

## Nutritional Recommendations: An Approach for the Management of Non Alcoholic Fatty Liver Disease Associated with Obesity in the Era of the Coronavirus

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### Abstract

The association of non-alcoholic fatty liver disease (NAFLD) with coronavirus disease 2019 (COVID-19) is unknown. Patients with NAFLD are at risk of developing a severe form of COVID-19 and have a higher viral loss time. The aim of this study is to examine the factors likely to contribute to the effectiveness of public health approaches to the COVID -19 pandemic in patients with NAFLD. A literature search of the major databases from December 1991 to June 2020 identified seven studies investigating NAFLD and its associated risk factors, including obesity and type 2 diabetes in COVID-19 patients. The analysis of these studies shows that the severity of COVID-19 infection increased with the increase in the number of metabolic risk factors and that food plays a crucial role in improving immunity in response to COVID-19.

Therefore improving the effectiveness of public health approaches to the COVID -19 pandemic of patients with NAFLD and its associated risk factors must include nutritional recommendations.

**Keywords:** Comorbidities; COVID-19; Immunity; NAFLD; Nutrition; Obesity

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### Introduction

Alcoholic fatty liver disease (NAFLD) is the hepatic manifestation of metabolic syndrome [1]. It is a chronic liver disease linked to obesity type 2 diabetes that are 2 important risk factors of severe COVID-19 [2]. A report on more than 5000 patients with COVID - 19 in New York hypertension, obesity and diabetes were the most common comorbidities [2]. Many studies have also shown that patients with NAFLD are at risk of developing a severe form of COVID-19 (Table. 1) [3-6]. The severity of the COVID-19 infection was also increase with increased number of metabolic syndrome risk factors [7]. Furthermore, a retrospective study on Chinese patients with COVID-19 showed that at their admission 37.6% had NAFLD and 23.3% were with comorbidities and that patients with NAFLD had a higher risk of the disease progression and a longer viral loss time compared to patients without NAFLD. In addition, COVID-19 patients were older, had a higher body mass index (BMI), a higher comorbidity and NAFLD and, they have a higher risk of progression to severe COVID-19 [8]. Therefore, large numbers of people may be at risk for COVID-19 associated with the prevalence of NAFLD in the general population [8]. Indeed this prevalence varies from 13.48% in Africa to 30.45% in South America and 31.79% in the Middle East

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[9, 10]. In Europe this prevalence is estimated to be 23.71% and in the United States as 24.1% [9]. Similarly, obesity is a poor prognosis in co-morbid patients with COVID-19 [3, 4]. The World Health Organization (WHO) estimated in 2017 that the prevalence of obesity was 13% and that of overweight as 39% in the world’s adult population. The prevalence of obesity in adults varies between countries; 15.3% in France to 38.2% in the United States and 32.4% in Mexico, 30.7% in New Zealand . 30% in Hungary [11]. In Africa, it is estimated that almost 20 to 50% of urban populations are overweight or obese [12] with 55.6% in Algeria and 29% in Morocco [13].

Country	Population study	NAFLD Diagnosis	Conclusions	References
China	66 NAFLD whose 45 obese and 21 non obese	Computed tomography (CT) CRP concentrations lower lymphocyte count	Obesity as a risk factor for greater severity of COVID-19 in patients with metabolic associated fatty liver disease, Metabolism	Zheng & al [4]
China	70 cases (21,6%)	CT ALT AST ALP GGT TBil ALB INR	High prevalence of NAFLD among patients with severe COVID-19 NAFLD patients represented 34.6% of severe patients	Qian., et al.(2020) [6]
China	65 Diabetic et 65 non diabetic	CT Metabolic dysregulation	NAFLD increases severity of COVID-19 disease in non-diabetic patients	Gao., et al (2020) [7]
China	NAFLD 76 (37,6)  Comorbidities 47 (23,3)	HSI ultrasound ALP ALT BMI	Higher risk for progression to severe COVID-19; longer viral shedding time 34 (87,2%) of NAFLD and 24 61,5% of comorbidités	Ji & al. (2020) [8]

**Table1:** Prevalence of NAFLD in patients with COVID-19

ALB, albumin; ALT, alanine aminotransferase; AST, aspartate aminotransferase; ALP, phosphatase.alkaline; BMI, body mass index; COVID-19, coronavirus disease 2019; CRP, C-reactive protein; CT, Computed tomography; GGT, gamma-glutamyltransferase; HIS, hepatic steatosis index; INR, international normalized ratio; NAFLD, non-alcoholic fatty liver disease; NASH, non alcoholic steato-hepatitis; TBI, total bilirubin; WHO, world health organization

The high prevalence of these risk factors worldwide is probably due to a high intake of dietary energy due to the increased consumption of large amounts of saturated fat, refined carbohydrates and sugars, and low in fiber, unsaturated fats and antioxidants. This type of diet damages the immune system, leads to chronic inflammation and altered defense against infections, including viruses [14]. WHO food guidelines, especially during the current COVID-19 pandemic, state that good nutrition is crucial to support an optimal immune system that can reduce the risk of viral infections [15]. In addition, another study reports that stress and sleep are two factors influencing the function of the immune system [16].

Thus, healthy living habits including eating habits can reduce long-term sensitivity and complications related to COVID -19.

In this regard, the purpose of this article is to provide nutritional recommendations to improve the effectiveness of public health approaches to the COVID-19 pandemic.

**The Health Implications of COVID- 19**

COVID- 19 presently is a major public health concern worldwide. It is a pandemic with multidimensional implications. The

nutritional measures involved are vital determinants for improving resistance and public health approaches against the COVID-19 pandemic [17]. In this stressful context, the nutritional status of people with chronic pathologies, in particular obesity and associated comorbidities, including non-alcoholic fatty liver disease (NAFLD), is an indicator of resistance to infections, including COVID-19 [14, 17, 18]. Especially since the therapeutic approaches for NAFLD associated with obesity are limited to lifestyle modifications and that the pharmacological therapies demonstrated a limited effectiveness [1]. The COVID-19 pandemic has led to unprecedented measures being adopted around the world. Among these measures, containment was imposed by the governments of each country in order to control the spread of the pandemic. This measure was accompanied by lifestyle modification, such as the changes of the physical activity level and the toxic dietary and sleep habits [19]. These changes in food intake may be the response to stress and increased emotional states in the face of the psychological, socio-economic implications of COVID-19 [20]. In addition, irregular food intake also disrupts the intestinal microbial composition [14, 21]. As a result they induce dysbiosis which in turn induces obesity and represents an important factor contributing to the presence of NAFLD and its progression to non-alcoholic steatohepatitis (NASH) [21] as well as the risk of COVID-19 infection by immunity impairment [17].

The COVID-19 emergency is a situation that has caused a food imbalance. In fact, most of the infected patients presented severe inflammation and anorexia leading to a drastic reduction in food intake [3, 5]. This nutritional imbalance dramatizes the state of obesity and its comorbidities including non-alcoholic fatty liver disease [14].

Therefore, the implications of COVID-19 highlight the value of nutritional recommendations to improve the immune system and decrease the risk of NAFLD as well as associated diseases [14-18].

### Nutritional Recommendations

Nutritional recommendations adapted to the Moroccan context consist in following the Mediterranean diet guideline, to limit excessive consumption of fructose, an intake of complex carbohydrates less than or equal to 50% of the total energy intake with a share of simple carbohydrates of less than 10%; protein intake of less than or equal to 0.8 kg bodyweight / day of good quality protein; a lipid intake lower than 30% of total energy intake with monounsaturated fatty acids and polyunsaturated fatty acids mainly from plant and fat rich fish. An intake of unprocessed foods rich in fiber which have a satiétogènè role, the recommended intake of fiber is 25g minimum, 30g optimum including 15 g of soluble fiber. Fiber intake regulates blood sugar and reduces the absorption of cholesterol. The main source of fiber is plants [22, 23]. Also that maintains an adequate supply of micronutrients which are essential in the metabolic processes such as vitamins, minerals and trace elements [20].

Many micronutrients are essential for immunocompetence, especially vitamin A, C, D, E, Bs, iron, selenium and zinc [24]. As well as rehydration by drinking unlimited water and not replacing it with sugary drinks [22].

In summary, macronutrients, micronutrients in the diet, generally promote healthy immune responses against all infections including COVID-19 [24]. They provide antioxidants and anti-inflammatory nutrients and maintain the energy balance provided that the food balance is maintained.

### The Balanced Diet

The balanced diet is not achieved over a single meal but from one meal to another and over several days by a combination of foods of nutritional value. Food equivalence is the replacement of a food with another food that has the same nutritional qualities. The "substitute" food may be from the same food group or from a different group than that of the replaced food.

The advantage of using certain food equivalents is to eat a variety of foods, while providing the essential elements for the organism, varied and complementary. Thus compensated, transient imbalances will have no influence on health. Only the usual imbalances repeated from one meal to another and over long periods are harmful. It is not consistent to remove all sources of fatty acids because

their functions in cells and the nervous system are essential for the maintenance of good health. Accordingly in the same vein, the literature is unanimous in adopting of the Mediterranean diet as one of the best nutritional approaches. This diet characteristic of the Mediterranean regions exists in several variants but it is generally characterized by a high consumption of fruits and vegetables, of complex carbohydrates; a moderate intake of fish; low to moderate consumption of red wine depending on the culture, during meals and olive oil as main source of fat [22].

### Conclusion

Calorie restriction is defined as a reduction in daily calorie intake to a proportion of 20-40% while maintaining adequate nutritional status to avoid malnutrition. Calorie restriction goals include limiting the consumption of high-energy foods or energy dense foods as well as promoting nutritious but low-calorie meals while respecting a total daily calorie intake ranges.

Non-alcoholic fatty liver disease, obesity and its comorbidities can be largely avoided by balancing energy intake against expenditure to avoid malnutrition, which seems to be a beneficial factor against COVID-19.

A person's diet, nutrition and the number of metabolic diseases govern their personal destiny in facing the clinical severity of COVID-19 pandemic.

As a preventive measure, a balanced diet, the practice of regular physical activity and compliance with hygiene rules can improve the effectiveness of public health approaches face the COVID-19 pandemic in obese patients with comorbidities including non-alcoholic hepatic steatosis.

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