

Bad cholesterol and good mood: exploring the link

Abstract

It is a well-known fact that high cholesterol increases the risks of heart disease. Hence, physicians actively encourage cholesterol-lowering interventions using medications and lifestyle modifications. However, there is considerable evidence that aggressive lowering of cholesterol is associated with depression, bipolar disorders, violent behaviour, and suicidal ideation. It has been hypothesised that low cholesterol leads to low levels of serotonin, a chemical that is responsible for maintaining mood balance. South Korea and India have highest number of suicides in Asia. It is a significant challenge for physicians to search an alternative that will not only maintain healthy level of cholesterol, but also contribute to psychological well-being of the patient. Generally, the role of diet and physical activity is considered secondary to medications. However, dietary supplements like coenzyme Q10 (CoQ10), omega-3 fatty acids, niacin, and physical activity like Yoga are extremely beneficial for improving lipid profile and symptoms of depression.

Keywords: Depression. Dietary Supplements. Yoga.

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According to American Psychiatric Association, depression is a state of constant low mood and loss of interest in activities that were once pleasurable. It is a common, yet serious medical illness that can strike at any age. Depression has a substantial impact on a person's ability to think, behave, and act. The reaction may vary from loss of appetite, insomnia, and fatigue to sadness, anxiety, hopelessness, and even suicidal thoughts. Well-known causes of depression are genetics, female gender, personality, socio-cultural factors, deficiency of certain vitamins and minerals, hormonal imbalance, postnatal, and neurotransmitters. In addition, research has indicated that there is a link between low cholesterol and depression.[1] Although cholesterol is commonly associated with the risk of developing cardiovascular disease (CVD), scientists have discovered that low levels of serum cholesterol are associated with depressive symptoms, suicidal intent, mood disorders,[2] and aggressive behaviour.[3] This is due to the fact that low cholesterol leads to low levels of serotonin, a chemical that is responsible for maintaining mood balance.[4]

Cholesterol and depression: literature review

Numerous studies have been conducted across gender, age, special population, general population, outpatient and inpatient samples to test association between lipids and depression.[2] One of the earliest studies, which highlighted the association between cholesterol and mood, was conducted in 1991 in Rotterdam, Netherlands among 30,359 men aged between 40-70 years. The study compared a cohort of men with low cholesterol to a reference group with cholesterol concentrations between the 35th and 75th centiles. The results

showed a statistically significant decrease in plasma serotonin concentrations in untreated men with persistently low serum cholesterol.[4]

In the past, focus of the research has primarily been on total cholesterol. Recently, scientists have started exploring the role of low-density lipoprotein (LDL) and high-density lipoprotein (HDL) fractions as well. Recently, a study conducted among Polish patients with mood disorder confirmed that suicidal thoughts, tendencies, and suicide attempts were associated with lower levels of total cholesterol, LDL cholesterol, and total lipids in both male and female patients.[5] Another study results showed reduced level of HDL cholesterol in subjects with long-term history of depression.[6] Although several studies supported the link between low cholesterol and depression, some studies have refuted this association too.[2]

Suicide epidemic in Asia

According to the World Health Organization (WHO), five Asian countries feature within ranks one to 15 in the list of suicides per 100,000 people per year. These countries are South Korea, Sri Lanka, Nepal, Kazakhstan, and India. Although no relevant research was found for Sri Lanka, Nepal, and Kazakhstan, which could prove if there is any association between low cholesterol and suicide, several studies highlighting this association were found in South Korea and India.

Soaring suicides in South Korea

Korea has a particularly high suicide rate in the 65 years or above age group.[7] This is in sharp contrast to high suicide rates prevalent among younger ages in other countries. Korean

researchers have tried to examine if there is any association between low total serum cholesterol and suicidal behaviour. In 2002, a research compared fasting serum cholesterol in 231 suicide attempt patients, non-suicidal psychiatric controls, and normal subjects.[8] Three important results were obtained from this study:

1. The total serum cholesterol levels were significantly lower among the suicide attempt patients than the psychiatric controls or the normal controls. This finding was consistent with earlier studies.
2. The total serum cholesterol levels in male suicide attempt patients were significantly lower than in female suicide attempt patients, which suggested that male depressive patients with low cholesterol levels are more likely to have made a serious suicide attempt than female depressive patients.
3. The severity of suicide attempt had a negative association with total serum cholesterol levels.

Even though the researchers assessed only total cholesterol levels, but not HDL or LDL levels, the study results strongly suggested low cholesterol is a risk indicator for suicidal behaviour. A year later, another study compared serum lipid profiles between 60 patients who had recently experienced failed attempts at suicide and equal number of non-suicidal psychiatric patients and normal controls. It was found that total serum cholesterol and LDL levels were lower in the suicidal subjects than non-suicidal psychiatric or normal controls at statistically significant levels.[9] In a more recent study published in 2014, it was found that there is a relationship between triglycerides and suicide ideation that is independent of both body mass index (BMI) and body weight.[10] Although the aforementioned studies have concluded that low serum cholesterol is a risk factor for suicidal behaviour, the relatively small sample size limits generalisation of findings.

India: a unique paradox

According to WHO, suicide is one of the leading causes of deaths in India. National Crime Records Bureau (NCRB) reports that, on an average, more than one lakh people have committed suicides every year during the period between 2003 and 2013. Family problems and illnesses, accounting for 24.0% and 19.6% respectively, are the major causes of suicides, of which insanity/mental illnesses constitute approximately six per cent of the latter.

Several Indian studies have tried to explore the relationship between low serum cholesterol and increased risk of depression and suicide. In one study, lipid profile of 40 suicide attempters was compared with equal number of age, sex, and BMI matched controls. It was found that total serum cholesterol, serum triglyceride, LDL levels, and HDL levels were lower in suicide attempters, but not statistically significant.[11] Statistically significant results were observed in another study conducted in Kashmir to review significant factors responsible for sudden increase in suicidal attempts in mid-90s.[12] Overnight fasting samples were collected and lipid profile was compared in four groups (suicide attempters, psychiatric controls, minor medical ailment patients, and normal controls). The main finding of the study was that total

serum cholesterol and serum triglycerides were decreased in suicide attempters. In a more recent research, it was concluded that cases of suicidal deaths had lower serum total cholesterol levels than healthy control subjects.[13]

Cholesterol lowering activities are actively and aggressively encouraged in India; but, not many of us know the association between lowering cholesterol and mortality. There is an urgent need to cautiously evaluate the benefits of such interventions before promoting the same.

Role of supplements and physical activity

Maintaining lower levels of cholesterol is beneficial to reduce the risk of heart disease or stroke. Statins are considered to be the panacea for lowering cholesterol and are prescribed extensively. Research has suggested that aggressive use of statins is associated with depression.[14] Usually, physicians find it difficult to move away from standard medications and consider alternative medicine. Although the role of diet and physical activity is considered secondary to medications, there is substantial evidence that dietary supplements like coenzyme Q10 (CoQ10), omega-3 fatty acids, and niacin are extremely beneficial for improving lipid profile and symptoms of depression.

Levels of CoQ10 tend to be lower in people with high cholesterol compared to healthy individuals of the same age. In addition, statins appear to deplete natural levels of CoQ10 in the body.[15] Regular CoQ10 supplementation has shown to correct the deficiency caused by statins. Furthermore, CoQ10 is instrumental in reversing statin-related side effects, like statin-induced myalgia and cardiomyopathy.[16] Studies have shown that omega-3 and niacin are more effective in increasing HDL-C than statins.[17]

Another relatively under-researched solution may come from Yoga, the ancient Indian exercise practice, consisting of various physical postures (Asana), meditation (Dhyana), and breathing techniques (Pranayama). Yoga is safe, cost-effective, simple to learn, and can be practiced by even ailing or elderly individuals. Several studies investigating the effect of Yoga in healthy as well as patients with pre-existing disease have demonstrated a significant improvement in lipid profile, body weight, depression, anxiety, and overall well-being relative to controls.[18-20]

Conclusion

Whether it is medication-induced, genetic, or a result of lifestyle modifications, aggressively reducing cholesterol may put patients at a risk for depression and mood disorders. As both dyslipidaemia and depression have a significant impact on individual's health, a multi-faceted strategy is required to achieve positive health outcomes. The role of dietary supplements and Yoga is noteworthy in this regard.

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