ASSOCIATION BETWEEN ACCULTURATION MODES AND TYPE 2 DIABETES AMONG NATIVE HAWAIIANS

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Running Title: Acculturation and Diabetes in Native Hawaiians

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ABSTRACT

Objective: To examine the association between acculturation modes (integrated, assimilated, traditional, and marginalized) and type 2 diabetes prevalence in Native Hawaiians.

Research Design And Methods: Cross-sectional data was analyzed from 495 Native Hawaiians to include acculturation modes, diabetes status, triglycerides, fasting insulin, BMI, age, and education level. Acculturation modes were assessed using an 8-item cultural affiliation questionnaire.

Results: Native Hawaiians in a traditional mode of acculturation were more likely to have type 2 diabetes (27.9%) compared to those in an integrated (15.4%), assimilated (12.5%), and marginalized (10.5%) mode.

Conclusions: The higher prevalence of type 2 diabetes among Native Hawaiians in a traditional mode of acculturation could not be attributed to any of the socio-demographic or biological factors included in this study. We discuss the role of psychosocial factors as possible mediators in the relationship between acculturation modes and type 2 diabetes.
Acculturation is believed to affect type 2 diabetes among certain U.S. ethnic groups because of lifestyle and environmental changes (e.g., diet, physical activity, and exposure to environmental stressors) (1,2). Studies find an association between acculturation factors and type 2 diabetes among immigrant groups in the U.S. (e.g., Arab-Americans and Hispanics) (3,4), but a dearth of such studies exist among native populations. Native Hawaiians, the indigenous people of Hawai‘i, have high type 2 diabetes prevalence and diabetes-related mortality rates that could be associated with acculturation factors (5).

Past studies of acculturation and type 2 diabetes used proxy factors of acculturation, such as length of stay in the U.S., generational status, and language preference (3,4), which are not appropriate for native populations. A relevant acculturation model for native groups suggest that health status can differ across four modes of acculturation: integrated (high affiliation with ethnic heritage and mainstream culture), assimilated (high affiliation with mainstream culture only), separatist (re-termed here as traditional; high affiliation with ethnic heritage only), and marginalized (low affiliation with both ethnic heritage and mainstream culture) (6). We examined the association between these four acculturation modes and type 2 diabetes among Native Hawaiians.

RESEARCH DESIGN AND METHODS

Cross-sectional data from 495 Native Hawaiians (225 males and 270 females) who participated in the Kōhala Health Research Project (KHRP), a community-based epidemiological study of diabetes and cardiovascular risk factors, were analyzed here. The KHRP’s design and methods have been described elsewhere (7).

Diabetes was determined using World Health Organization (WHO) criteria of fasting blood glucose ≥126 mg/dl or 2-hr post-challenge blood glucose ≥200 mg/dl (8). All participants, except for those taking insulin or oral diabetic medication, underwent a 2-hour, 75gram oral glucose tolerance test after an overnight fast (10-14 hours). Only fasting blood samples were collected from those participants.

Acculturation modes were assessed using an 8-item cultural affiliation questionnaire designed by the KHRP. It has two subscales – an ethnic cultural identity subscale (4-items) and a Western-U.S. cultural identity subscale (4-items) – designed to assess the degree of identity/affiliation with, feelings toward, and knowledge about each cultural group and the impact each cultural group has on lifestyle. A 5-point response scale was used for each item, ranging from 1 (e.g., very knowledgeable, very positive, or very involved) to 5 (e.g., not knowledgeable at all, very negative, or disinterested). Scores ≤12 on each subscale (12=median score; range=4-20) indicated higher levels of affiliation. Participants were considered integrated with scores ≤12 on both subscales; traditional with scores ≤12 on the ethnic subscale and scores >12 on the Western-U.S. subscale; assimilated with scores >12 on ethnic subscale and scores ≤12 on the Western-U.S. subscale; and marginalized with scores >12 on both subscales. Cronbach’s Alpha was 0.72 for each subscale, indicating good internal reliability estimates.

Age, education level, BMI [height (m)/weight (kg)^2], degree of Native Hawaiian ancestry, triglycerides, and fasting insulin were selected from the KHRP dataset to examine as possible confounders for inclusion in our analysis. These specific factors were chosen because they are identified correlates of diabetes in Native Hawaiians (7). Degree of Native Hawaiian ancestry was based on self-reported (ascertained from an interview) blood quantum categories: 100%, 75%, 50%,
25%, and <25%. These factors were to be adjusted for in a logistic regression model examining the effects of acculturation modes on diabetes status (0=no diabetes, 1=diabetes) if they were found to have a significant association ($P \leq .05$) with both diabetes status and acculturation modes based on bivariate analyses (ANOVA and $\chi^2$). JMP statistical software version 6.0.2 was used for data analysis (SAS Institute Inc., 2006).

RESULTS

A majority of the participants were integrated ($n=382$; 77.2%) followed by traditional ($n=86$, 17.4%), marginalized ($n=19$; 3.8%), and assimilated ($n=8$; 1.6%). Significant differences in type 2 diabetes status was observed across acculturation modes [$\chi^2=(3, 495) 7.71$, $P=.05$], with the traditional mode having more diabetes ($n=24$; 27.9%) followed by integrated ($n=59$; 15.4%), marginalized ($n=2$; 10.5%), and assimilated ($n=1$; 12.5%) modes (see Figure 1). Of the potential confounders examined, increased age ($F=55.58$; $P<.0001$) and higher BMI ($F=26.64$; $P<.0001$), triglycerides ($F=24.39$; $P<.0001$), and fasting insulin ($F=25.38$; $P<.0001$) were significantly associated with having diabetes while only education level was significantly associated with acculturation modes [$\chi^2=(9, 495) 28.19$, $P<.001$]. None of the potential confounders examined were significantly associated with both diabetes status and acculturation modes.

A logistic regression model was done to calculate the odds ratio (OR) and confidence interval (CI) and as a post hoc analysis to determine which modes significantly differed in diabetes prevalence. The results showed that participants with a traditional mode were more likely to have type 2 diabetes [$P=.01$; OR 2.12 (95% CI 1.23–3.65)] compared to the integrated mode (reference group). There were no significant differences in diabetes status between the integrated mode and the assimilated and marginalized modes.

CONCLUSIONS

Native Hawaiians in a traditional mode of acculturation had a greater prevalence of type 2 diabetes compared to those in the integrated, assimilated, and marginalized modes that could not be attributed to any of the socio-demographic or biological factors included in this study. These findings suggest that psychosocial or other factors associated with the traditional mode of acculturation not accounted for in this study may increase the risk for type 2 diabetes among Native Hawaiians in this mode of acculturation.

Research in other ethnic groups found that people in the traditional and marginalized modes have greater acculturative stress (e.g., depression and greater perceived discrimination) than those in the integrated and assimilated modes (9). Studies also show that people with depression, a common response to environmental stressors have a 37% increased risk of type 2 diabetes (10). One hypothesis that needs investigation is that Native Hawaiians in the traditional mode may experience more psychosocial or environmental stressors compared to Native Hawaiians in the other three modes and, thus, increasing their risk for type 2 diabetes.

Inferences from our study should be limited to comparisons between the integrated and traditional modes because of small sample sizes among the assimilated and marginalized groups. There appears to be adequate statistical power to detect differences between the integrated and traditional modes given the effect size (OR=2.12) found for their association and the fact that these two modes combined made up 94.6% of our entire sample.

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REFERENCES

FIGURE LEGEND

Figure 1. Prevalence of type 2 diabetes in Native Hawaiians across four acculturation modes.
FIGURE 1