular steatosis, which occurs when droplets of fat accumulate in the inner part of cells, pushing other cellular components towards the cellular membrane, leading to inflammation and fibrosis. This fat accumulation is, in most cases, due to excess caloric consumption and a sedentary lifestyle.

The prevalence of NAFLD in a region is associated with the area's socioeconomic status (SES) [3]. SES can greatly affect lifestyle by determining access to healthy food, healthcare, and education. These disparities are linked to both NAFLD and obesity prevalence. As a result, there are often higher NAFLD rates in low-income, food-insecure communities. Furthermore, children growing up in such communities have a much higher risk of developing NAFLD at an earlier age [4]. NAFLD is more prominent in minority groups, with Latino and Black children and adults having around ten percent more NAFLD cases than their similar-aged white counterparts [4]. In addition, NAFLD is also more prevalent in senile and veteran populations, with seven percent of patients having early symptoms of fibrosis and NAFLD, and thirteen percent of patients exhibiting advanced fibrosis and NAFLD [4].

NAFLD occurs mostly, but not always, in individuals with obesity, with over 70% of people with NAFLD having a BMI consistent with obesity [1]. Furthermore, NAFLD patients have a general predisposition to develop type 2 diabetes and other weight-related health issues. Long-term outcomes of NAFLD include cirrhosis, liver cancer, liver failure, and cardiovascular disease [1]. The nomenclature of NAFLD has recently been changed to metabolic (dysfunction)-associated fatty liver disease (MAFLD), as this new terminology more accurately reflects the underlying pathogenesis of the condition [5]. In this paper, NAFLD is used, as most studies refer to it by this name.

Prior studies have often focused on the associations between SES and NAFLD or obesity and NAFLD separately, but neither has looked at the two in combination with NAFLD outcomes. Additionally, limited research has been done relating SES to management and disease progression in NAFLD patients with obesity. Furthermore, the effect of external factors closely related to SES, like diet and physical activity, on NAFLD is not explored [6]. This paper intends to address how SES can directly or indirectly impact the prevalence and management of NAFLD in patients with obesity.

METHODS:

This paper is a qualitative literature review. PubMed and Google Scholar were used to identify and select sources for writing this paper. Key search words include: non-alcoholic fatty liver disease AND socioeconomic status, NAFLD AND obesity AND income disparities, low income AND liver disease, health disparities AND fatty liver, and access to care AND NAFLD. Only papers that were published after 2010 were used in this paper. Original studies were included in the study. Non-original studies, studies about alcoholic liver disease, papers without NAFLD or obesity, and animal/in-vitro studies were not reviewed.

RESULTS:

SES (and related factors) and NAFLD Prevalence

Socioeconomic status, along with many other environmental factors, influences the prevalence of NAFLD in a region [6-8]. Other factors often found to be consistent with SES include diet,

physical activity, and education [6]. A study conducted in Switzerland observed the relationship between education and NAFLD using multivariable regression [7]. The study found that NAFLD prevalence was 23% in participants with high education, 33% in participants with intermediate education, and 40% in participants with low levels of education [7]. Furthermore, a significantly reduced risk of NAFLD and fibrosis was found in the participants with a higher level of education, with an adjusted relative risk of 0.52 [7]. Additionally, a subgroup analysis found that liver stiffness was almost twice as common in people with low education compared to high education [7]. A cross-sectional analysis study conducted in the United States found that a high-quality diet, in addition to regular exercise, was associated with a lower risk of developing NAFLD [6]. The NAFLD risk was lower in patients physically active (>600 metabolic equivalent [MET] min/wk), versus inactive participants (<600 MET min/wk) [6].

Racial and Ethnic Disparities Related to NAFLD

Along with SES, racial and ethnic disparities related to SES can greatly influence the prevalence of NAFLD in underprivileged or minority communities [8-10]. Miller et al. found that, relative to white populations and women, NAFLD is much more common in the Hispanic population and men, and less common in the Black population [9]. Furthermore, the study found that a lower SES, in addition to race, means a higher rate of NAFLD prevalence [9]. Black and Hispanic patients also suffer worse outcomes and faster rates of disease progression and mortality [9]. Samanta et al. conducted research in the U.S. and found that Hispanic and African-American populations have several confounding factors (the lack of immunization, comorbidities, and socioeconomic status (SES) barriers) that affected the incidence of chronic liver disease (which includes NAFLD) [10]. Additionally, lower xanthine dehydrogenase (XDH) mRNA expression was linked with poor overall survival in Asian patients with liver cancer [10].

Access to Diagnosis and Management of NAFLD

SES and the diagnosis and management of a disease often go hand in hand [11,12]. In the case of NAFLD, a growing population is a large problem [11]. In this study, scientists collected data from across the world and made a graph showing the urgency of better healthcare [11]. In many countries, obesity and NAFLD are growing problems due to reduced SES [11]. Another study collected information regarding the public's knowledge about NAFLD [12]. Only 20 percent of people knew what NAFLD was, and even fewer people from minority groups knew about NAFLD [12]. Additionally, the NAFLD diagnosis for people living in poverty is relatively low [12]. Due to NAFLD not being diagnosed, it can accelerate into liver fibrosis, cirrhosis, hepatic decompensation, and even liver cancer [12]. For the screening and diagnosis of NAFLD, evidence-based methods such as serum indices, non-invasive tests (NITs), and liver biopsy are available [12]. Once the diagnosis is confirmed, high-risk patients can be referred to the specialist for directed treatment [12].

DISCUSSION:

This review found that lower socioeconomic status, influenced by racial and ethnic disparities, increases NAFLD prevalence, worsens outcomes, and limits access to timely diagnosis and management in patients with obesity. Potential solutions that can decrease the prevalence of NAFLD include improving public awareness regarding the pathophysiology of the disease and educating the public about the prevention strategies that can be utilized to decrease the likelihood

of developing NAFLD. Educating children early on about proper nutrition and physical activity may instill lifelong habits that reduce liver fat accumulation. Additionally, increasing access to affordable, nutritious foods through government assistance programs may help lower-income populations make healthier dietary choices, which may reduce their likelihood of developing NAFLD. Since NAFLD is generally asymptomatic, screening at the primary care level is critical [14]. Early detection allows for timely intervention before the disease progresses into more severe stages, such as nonalcoholic steatohepatitis (NASH) or cirrhosis [13]. Routine liver function tests, along with the use of non-invasive diagnostic tools, can play a crucial role in identifying individuals at risk [13].

Consistency was found in five papers regarding SES and NAFLD; better socioeconomic status was associated with less NAFLD and chronic obesity. Kanwal et al. confirm that NAFLD is typically undiagnosed until further complications occur [13]. This emphasizes the need for screening protocols and clinical awareness, as many patients may not show symptoms until liver damage is advanced [13]. Without early diagnosis, patients miss important opportunities for lifestyle interventions that could prevent the disease [13]. For example, a Pathway app was created to assist clinicians in diagnosing stage F2-F4 NAFLD [13]. This tool uses clinical algorithms and patient data to identify fibrosis levels and guide appropriate referrals or treatments [13]. The app is intended to be applicable in any setting, including primary care, endocrine clinics, obesity medicine, and gastroenterology settings [13]. Its wide applicability makes sure that specialists and general practitioners alike have access to streamlined decision-making tools, enhancing diagnostic accuracy and patient outcomes [13]. Healthcare professionals are encouraged to incorporate the app into their practice to better diagnose and treat NAFLD in various settings.

This paper highlights a strong connection between socioeconomic status, obesity, and the prevalence of NAFLD. The paper also provides recommendations that may be helpful in the management of NAFLD. Evidence shows that individuals in low-SES and minority communities face greater challenges in prevention, early diagnosis, and effective treatment of NAFLD. As such, it is vital to improve healthcare accessibility. The findings of this study emphasize the need for public health interventions that address both medical shortcomings and social determinants of health. Future research should focus on developing strategies, such as community-based education, digital health tools, and policy changes that target at-risk populations. All of these interventions are crucial in reducing the growing burden of NAFLD.

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