Substance Addiction and Nutritional Psychiatry: The present state of evidence

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INTRODUCTION

There is now growing evidence for an association between diet and mental health, independent to demographic and age factors or reverse causality. This new field of research, focused to develop a rigorous evidence base to support the role of diet and nutrition in psychiatry disorders, is named “Nutritional Psychiatry”. [1]

It is increasingly being recognized that there is an exacerbating relationship between problematic substance use and poor nutrition. Nutritional deficits seem to predispose to substance use disorders. Moreover, illicit drug use has been shown to diminish appetite, cause craving for low-nutrient calories, lead to micronutrient deficiencies and increase the frequency of consuming fatty foods. Furthermore, alcohol is known to negatively influence both nutrient absorption and diet quality. [2]

The aim of this work is to review the current scientific evidence correlating substance addiction and nutritional psychiatry.

MATERIALS AND METHODS

A non-systematic Pubmed/MEDLINE search was conducted using the terms: “nutritional psychiatry”, “addictions”, “nutraceuticals” and “treatment”. The research was limited to articles published in the last 8 years.

THE MICROBIOTA-GUT-BRAIN AXIS AND NEUROPLASTICITY

The microbiota-gut brain (MGB) axis is the bidirectional communication between the intestinal microbiota and the brain and is regulated by dietary patterns. An increasing body of evidence has revealed that the gut microbial ecosystem can affect neuropsychiatric health, releasing neurotoxic molecules in the blood stream and disrupting neurobiological pathways, as demonstrated in figure 1. [3]

THE LIMBIC SYSTEM

The limbic circuit plays an important role in emotion, cost-benefit decision making, and addictive behavior. Progressive pathological changes in neurotransmitters and neuronal firing within this circuit also correlate with the recurring three stages of addiction: binge and intoxication, withdrawal and negative affect, and preoccupation and anticipation. [4]

An epidemiological study demonstrated an association between poor diet and reduced hippocampal volume. [5]

THE MEDITERRANEAN AND THE WESTERN BASED DIETS

A Mediterranean diet is generally characterized as a higher intake of fruit, vegetables, fish and wholegrains, while a western diet, in contrast, is characterized by higher consumption of processed foods, processed meats, refined grains, salty and sugary snacks and beverages. [6]

DIET AND ALCOHOL

A recent study has shown that the consumption of macronutrients (mostly carbohydrates and proteins) is positively associated with alcohol consumption. The same study verified that the consumption of micronutrients (mainly vitamins) seems to be a protective factor for the dependence of alcohol. Daily caloric intake does not appear to be associated with the likelihood of having an Alcohol Use Disorder. [2,7]

DIET AND ILICIT DRUGS

A recent study showed that higher daily caloric intake was observed in substance users (significant results in the total sample and in the male sample) Consumption of macronutrients is associated with the possibility of using illicit drugs, but this association does not occur with respect to micronutrients. Fat consumption is related to the probability of using illicit drugs, especially in the female subgroup. [2]

Another study showed that Western-based diets facilitate morphine-reinstatement and that Mediterranean-based diets preserve mesolimbic neuroplasticity. [6]

N-acetylcysteine may have a role in the treatment of addiction, especially of cocaine and cannabis dependence. [8]

THE KETOGENIC DIET

Studies performed in rats showed Ketogenic Diet may suppress symptoms of Alcohol Withdrawal Syndrome as well as diminish behavioral responses to cocaine. [9,10]

CONCLUSIONS

Greater consumption of macronutrients is positively associated with the odds of substance use. Specifically, daily dietary fat intake is most strongly associated with substance abuse. In the other hand, daily dietary micronutrient consumption broadly, and vitamin intake specifically, appears to be a protective factor. A Mediterranean based diet, rich in n-3 polyunsaturated fatty acids may positively modulate the microbiota-gut-brain axis, increase BDNF and serotonin levels, as well as decrease oxidative stress and reduce chronic low-grade inflammation, commonly present in this population. Continued research is now required to investigate the efficacy of intervention studies in large cohorts and with well-established control group.

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Figure 1: