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Effect of Social Support on Stress-Related Changes in Cholesterol Level, Uric Acid Level, and Immune Function in an Elderly Sample

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Strong social support systems, which in epidemiologic studies are associated with decreased morbidity and mortality, have been hypothesized to mitigate the harmful effects of stressful stimuli on the individual. The authors found that, among 256 healthy elderly adults, individuals with good social support systems tended to have lower serum cholesterol and uric acid levels and higher indices of immune function; these correlations were independent of age, body mass, tobacco use, alcohol intake, and degree of perceived psychological distress. Thus, social support systems may intervene between the stressful stimulus and the physiologic response to that stimulus.

(Am J Psychiatry 142:735-737, 1985)

Social support is gaining acceptance as an important variable in the determination of health status. Berkman and Syme (1) found significantly higher age-adjusted relative mortality risks among their most isolated subjects than among those with the most social ties. The higher risk for the socially isolated was independent of physical health status; health behaviors such as alcohol consumption, smoking, and physical activity; utilization of preventive health services; and socioeconomic status. That study and others (2-5) support the hypothesis that social and community ties protect against a wide variety of pathological outcomes. The exact mechanism by which this is accomplished is uncertain. Bovard (6, 7) suggested that

stressful stimuli initiate a complex series of neuroendocrine responses which lead to general catabolism and immunosuppression and that supportive relationships initiate a competing response which modifies and helps to neutralize these harmful effects.

Three well-recognized indicators of health status known to be modified by stress are serum uric acid level, serum cholesterol level, and immune status. Friedman et al. (8) reported a highly significant difference in the cholesterol level of accountants between times when they considered themselves under stress and times when they felt relaxed. Similar results from different stressful situations have been reported by others (9, 10). Kasl et al. (11) found that employees' anticipation of plant shutdown was associated with abnormally high serum uric acid levels and that the more stressful the employees found the anticipated job loss, the higher the uric acid level. Rahe and Arthur (12) and Rahe et al. (13) found high serum uric acid levels in Navy divers who were anticipating challenging, unfamiliar training activities. Finally, several investigators (14, 15) have shown depression of immune function to be associated with physical or psychological stress in experimental animals and man. These three stress-induced changes—high serum cholesterol and serum uric acid levels and depressed immune response—have been found to act as independent predictors of subsequent morbidity and mortality (16-18).

Because it has been proposed that strong social support systems mitigate the harmful effects of stressful stimuli, we asked whether there was any relationship between degree of social support and serum cholesterol level, serum uric acid level, and immune response. For this investigation we defined social support as satisfying relationships with trusted individuals in whom our subjects could confide. Many older people suffer the loss of such significant people and relationships through death or separation caused by relocation or institutionalization. We hypothesized that individuals with confident relationships would have lower uric acid and cholesterol levels and higher immune responses than those with poorer social support systems.

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METHOD

The sample consisted of 256 healthy individuals between the ages of 61 and 89 years. These subjects lived independently in an urban community in the southwest United States and were volunteers in a longitudinal study of aging. Fifty-four percent of the sample were women and 46% were men; 87% of the men and 50% of the women were married. This group was mostly white and middle class. Approximately 91% had at least a high school education, and 42% had a college education. The mean age was 72 years. All subjects underwent a complete medical history, annual physical examination, and laboratory tests, including complete blood count and a 24-channel automated chemical analysis of serum. These volunteers were free of major illnesses and were taking no prescription medications at the beginning of the study. Blood samples were obtained while the subjects were in the fasting state.

The tests of immune function included a total lymphocyte count and measurement of the response of peripheral blood mononuclear cells to phytohemagglutinin as measured by [³H]thymidine incorporation (mitogen response). The techniques employed have been described in detail elsewhere (19).

Data concerning social bonds were obtained with the Interview Schedule for Social Interaction (20), adapted to a self-administered questionnaire format. For our purposes in this study, we were concerned with the scores for frank and confiding relationships. Lowenthal and Haven (21) have discussed the importance of the confidant relationship to the well-being of older persons.

Emotional status was measured with a 92-item self-rating checklist for symptoms of distress (22). This instrument yields individual scores for depression, anxiety, hostility, and somatic complaints and a composite distress score. The distress score allowed us to statistically control for the amount of psychological stress the individual perceived.

RESULTS

Correlations were computed for social support scores and serum cholesterol level, serum uric acid level, lymphocyte count, and mitogen response. These are shown in table 1 and reveal a statistically significant inverse relationship between degree of social support and level of serum uric acid or cholesterol and a significant positive relationship between social support and total lymphocyte count. We then computed partial correlations separately for men and women because the two groups were found to differ significantly in the values for the physiologic variables under study. These correlations were adjusted to control for smoking (yes or no), body mass index (weight in kilograms divided by height in meters squared), age, and alcohol intake (percentage of total caloric intake), and

TABLE 1. Correlations Between Social Support and Cholesterol Level, Uric Acid Level, Total Lymphocyte Count, and Mitogen Response Among 256 Healthy Elderly Subjects

Variable	Correlation (r) With Social Support ^a	Significance
Cholesterol level	-.16	p<.01
Men	-.21	p<.05
Women	-.12	n.s.
Uric acid level	-.17	p<.01
Men	-.04	n.s.
Women	-.20	p<.05
Total lymphocyte count	.13	p<.05
Men	.14	n.s.
Women	.20	p<.05
Mitogen response	.11	n.s.
Men	.10	n.s.
Women	.20	p<.05

^aPartial correlations for men (N=91) and women (N=106) adjusted for smoking, body mass, age, alcohol intake, and perceived psychological distress.

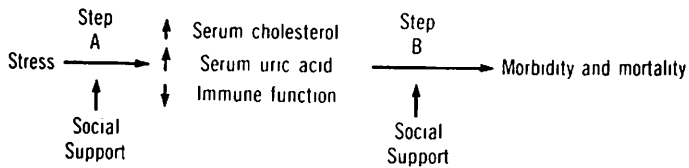
degree of perceived psychological distress as measured by the 92-item symptom questionnaire. Individuals for whom any part of this information was missing were excluded, bringing the final sample size to 197. As shown in table 1, for women there were significant correlations in the expected directions between degree of social support and serum uric acid level, lymphocyte count, and mitogen response, and the inverse association between social support and serum cholesterol level did not reach significance. For men, the only significant correlation was the inverse relationship between social support and serum cholesterol level, although the other, nonsignificant correlations were all in the expected directions.

DISCUSSION

We began this investigation with the hypothesis that individuals with strong social support (defined in this study as satisfying confidant relationships) would have lower uric acid and cholesterol levels and higher lymphocyte counts and mitogen responses than the subjects lacking such support. This hypothesis was based on the evidence suggesting that social support can mitigate the harmful physiologic effects of stressful stimuli in day-to-day life. Theoretically, social support could mitigate the effect of stressful stimuli on the physiological response to stress, which includes increased uric acid and cholesterol levels and decreased immune response, or social support could buffer the effect of the physiological response on subsequent health (see figure 1). Our results are consistent with this buffering hypothesis of social support and suggest that social support acts proximally to reduce the physiologic response to stress, although it may also act more distally as well.

We can only speculate about why the physiologic variables differ between men and women. The women overall had lower cholesterol and uric acid levels and better immune function than the men. As Lowenthal

FIGURE 1. Possible Effects of Social Support on Physiologic Responses to Stress and on Outcome of Stress-Related Physiologic Changes



and Haven (21) proposed, women may have a greater sensitivity to close relationships. Lowenthal and Haven also found that women are more versatile in their choice of relationships, and these two factors may combine to produce a greater adaptability for survival among women.

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