Tryptophan Intake and National Rates of Suicide and Homicide

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Serotonin (5-hydroxytryptamine) is the neurotransmitter most likely to be related to depression (Lester, 1988), and some researchers have suggested that it may also be responsible for the inhibition of aggression in individuals (Mawson and Jacobs, 1978). The level of the serotonin metabolite 5-hydroxyindoleacetic acid (5-HIAA) has been found to be low in the cerebrospinal fluid of suicidal people (eg. Asberg, et al, 1984) and the concentration of serotonin lower in their central nervous systems (eg. Shaw, et al, 1967).

The synthesis of serotonin by the body requires the precursor amino acid L-tryptophan which is obtained from the food we eat (Fernstrom, 1981). Lester (1985) used the fact that corn has low levels of tryptophan to see if the corn intake of nations was related to their suicide and homicide rates. His results were negative.

Recently, Kitahara has made much more detailed calculations of the tryptophan intake of nations, computing the ratio of tryptophan to other amino acids (tyrosine, phenylalanine, leucine, isoleucine and valine) in the food intake of nations based on published data on the per capita foods supplied per day.

Kitahara claimed to find that lower intake of tryptophan was associated with higher suicide rates in a sample of 32 nations of the world. However, (1) Kita-hara's sample of nations was quite diverse and he failed to control for gross national product per capita (necessary since less developed nations report lower suicide rates), (2) he included several tiny nations (such as Malta) which do not appropriately belong in the study, and (3) overall, the Pearson correlation between tryptophan uptake and suicide rates was not significantly different from zero.

The present study sought to replicate Kitahara's study using a more appropriate sample of nations, with controls for the gross national product per capita and extending the study to homicide rates.

The sample of nations included: Argentina, Australia, Austria, Belgium, Canada, Columbia, Costa Rica, Denmark, Ecuador, France, Greece, Ireland, the Netherlands, New Zealand, Nicaragua, Norway, Peru, Portugal, Singapore, Spain, Sweden, Switzerland, Thailand, the United Kingdom, Uruguay, the USA, and West Germany.

Data on the tryptophan intake (tryptophan as a ratio to other amino acids) were obtained for 1975-1977 from Kitahara (1986). Suicide and homicide rates were obtained for 1977 from *World Health Statistics Annual*, the annual publication of the World Health Organization. The gross national product per capita for 1977 was obtained from the World Bank (1979).

The Pearson correlation between the tryptophan supply index and suicide rates was -0.12 (not significant) and homicide rates was -0.29 ($p = 0.07$). Controlling for the gross national product per capita, the correlation with suicide rates remained nonsignificant (partial $r = -0.18$) while that for homicide rates was now significant (partial $r = -0.34$, $p = 0.04$). Reducing the sample to the 18 nations with a gross national product per capita above $2500 eliminated the significant association for homicide rates.

Thus, the present study has suggested that, for a diverse sample of nations of the world, the higher the tryptophan intake in a nation, the lower the homicide rate. Thus, the hypothesis suggested by Mawson and Jacobs (1978) that tryptophan intake may inhibit aggression was supported by the present study.

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