

The Realistic Impact of Diet on Depression: A Holistic Review

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Abstract

Depression is a mental disorder, which characterized by persistent sadness, poor interest or pleasure in previously enjoyed events. This may effect on appetite and sleeping pattern as well. It has reported that, globally 5% of adult population is suffering from the disorder as it is a leading cause of disability around the world and contributes greatly to the global burden of disease. Genetics, hormonal, immunological, biochemical, and neurodegenerative factors are effect on depression. Diet modifies each of these factors and, as a consequence, has a possible influence on the progress and course of this illness. This study aimed to review current literature and determined the significance of different meal patterns and association between diet and depression. Studies have reported that the nutritional factors have an influence on neural physiology and the nutritional quality of the diet has a proven relationship with the depression and anxiety. There are reported benefits of Mediterranean diet and the consumption of recommended amounts of fruits and vegetable, fish and whole grains lead to lower the possibility of depression among adult population. With the available findings and further investigations, there is a necessity to find out local and inexpensive food suggestions and combinations with the cultural interventions to develop a remedy for depression.

Keywords

Nutritional quality, Mediterranean diet, Depression, Anxiety

1. Introduction

As declared by the World Health Organization (WHO) major depressive disorder hits on more than 300 million people and depression is leading the place among mental health issues [1]. According to the recent confirmation, approximately 800,000 suicides per year were reported due to major depressive disorder [2]. Depression is not just a mental health issue but also develop complication on treating of existing chronic diseases where it makes complication during management of these diseases. Depression is a risk factor not only on educational level, body weight, and genetic factors but also on the diseases such as diabetes, and chronic heart disease [3-5].

Although there is lack of awareness, mental health is affected by the dietary habits and also some foods. Depression has been accounted in to biochemical based or emotional circumstances to occurred yet is been contrary as

nutrition can play a significant role in the onset, severity and the duration of the condition. As noticed of the patterns of meal consumption of the patient may show poor appetite, skipping meals, and a dominant desire for sweet foods [6, 7] is behavioral patterns were observed even when the preceding stage and during depression period [7].

Depression, bipolar disorder, schizophrenia, and obsessive compulsive disorder are the most prevalent mental disorder among numerous countries. Among these patients there is noticeable severe deficiency in the nutrients such as vitamins, minerals, and omega-3 fatty acids. In many Asian and American countries, dietary intake pattern show deficient of above nutrients. Moreover, continuous supplement of vital nutrient is efficient in reducing patients' symptoms. Neurotransmitters are formed by amino acids which reduces the symptoms where there is alleviate depression and other mental health problems and that is good prevalence of amino acid supplementation [7].

Although there are psychological and pharmacological treatments, under development countries which most of the people either in the middle or low income, treatment and support services for depression known to be lack it is such a burden to a country. Further some people tend to avoid or skip consuming the medicines as its popular of the side effects comes with them. Such noncompliance is a common occurrence encountered by psychiatrists. A vital point to evoke here is that, such noncompliant patients who goes through mental disorders are in a higher risk for committing suicide or causes to being institutionalized. In some instances, continuing use or higher doses would lead to drug toxicity and that also a life threatening condition to the patient [8]. Another and effective further a promising way for psychiatrists to get rid this noncompliance is to acquaint themselves about alternative or complementary nutritional therapies. Nutritional neuroscience is an evolving discipline brings hope on the fact that nutritional factors are entangled with human cognition, behavior, and emotions and which leads to reach a solution for the circumstance in practical way for under developed countries. There should be thorough research to emphasis whether there is connection between foods and depression and that would be a good involvement in terms of prevention is better than the cure. Same time different countries have different foods and their combinations and cultural interventions which can be easily incorporated or collaborated or further developed as a remedy for depression or prior to depression when the person shows signs [7].

2. Depression

2.1 What is depression?

Depression is a complex disease where no one can emphasize what exactly the cause is. However, it can happen due to several reasons. It is frequently said that depression cause as a result of chemical imbalance. But it is not very clear whether it's too much or too little the particular brain chemicals are. Rather many chemicals are involved. There are many possible causes of depression include faulty mood regulation by the brain, genetic vulnerability, and stressful life events [9]. Persistent sadness, lack of interest, lack of pleasure, fluctuates between feelings of guilt and low self-esteem, sleep disorders and lack of appetite, tiredness and poor concentration are some of the symptoms to be recognized [10]. Ending of relationship, difficult or hard life experience, death of loved ones and there are many more other experiences can lead a person to feel sadness or grief which is natural though it is referred as depressed. Being sad is not the same as having depression.

Genetic involved depression can run in families for instant, if one identical twin suffers from depression the other has a 70% chance of occurrence of depression. Hormones may be one factor involves causing or triggering depression as hormones are responsible for body balance. Hormone changes can result with pregnancy where during or postpartum pregnancy. Other than that thyroid problem, menopause, and etc are some of the other instances [11]. People with low self-esteem, can easily be overwhelmed by stress, and continuous exposure to violence, neglect, abuse or poverty would make people vulnerable to depression [12].

Major depression with symptoms of it would interfere with one's ability to work, sleep, study and eat. Dysthymia or persistent depressive disorder which is known to have less severe symptoms yet last longer typically at least for 2 years. Perinatal depression occur women during her pregnancy period or postpartum depression/after delivery. Seasonal affective disorder which starts in late fall and early winter and goes away during spring and summer where it comes and goes with the season. Depression with symptoms of psychosis is the severe form depression where it gives psychosis symptoms to the person such as disturbing untruthful stationary beliefs (delusions) or hearing or seeing things which are not existing (hallucination) [12].

2.2 Prevalence of depression

Depression is known to be one of the most common mental health condition frequently developed along with

anxiety. Depression can be mild and temporary or severe and long lasting. Although some people would experience it only once some people would experience it multiple times which can ended up their life with suicide. This is preventable along with the appropriate support provide [13] yet 90% of suicidal incident occurred due to depression [14]. Thus this is a substantial condition to worry about. In figures, it is 350 million of people worldwide suffer with depression [15], and this is among the five leading cause of health loss of different age group as experimented by Australia [16].

According to “WHO” depression hit 3.8% globally. However, 5% of adult are suffering from the condition. This accounts 6% women and proves that the prevalence of depression is high among women than men (4%), further, it is 50% more common among women than men as 10% of pregnant women and women who have just given birth going through depression globally [10]. Why the attention for the incident of depression necessary is that more than 700,000 people die due to suicide every year which is the fourth leading cause of death among 15-29 years old. Although, there are psychological and pharmacological treatments, under development countries which most of the people either in the middle or low income, treatment and support services for depression known to be lack. This leads to enhance the prevalence of mental disorders in those countries and it is more than 75% in figures [10].

3. Diet and depression

Genetics, hormonal, immunological, biochemical, and neurodegenerative factors are effect on depression. Diet modifies each of these factors and, as a consequence, has a possible influence on the progress and course of this illness [17, 18]. Inflammatory processes are believed to emulate etiological role in the beginning and maintenance of depressive sicknesses [17], and is identified the central importance in the high-incidence non communicable diseases, for instance cardiovascular disease, diabetes [17, 19, 20] and cancer [17, 21]. Inflammation may partially describe the relationship concerning these medical illnesses, depression, and mortality, plus the associations with diet [17, 22].

There are now broad observational evidence across countries and age groups supporting the controversy that quality of the diet either protective or risk factor for depression [15, 17]. Nutritional factors also exert a direct and potent influence on neural physiology [21]. In experimental studies a western-style diet lowered brain-derived neurotrophic factor (BDNF) levels within a short time, an effect that was independent of obesity or nutritional deficits [17, 23]. BDNF protects neurons from oxidative stress and promotes neurogenesis [17, 24] and is believed to play a central role in depressive illness [17, 25]. Thus, by modulating the expression of BDNF, diet may influence psychiatric status. Finally, diet influences oxidative processes, which may also be implicated in the pathophysiology of depressive illnesses [17, 26]. For example, antioxidant-rich diets appear to be effective in slowing or preventing age-associated pathophysiological and cognitive changes [17, 27] and reducing the risk of age-associated diseases [17, 28]. In this way, dietary factors may modulate the risk for neurostructural and cognitive changes in the brain that affect psychological symptoms across the life course [26, 29]. The potential impact of diet on pathogenesis of depression may compound the impact of depressive illness on appetite and self-care. Thus, mental illness, dietary inadequacy, and nutrient depletion exacerbating mental illness may be linked in a vicious circle. This model remains to be tested but mirrors and overlaps with what is already known about the course of depressive illness [30] relation diet diseases and anxiety.

There are different countries and different cultures with different quality food habits yet according to the available evidence from observational studies suggests that the foods contain higher amount of vegetables, fruits, legumes and whole grains and lean proteins such as fish are related to reduced risk of depression. Whereas, dietary patterns which include processed food and sugary products (see Figure1), more are related with an increased risk of depression [15, 31, 32].



Figure 1. Dietary patterns associated with processed food and sugary products.

An experiment conducted using more than 5000 Norwegian population has revealed that adults consume better quality diets less incident to be depressed where others who consume greater levels of processed and unhealthy foods were associated with increased anxiety levels [31, 33]. A cohort study of nearly 3500 public servants was observed a great risk for self-reported depression with who consume high levels of western style foods and reduced the incident for diet higher in whole foods over approximately five years of follow-up [32, 33].

Adapting a Mediterranean diet elevated amounts of vegetables, fruits, legumes, whole grains, fish, olive oil, and low-fat dairy products, correlates with lower levels of inflammatory indications [17, 34], while western-type diets and diets high in refined carbohydrates are connected with elevated levels of C-reactive protein, a marker of low-grade inflammation [17, 35].

This was confirmed by the study done with more than 10000 of middle aged population in Spain and there was inverse association with the population adhere to Mediterranean dietary pattern over approximately four and half years as well as a positive relation was observed with fast foods and commercial baked goods and depression risk [33, 36, 37].

Better quality diets during pregnancy reduce the risk for postpartum depression and this was proven by a mother and baby cohort study with 529 of participants [34, 39]. Further, these results were supported by the studies done Japan [33, 39, 40], China [33, 41], the US [33, 42, 43]. These studies were also supported by the studies which showing the serum folate concentration which is a marker of dietary quality and predict depression over time [33, 44]. As reported by Oddy *et al.* eating a diet comprises higher content of takeaway foods, red meat, and had increased internalizing and externalizing behaviors. However consumption of fruit and vegetables exhibit the opposite association [33, 44]. Studies have concluded using young adults to determine the connection between healthy and unhealthy dietary habits to psychological symptoms and were observed negative and positive relationship correspondingly [33, 46]. Further there is inverse relationship with diet quality and adolescent depression and mental health was observed [33, 47, 48]. Furthermore, diet quality improvement was mirrored by mental health improvement where declining of physiological functioning was associated with diet quality reduction over the follow up period [33, 48]. Contemporary still, a cross-sectional study conducted using German children in both the GINIplus and LISAPLUS cohort studies exhibit that enhanced diet quality was connected with less emotional symptoms, while elevated confectionary consumption had a positive association with emotional symptomatology [33, 49].

There are now broad observational evidence across countries and age groups supporting the controversy that quality of the diet either protective or risk factor for depression [15, 17, 34, 50, 51]. Recent meta-analysis shows consuming and following healthful dietary patterns which contain higher amount of fruits and vegetable, fish and whole grains lead to lower the possibility of depression forming among adults [15]. Another meta-analysis revealed that highly attached to Mediterranean diet would reduce risk in 30% of depression without any proof for publication bias [51, 52]. These diets are known to contribute the reduction of chronic disease reduction as Mediterranean diet consider as healthy diet patterns (see Fig. 2) [51, 53].

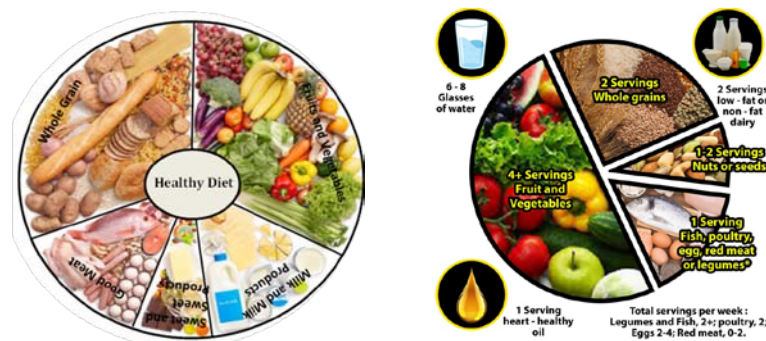


Figure 2. Healthy diet and Mediterranean diet plate.

Recent systematic review shows a relationship between unhealthy dietary patterns such as saturated fat and refined carbohydrates, and processed foods and poor mental health among children and adolescents [50, 51]. Emotional dysregulation in children would occur along with women's diet quality during pregnancy and that was reported by several cohort studies [51, 54, 55]. Further it reports the potential mechanisms of action that include brain plasticity [55, 63], the gut microbiota [51, 57] and inflammatory [51, 58] and oxidative stress [51, 59] pathways are associated with women's diet quality during pregnancy.

Some nutritional supplements can be functioned as additional therapies in psychiatric disorders [51, 60] where

the focus of relationship between overall dietary quality and mental disorders is novel and has been limited to animal studies and observational studies in humans. The existing observational data shows fundamental relationship between diet quality and depression on the basis of the Bradford Hill criteria [34, 51] and are supported by broad investigational data in animals [51, 61], randomized controlled trials are required to test causal relationships and identify whether dietary change can improve mental health in people with such conditions.

According to post hoc analysis of a large scale intervention trial provided preliminary support that the dietary improvement as a strategy for the prevention of depression. Increased risk individuals for cardiovascular events were randomized either extra virgin olive oil or mixed nuts, or a low- fat control diet along with Mediterranean diet [51, 53]. Furthermore, there was evidence of reduced risk for incident of depression (albeit non-significant) while it was not assess the effectiveness of the intervention for preventing depression for those randomized to a Mediterranean diet supplied with nuts. This was statistically significant with type 2 diabetes where approximately half of the sample comprised by them [51, 62].

According to Jacka *et al.*, and Opie *et al.*, once diet is improved as current recommendations targeting depression may be useful and reachable strategy in terms of addressing depression in both the clinical setting and general population [51, 63]. There are body pathways which are playing a role in depression and also are influenced by the diet quality such as inflammatory [51, 58] and oxidative stress [51, 59] pathways, brain plasticity [51, 56], and new evidence base focused on the gut microbiota [51, 57] as well. The behavioral modifications connected to food including cooking, shopping, meal patterns could be counted in to nutrition intervention as well as changes in activity gives therapeutic benefit to the person [51]. Furthermore, this experiment suggests that dietary improvement followed by dietician may provide useful treatment strategy to manage this type of highly widespread mental disorder [51].

Consumption of fruits and vegetables, practicing dietary patterns such as traditional and Mediterranean diets and intake of particular nutrients such as folate and omega-3 fatty acids all have been associated with a reduced occurrence of depression [65-68].

It has been proven that individuals who are suffering from depression and anxiety often have inferior dietary habits. Therefore it has bidirectional connection between dietary intake and depression and anxiety symptoms [65, 69]. Recently, there is an understanding about the link of nutrition and mental health [65, 70, 71].

The people who have been experienced depression anxiety need to improve their mental health along with improve dietary intake. According to several reviews which provide the substantiation that effective components of dietary intervention such as behavioral change techniques, dietary counseling, nutrition education and approaches to improve adherence to dietary instruction in the general population [66, 72-74]. The summary of the relationship between diet and depression is presented in the Table 1.

Table 1. Factors and effects of diet on depression

Factor	Effect	Reference
Better quality diet	<ul style="list-style-type: none"> Diets high in vegetables, fruits, legumes, and whole grains and lean proteins such as fish This has inverse relationship with adolescent depression 	15, 31, 32, 33, 47, 48
Western style diets	<ul style="list-style-type: none"> Lowered BDNF levels which involves protecting neurons form oxidative stress and promotes neurogenesis (BDNF plays a major role in depressive illness Diets high in refined carbohydrate are connected with high levels of C reactive protein a maker of low grade inflammation 	17, 24, 25, 35, 50, 51
Dietary patterns with processed foods and sugary products	<ul style="list-style-type: none"> Increase the risk of depression Elevated confectionary consumption showed positive association with emotional symptomatology of German children 	15, 31, 32, 33, 49
Adopting to a Mediterranean diet	<ul style="list-style-type: none"> Diet in elevated amounts of vegetables, fruits, legumes, whole grains, fish, olive oil, and low fat dairy products correlates with lower levels of inflammatory indications. This would reduce the risk of depression in 30% 	17, 34, 33, 36, 37, 51, 52
Diet quality during pregnancy	<ul style="list-style-type: none"> Better quality diet during pregnancy reduce the incidence of postpartum depression Diet quality during pregnancy has connection between emotional dis-regulation in children 	33, 34, 39, 40, 41, 42, 43,

4. Conclusion

Genetics, hormonal, immunological, biochemical, and neurodegenerative factors are effect on depression. Diet modifies each of these factors and, as a consequence, has a possible influence on the progress and course of this illness. Inflammatory processes are believed to emulate etiological role in the beginning and maintenance of depressive sicknesses. consuming quality diet which has higher amount of fruits and vegetable, fish and whole grains or adopt to good dieting pattern such as Mediterranean diet s with, elevated amounts of vegetables, fruits, legumes, whole grains, fish, olive oil, and low-fat dairy products, correlates with lower levels of inflammatory indications and lead to lower the possibility of depression, while western-type diets and diets high in refined carbohydrates are connected with elevated levels of C-reactive protein, a marker of low-grade inflammation. It has been proven that individuals who are suffering from depression and anxiety often have inferior dietary habits. Therefore it has bidirectional connection between dietary intake and depression and anxiety symptoms. Therefore people who have been experienced depression anxiety need to improve their mental health along with improve dietary intake. According to several reviews which provide the substantiation that effective components of dietary intervention such as behavioral change techniques, dietary counseling, nutrition education and approaches to improve adherence to dietary instruction in the general population.

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