Stress Burden and Diabetes in Two American Indian Reservation Communities

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OBJECTIVE — To examine the association between psychosocial stress and diabetes in two American Indian reservation communities (Northern Plains and Southwest).

RESEARCH DESIGN AND METHODS — The American Indian Services Utilization, Psychiatric Epidemiology, Risk and Protective Factors Project (AI-SUPERPFP), a cross-sectional probability sample survey, interviewed 3,084 randomly selected members of two American Indian tribal groups. Included were a psychiatric epidemiological interview, a physical health problems checklist, and an extensive sociodemographic section.

RESULTS — Stress was common in these reservation communities, and the stress burden was greater among those with diabetes. After adjusting for sociodemographic characteristics, early-life interpersonal trauma and community family dysfunction were significantly associated with increased odds of diabetes in the Northern Plains, while discrimination and community addiction problems were significantly associated with increased odds of diabetes in the Southwest.

CONCLUSIONS — A number of psychosocial stresses were significantly associated with increased odds of self-reported diabetes in these two American Indian communities.

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Diabetes is a serious health problem for American Indians with a prevalence being, on average, two to three times greater than that of others in the U.S (1,2). A number of studies suggest that psychosocial stress plays an important role in the development of diabetes (3–8). Many American Indians live in pervasively adverse social and physical environments that place them at high risk to stress exposure (9,10). To date, the association between stress burden and diabetes among American Indians has remained unexplored; that deficit is addressed here in two American Indian reservation populations.

RESEARCH DESIGN AND METHODS

— The American Indian Service Utilization, Psychiatric Epidemiology, Risk and Protective Factors Project (AI-SUPERPFP) was a community based epidemiological study. AI-SUPERPFP methods are described in detail elsewhere (11). Data were collected between 1997 and 1999 from members of Southwest and Northern Plains tribes. For confidentiality purposes, we use the general descriptors of Northern Plains and Southwest rather than specific tribal names. Eligibility for participation was restricted to noninstitutionalized enrolled tribal members who were 15–54 years of age at the time of sampling in order to allow direct comparisons with the National Comorbidity Survey (12). Among those located and determined eligible, 76.8% in the Northern Plains and 73.7% in the Southwest agreed to participate (n = 3,084: 1,638 Northern Plains and 1,446 Southwest); response rates were lowest for men and younger tribal members.

Variable construction was completed using SPSS (13) and SAS (14). Self-reported diabetes status was assessed by the question: "Did a doctor, medicine man, or other health-care professional ever tell you that you had diabetes?" Stress burden was indexed in terms of early-life stress and chronic stress. Early-life stress involved participant reports of 25 specific adverse events that happened before age 18 years, grouped into six broad categories: separation from parents (e.g., parents seriously ill and unable to care for child), interpersonal trauma (e.g., sexual abuse), noninterpersonal trauma (e.g., life-threatening accident), witnessed violence (e.g., seeing others subjected to violence), traumatic news (e.g., suicide of someone close), and significant untimely deaths (e.g., sibling death). Chronic stress of an ongoing or enduring nature were measured by 30 items in seven categories: expectations (e.g., taking on too many things at once), social life stress (e.g., avoiding social events), location hassles (e.g., noisy or polluted neighborhood), discrimination (e.g., having problems related to being Indian), community family dysfunction (e.g., broken homes perceived as a big problem), community addiction problems (e.g., substance use seen as a big problem), and community economic distress (e.g., not enough jobs). More information about stress variables may be found in online Appendix 1 (available at http://care.diabetesjournals.org).

Inferential analyses were conducted in STATA (15) using sample and nonresponse weights to account for differential selection probabilities and for nonresponse biases (16). Participants with unknown diabetes status were excluded from all analyses. Differences in group characteristics were examined by χ^2 analyses or two sample t tests. Multiple logistic regressions were used to examine the association between diabetes and the stress variables, which showed significant unadjusted associations with diabetes, controlling for the following sociodemographic variables: sex, age, educational level, and employment status.

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Abbreviations: AI-SUPERPFP, American Indian Services Utilization, Psychiatric Epidemiology, Risk and Protective Factors Project.

Table 1—*Adjusted association between diabetes and stress burden

	Northern Plains		Southwest	
	OR (95% CI)†	OR (95% CI)‡	OR (95% CI)†	OR (95% CI)‡
Early-life stress				
Separation from parents	1.08 (0.72–1.62)	0.98 (0.63, 1.51)	1.42 (0.90, 2.25)	1.42 (0.90, 2.24)
Interpersonal trauma	1.70 (1.06–2.71)§	1.67 (1.01, 2.77)§	1.16 (0.63, 2.14)	0.95 (0.52, 1.75)
Chronic stress				
Location hassles	1.36 (0.89–2.06)	1.20 (0.73–1.96)	1.00 (0.55–1.84)	0.75 (0.41–1.38)
Discrimination	1.14 (0.65–2.01)	0.78 (0.39–1.59)	2.74 (1.52–4.96)‖	2.76 (1.49–5.11)‖
Community family dysfunction	1.34 (1.00–1.79)§	1.19 (0.77–1.85)	1.22 (0.87–1.71)	0.78 (0.47–1.30)
Community addiction problem	1.34 (0.99–1.81)	1.15 (0.75–1.77)	1.56 (1.10–2.20)§	1.91 (1.10–3.30)§
Community economic distress	1.25 (0.85–1.83)	0.93 (0.60–1.45)	1.20 (0.82–1.76)	0.90 (0.55–1.47)

*Only includes stressors that showed a significant unadjusted relationship with diabetes in the Northern Plains or Southwest. †Controlling for sex, age, education, and employment status. ‡Controlling for sex, age, education, employment status, and other stress variables. §$P < 0.05$, ‖$P < 0.001$.

RESULTS — The overall weighted prevalence of diabetes was 8.8% in the Northern Plains and 6.6% in the Southwest. Unadjusted association between diabetes and stress is summarized in online Appendix 1. Stress was common in these reservation communities, with the stress burden being greater among those with diabetes. Specifically, early-life interpersonal trauma and location hassles were significantly more common among Northern Plains diabetic than nondiabetic individuals. In the Southwest, childhood neglect and discrimination experiences were more common among diabetic than nondiabetic individuals. In both tribes, respondents with diabetes reported significantly higher levels of all three community stresses: family dysfunction, addiction problems, and economic distress.

In the multivariate models (Table 1), when adjusting for sociodemographic characteristics only, early-life interpersonal trauma and community family dysfunction were significantly associated with diabetes in the Northern Plains. However, in the model that adjusted for both sociodemographic characteristics and other stresses, only early-life interpersonal trauma remained significantly associated with diabetes. In the Southwest, higher level of perceived discrimination and higher level of community addiction problems were significantly associated with increased likelihood of diabetes in both adjusted models.

CONCLUSIONS — Our findings support and extend the current literature by providing evidence of an association between stress burden and increased odds of self-reported diabetes in two American Indian communities. The mechanism of the observed association is not known and cannot be determined from these data due to the cross-sectional design of this study. It has been proposed that psychological reaction to stress leads to the activation of the hypothalamopituitary-adrenal axis, causing various endocrine perturbations, which leads to obesity and insulin resistance (4,5). Hence, it is possible that psychosocial stress causes diabetes via psychoendocrine pathways. On the other hand, it is also possible that having diabetes leads to a higher level of perceived psychosocial stress in one's life. Future longitudinal studies with more information on diabetes onset and physiological markers represent important next steps in elucidating the mechanisms of the association between diabetes and stress evident in our findings.

Similar to several previous AI-SUPERPFP findings showing tribal differences (17–20), the association between stress and diabetes observed here varies by tribe, suggesting that additional factors moderating the relationship between stress and diabetes likely differ across these tribes. Though this study was not designed to explain the source or nature of these differences, our findings emphasize the variability in the characteristics and functioning of American Indian tribes.

Limitations of this study include lack of information on the relative onset of diabetes and stress, precluding assessment of temporal precedence, and inference of causality. Additionally, diagnoses of diabetes were by self-report only, and no information on the type or severity of the illness was obtained. Finally, given the limited age range of this study (15–54), further studies on this topic are needed regarding older populations. Despite these limitations, this study adds to the sparse literature on stress and diabetes in ethnic minorities and provides preliminary evidence for a significant association between diabetes and a wide spectrum of psychosocial stresses in American Indian tribal populations; these findings can inform the design of more effective interventions for diabetes prevention and treatment in this special population.

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