

The Role of Nutrition in Mental Health: Suicide

Ziv Zukier, Jesse A Solomon, Mazen J Hamadeh

School of Kinesiology and Health Science, Faculty of Health, York University
4700 Keele Street, Toronto ON M3J 1P3

Abstract

Suicide is a serious public health issue, the prevalence of which is on the rise. Every year, an increasing number of persons (more males than females) either attempt to or succeed in taking their own lives. Suicide is very difficult to completely understand, as it is almost always associated with (and a sign of) a DSM-IV (*Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition) psychiatric illness. A thorough search was conducted using various databases such as those of PubMed, Medline (Ovid), Statistics Canada, and Google Scholar to investigate any relationship between nutrition and suicide. This report is an up-to-date review of a sample of epidemiological studies and intervention trials on the role of nutrition in people with suicidal tendencies. Epidemiological studies have found that differences in diet (specifically in the consumption of fruits and vegetables, meat, fish, and fat) and in serum levels of essential fatty acids (EFA) and total cholesterol among those who have attempted suicide compared with people who have not. Persons with lower levels of serum cholesterol were found to have a greater risk of carrying out suicidal acts than those with higher levels. However, intervention trials that lowered cholesterol levels had no significant effect on suicidality. EFA supplementation trials, on the other hand, were successful in reducing suicidal ideation. The results from our review suggest that a change in diet consisting of foods low in fat, high in EFA, and high in meat, fish, and fruits and vegetables may help to alleviate a person's tendency to carry out a suicidal act.

Suicide: Background

Since the late 1970s, suicide has accounted for about 2% of annual deaths in Canada (1). Between 1960 and 1991, Canada's suicide rate increased by 64%, from 7.8 deaths per 100,000 people to 12.8 (1). In 2003, there were 3650 reported suicides in Canada (2) and some 877,000 such deaths worldwide (3). The risk of suicide is also higher among males than females, with a (1991) male: female ratio of 3.8:1 in Canada (1).

Suicide is very difficult to fully understand, because it is almost always associated with other mental illnesses. Mann and associates (3) reported that in more than 90% of suicides, the person suffers from a DSM-IV psychiatric illness, and that 60% of suicides are associated with either major depression or bipolar disorder. Although the etiology, prevention, and treatment of suicidal behaviors have been studied mainly from the

pharmacological and social perspectives, a small but growing body of research has focused on establishing a relationship between nutrition and emotional health. These studies have found differences in diet, essential fatty acids (EFA), and cholesterol levels between people with suicidal tendencies and those without such tendencies.

Method

We conducted a thorough search using various databases such as those of PubMed, Medline (Ovid), Statistics Canada, and Google Scholar to find reports concerned with any possible relationship between nutrition and suicide. Those with significant related results were retrieved and read in detail for description herein.

Diet

Recently, Li and co-workers (4) conducted a cross-sectional analysis investigating the differences in food consumption between men and women who have attempted suicide (attempters) versus those who have not (non-attempters). The 6803 adults (aged 17–39 y) in their Third National Health and Nutrition Examination Survey (NHANES III) completed a Healthy Eating Index (HEI), a food frequency questionnaire (FFQ), and a 24 h dietary recall (24HDR). Cross-sectional analysis revealed that male attempters consumed 28% fewer vegetables ($P < 0.05$) and 15% less meat ($P < 0.01$), and tended to consume 14% more total fat in their daily diets ($P < 0.10$) than male non-attempters. Furthermore, results showed male attempters to have a higher likelihood of lower vegetable consumption (odds ratio (OR) 2.47, 95% confidence interval (CI) 1.19–5.15) and less meat (OR 2.36, 95% CI 0.91–6.16) compared with male non-attempters. Similarly, female attempters also consumed 15% fewer vegetables ($P < 0.05$) than female non-attempters; but they also consumed 32% fewer fruits ($P < 0.05$; OR 2.36, 95% CI 1.15–4.85). Female attempters were also found to eat significantly less fish or other seafood ($P < 0.01$) than female non-attempters (4). The importance of fish consumption on minimizing suicidal ideation was also highlighted by Tanskanen's research group (5), who found that the risk of suicidal ideation was significantly lower (OR 0.57, 95% CI 0.35–0.95; $P = 0.03$) among adults ($n = 1767$, aged 25–64 y) who frequently consumed fish than those who did not.

Essential Fatty Acids

Substantial research has been conducted on EFA deficiencies and EFA supplementation in persons suffering from various mental illnesses. With suicide almost always being comorbid with other mental illnesses such as bipolar disorder and major depression, studies have therefore also assessed EFA levels in people with suicidal tendencies. Sublette and colleagues (6) focused on the predictability of a person's risk for future suicidal activities based on EFA proportions (docosahexenoic acid (DHA) levels and n-6:n-3 ratios) in plasma phospholipids. In this 24 mo study, 33 unmedicated adults (mean

age 40 y, standard deviation ± 12 y) suffering from various mental illnesses received naturalistic psychopharmacological inpatient or outpatient treatment followed by community-based treatment. Of these, 7 people attempted suicide, including 2 who were successful. Low DHA percentages of total plasma phospholipid fatty acids ($P < 0.002$) and elevated n-6:n-3 ratios ($P < 0.008$) were found to predict future suicidal activities. In addition, suicidal ideation, as measured by the Beck Scale for Suicidal Ideation, was negatively correlated with DHA percentages (Spearman's rho -0.43 , $P = 0.02$).

In 2004, Huan and collaborators (7) conducted a case-control study of men and women (aged 20–75 y) examining potential relations between suicide attempts and n-3 fatty acid levels in erythrocytes (red blood cells: RBCs). Blood samples were immediately taken from 100 people who had attempted suicide and from 100 control patients who had been injured in work-related or vehicular collisions immediately upon their admission to hospital, and analyzed for RBC fatty-acid composition. After adjusting for age, gender, and smoking status, the suicide attempters had 30% lower RBC concentrations of EPA (eicosapentaenoic acid, an n-3 fatty acid; $P < 0.0001$), compared with the control group.

Hallahan and coauthors (8) conducted a single-center, double-blind, randomized control trial analyzing the effects of n-3 supplementation in persons who do recurrent self-harm. The 49 patients (aged 16–64 y) seen after an act of self-harm were randomized to receive either a combination of EPA (1.2 g/d) and DHA (0.9 g/d) or placebo for 12 wk. (All participants in the study were taking anti-depressants.) At baseline and at the conclusion of the trial, efficacy of the intervention was assessed in five psychological domains: suicidality, with the Overt Aggression Scale—Suicidality (OAS-S); depression, with the Beck Depression Inventory (BDI) and Hamilton Rating Scale for Depression (HRSD); aggression, with the Modified Overt Aggression Scale (OAS-M); impulsivity, with the Immediate/Delayed Memory Tasks (IMT/DMT); Daily Stresses, with the Perceived Stress Scale (PSS) and Daily Hassles and Uplifts Scales (DHUS). The n-3 supplementation group's scores significantly improved for suicidality (OAS-S, $P = 0.02$), depression (BDI, $P = 0.004$; HRSD, $P = 0.045$), and daily stresses (PSS, $P = 0.021$; DHUS, $P = 0.027$) compared with the placebo group. Differences in scores for impulsivity and aggression were not statistically significant.

Cholesterol

A relationship exists between serum total cholesterol (TC) levels and suicide risk. More specifically, persons with low TC levels are at a higher risk of suicide than those with higher levels (9–13).

Ellison and Morrison (9) conducted an epidemiological analysis that assessed the relation between serum TC measurements and mortality from suicide by persons in the Nutrition Canada Survey cohort between 1970 and 1972. Using the Lieberman-Burchard reaction method, they measured serum TC in 11,554 people (aged 15–84 y) to assign them into four predetermined “TC quartiles” (<4.27 , $4.27-4.97$, $4.97-5.77$, and >5.77 mmol/L)

according to their TC results. During 23 y of follow-up, 27 study participants were known to have died by their own hand. After adjusting for age and sex, those in the lowest TC quartile (<4.27 mmol/L) had more than six times the risk of committing suicide (RR 6.39, 95% CI 1.27–32.1) as those in the highest quartile (>5.77 mmol/L). Participants in the second (4.27– 4.96 mmol/L: RR 2.95, 95% CI 0.63–13.7) and third TC quartiles (4.97–5.77 mmol/L: RR 1.94, 95% CI 0.47–7.96) also had increased risk of committing suicide compared with those in the highest quartile (>5.77 mmol/L).

A comprehensive review and meta-analysis by Lester (10) further explored the relation of TC and risk of suicide. Earlier reviews by Golomb (11) and Muldoon's group (12) included, but failed to distinguish, suicide from other forms of violent death. The 2002 meta-analysis of epidemiological and intervention studies (10) showed that those with the lowest serum TC levels had a small (but significant) increase in rate of suicide over those with higher levels ($r = 0.0049$, $t = 3.36$, $df = 469,633$; $P < 0.001$). Although the magnitude of the effect is slight, it is statistically significant due to the large number of degrees of freedom (df). Furthermore, those who had previously attempted suicide had lower TC levels ($r = 0.062$, $df = 5,083$; $P < 0.05$) compared with the non-suicidal psychiatric patients, especially when the method of suicide used was violent ($r = 0.158$, $df = 469$; $P < 0.01$).

In cholesterol-lowering studies (through either dietary or pharmacological intervention) (10, 13), there was no significant increase in incidence of completed suicide.

Discussion

The act of suicide is often a reaction to or symptom of an underlying mental illness. Conventional treatment after a suicide attempt therefore tends to involve pharmacotherapy. According to the information presented in this report, however, there is a small but growing body of evidence that shows the importance of nutrition in suicide. Persons who attempted suicide were found to have larger amounts of fat and lower quantities of meat, fish, and fruits and vegetables in their diets, when compared with non-attempting individuals. Attempters were also found to have decreased EFA levels in their blood. Suicidal ideation was correlated with low levels of serum cholesterol. Although EFA supplementation was found to be successful in reducing suicidality, cholesterol-lowering interventions did not appear to increase risk.

The results from our review suggest that change to a diet of meat, fish, fruits and vegetables, low in fat but high in EFA, may help in alleviating a person's tendency to carry out a suicidal act. There are nevertheless no diet-specific intervention or cholesterol-raising studies currently in progress. Given the relative inexpense of a possibly preventative diet — one that could save lives — nutrition's role in suicide needs further examination. Although such investigations may raise issues of ethical concern, specifically the possibility of suicidal acts due to dietary manipulations, it is imperative that further studies be conducted to expand our understanding of the role and importance

of nutrition in suicide. Such knowledge, like that already recounted in this report, would be valuable to clinicians, dieticians, and nutritionists, who could use it to develop nutritional strategies to be used in conjunction with pharmacotherapy in treating persons with suicidal tendencies.

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