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REVIEW ARTICLE

Targeting Mitochondria for the Prevention and Treatment of Nonalcoholic Fatty Liver Disease: Polyphenols as a Non-pharmacological Approach

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Abstract: ***Scope*:** Nonalcoholic fatty liver disease (NAFLD) has a high and growing prevalence globally. Mitochondria are fundamental in regulating cell energy homeostasis. Nevertheless, mitochondria control mechanisms can be exceeded in this context of energy overload. Damaged mitochondria worsen NAFLD progression. Diet and lifestyle changes are the main recommendations for NAFLD prevention and treatment. Some polyphenols have improved mitochondrial function in different NAFLD and obesity models.

***Objective*:** The study aims to discuss the potential role of polyphenols as a non-pharmacological approach targeting mitochondria to prevent and treat NAFLD, analyzing the influence of polyphenols' chemical structure, limitations and clinical projections.

***Methods*:** *In vivo* and *in vitro* NAFLD models were considered. Study searches were performed using the following keywords: nonalcoholic fatty liver disease, liver steatosis, mitochondria, mitochondrial activity, mitochondrial dynamics, mitochondrial dysfunction, mitochondrial morphology, mitochondrial cristae, fusion, fission, polyphenols, flavonoids, anthocyanins, AND/OR bioactive compounds.

***Conclusion*:** Polyphenols are a group of diverse bioactive molecules whose bioactive effects are highly determined by their chemical structure. These bioactive compounds could offer an interesting non-pharmacological approach to preventing and treating NAFLD, regulating mitochondrial dynamics and function. Nevertheless, the mitochondria' role in subjects with NAFLD treatment is not fully elucidated. The dosage and bioavailability of these compounds should be addressed when studied.

Keywords: Bioactive compounds, liver steatosis, mitochondrial dysfunction, obesity, phenolic compounds.

1. INTRODUCTION

Nonalcoholic fatty liver disease (NAFLD) is the most prevalent liver disease worldwide [1] and is defined as an abnormal accumulation of lipids in the liver (greater than 5%) in the absence of excessive alcohol intake [2]. NAFLD can evolve from steatosis to steatohepatitis (NASH), cirrhosis, and even hepatocarcinoma [1]. Obesity, central adiposity, hyperlipidemia, hyperglycemia, and insulin resistance are risk factors related to the development of this disease, considered to be the hepatic manifestation of metabolic syndrome

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