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Diet, Psychosocial Factors Related to Diet and Exercise, and Cardiometabolic Conditions in Southern Californian Native Hawaiians

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Abstract

Objective: Native Hawaiians are at higher risk for cardiometabolic disease, including diabetes and cardiovascular disease compared with other ethnic groups. Diet, body mass index (BMI) and psychosocial, as well as cultural issues may influence risk for cardiometabolic disease. Our team conducted a community-based participatory research study and examined diet, height/weight, psychosocial factors, and community health concerns in Native Hawaiians living in Southern California.

Design and Methods: Cross-section of 55 participants, ≥ 18 years old. Dietary data were collected via three 24-hr dietary recalls, anthropometrics were measured, and psychosocial factors and cardiometabolic conditions were self-reported. Talk story related to diet and health was completed in a sub-sample. Means and frequencies were calculated on dietary intakes, cardiometabolic disease and BMI. Independent t-test and chi square analyses, as appropriate, were performed to assess differences in dietary intakes, obesity and psychosocial factors between those with and without a pre-existing cardiometabolic condition.

Results: Of those with pre-existing health conditions ($n=28$), 72% reported being diagnosed with a cardiometabolic condition. For those with pre-existing cardiometabolic conditions, the daily vegetable consumption was 2.57 servings (± 1.66) and the mean fruit consumption was 1.43 servings ($\pm 0.1.99$). The mean fiber intake was 16.24 grams (± 6.92), the mean percentage energy from fat was 34.82% (± 6.40) and the mean % energy from carbohydrate was 47.15 (± 6.77). The psychosocial data showed significantly ($p \leq 0.05$) lower social support, social interaction, self-monitoring and cognitive-behavioral strategies related to exercise for those with cardiometabolic disease compared with those without disease. All the talk story discussion groups expressed concern over diabetes and weight management, both as an individual and community issue.

Conclusions: The dietary data indicate that Native Hawaiians residing in Southern California should aim to increase their vegetable, fiber, and reduce % energy from fat and saturated fat. Additionally, the psychosocial data suggests that implementing physical activity programs based on socio-cultural values such as *ohana*, community gatherings, as well as individual self-monitoring and cognitive-behavioral strategies may improve cardiometabolic outcomes. In efforts to reduce cardiometabolic disease disparity, these data suggest that Native Hawaiians in Southern California are aware and concerned about cardiometabolic disease in the community, and that implementation of an effective energetic (diet plus physical activity) intervention that is socially, and culturally specific for Native Hawaiians in Southern California is critical.

Introduction

Health disparities related to cardiometabolic disorders, including cardiovascular disease, diabetes and obesity, are pervasive in the United States, particularly affecting African American, Hispanic, Asian American and Pacific Islander minority groups.¹⁻¹⁰ Mau and colleagues' recent review of studies assessing cardiometabolic disease risk reported that Native Hawaiians have the highest prevalence of diabetes compared with other ethnic groups in Hawai'i, ranging from 19 – 22% for type 2 diabetes and 16 – 35% for impaired glucose

tolerance.^{6,11-13} Studies on cardiovascular risk factors report increased obesity and blood pressure in those with Native Hawaiian ancestry compared with other ethnic groups in the United States.^{1,14-16}

Diet and physical activity are inextricably linked with diabetes and cardiovascular disease risk, and therefore several prevention programs have been implemented to reduce cardiometabolic risk in Native Hawaiians residing in Hawai'i.¹⁷⁻¹⁹ Studies assessing dietary intakes in Native Hawaiians show high energy intake, low legume consumption, and moderate soy intake for this population.²⁰⁻²² Intervention programs aimed at preventing diabetes in Native Hawaiians on Hawai'i applied culturally-appropriate concepts such as *ohana* (family) and community-based efforts to improve dietary intakes in order to reduce risk.^{17,19} The Native Hawaiian Diabetes Intervention Program showed that those who received a personalized family support intervention transitioned from the pre-action to the action/maintenance stage for reduced fat intake and increased physical activity.¹⁷

Outside of Hawai'i, California has the largest Native Hawaiian population in the continental United States. Dietary intakes, accessibility to traditional Hawaiian foods and possibly psychosocial factors related to diet/exercise may differ for Native Hawaiians residing in California. However, studies on dietary intakes and diet/exercise psychosocial factors in relation to cardiometabolic disease in Southern Californian Native Hawaiians have yet to be conducted. Partnering with Native Hawaiian organizations in Southern California, our team conducted a pilot community-based participatory research (CBPR) study to investigate dietary intakes, diet/exercise psychosocial factors and talk story discussions related to cardiometabolic disease in Native Hawaiians residing in Southern California. Exploring diet and community perspectives may provide insight into developing culturally-appropriate interventions for reducing cardiometabolic disease in this population.

Methods

Study Overview and Sample

The present study used a cross-sectional design among a non-probability sample of Native Hawaiians in Southern California. The study team convened a community advisory board (CAB), comprising of key partners, from two organizations [*'Āinahau O Kaleponi Civic Club* and the *Pacific Islander Health Partnership (PIHP)*], and university research members. The CAB was central to developing study protocol, reviewing questionnaires and assisting in recruitment. Recruitment methods included building partnerships with Native Hawaiian community-based groups, developing and disseminating culturally-appropriate fliers, and soliciting via telephone and in-person at cultural gatherings. Eligibility included ≥ 21 years of age, having some Native Hawaiian ancestry (self-reported) and currently residing in Southern California. After obtaining written consent, community leaders and study staff collected demographic,

socio-cultural questionnaires and pre-existing health condition information via questionnaire. Also at the initial meeting, in-person height and weight measurement were conducted. Following the initial assessment, three 24-hr dietary recalls via telephone were scheduled and collected. At subsequent assessment meetings self-reported psychosocial data related to diet/exercise were collected, and talk story sessions were completed. Sixty-two consented individuals completed the sociodemographic and pre-existing health conditions questionnaire and of the 62, 55 completed the 24-hr dietary recall and psychosocial questionnaire. Of the 55 participants, 8 had pre-existing health conditions other than cardiometabolic disease and were excluded from the present study. A total of 47 participants, 26 with no pre-existing health conditions and 21 with cardiometabolic related health conditions, are included in the present analysis assessing cardiometabolic conditions. Of the 47, 4 (9%) completed 24-hr dietary recalls through e-mail (using similar queries as on the telephone), and 9 (19%) provided self-reported height and weight. Of the total sample, 37 (15 males and 22 females) completed the talk story sessions and are included in the talk story data. There were a total of eight talk story sessions lasting approximately one hour. Each talk story had between 6-8 participants in each group. A full study protocol review was conducted and approved by the Internal Review Board (IRB) of the California State University, Fullerton (HSR#: 09-0159).

Dietary Assessments

The study involved using 24-hr dietary recall methodology to collect dietary data. Twenty-four hour dietary recall methodology uses computer-assisted technology to collect dietary data for the previous 24-hour period from participants/patients. For the present study, three 24-hour dietary recalls were collected over the telephone (and 9% through email), two of which were collected over the weekday and one was collected over the weekend during a two week period.

The Nutrition Data System (NDS) software was used to collect dietary data (NDS, University of Minnesota, 2007). The nutrient database used by NDS to obtain the nutrients from foods is derived from the USDA Nutrient Data Laboratory. The NDS includes values for nutrients, nutrient ratios and food components and encompasses over 18,000 foods, including ethnic foods and over 8,000 brand products. Supplement use was also collected via 24-hour dietary recalls.

Psychosocial Questionnaire

The psychosocial instrument and psychometric evaluations of the scales utilized in the present study have been validated previously in diverse groups.²³⁻²⁵ In previous studies, intra-class correlation for the psychometric evaluations of the scales ranged from 0.62 – 0.85, suggesting good to excellent reliability. Factor analysis revealed a good to reasonable loading of the data to each of the scales modeled (0.91 – 1.0) and Cronbach alpha values ranged between 0.69 – 0.93.

The scales in the questionnaire measured predisposing (social support) and self-regulation factors (cognitive and behavioral) related to diet and physical activity, both concepts intrinsic to social cognitive theory.²³⁻²⁵ Management and behaviors related to diet were also assessed. Fifteen scales were measured in the psychosocial questionnaire: social support for diet, social support for exercise,

self-monitoring diet, self-monitoring exercise, self-efficacy related to diet, self-efficacy related to maintaining diet, outcome expectations for diet and for exercise, diet planning, preparing/buying foods, portion control, social interaction related to diet, social interaction related to exercise, cognitive-behavioral strategies related to diet and cognitive-behavioral strategies related to exercise. Participants were asked to report on experiences over the past month.

Talk Story

Talk story is an informal conversation where individuals may talk about their day or what happens to be on their mind at the time.^{26,27} In the Hawaiian culture, it is considered a matter a respect to engage in talk story prior to engaging in direct conversation and it is one way that people get to know each other. As Sing (1999) has noted ““talking-story”... is how we as Hawaiians best approach an issue. It includes all our voices and the nuance of “group energy, group mana.” Through this type of conversation about dietary knowledge, health and practices, the research group and participants had an opportunity to better understand the concerns of the community in Southern California and acquire more in depth insights into the data.

Other Measures

Using a standard protocol, height and weight were measured in-person using stadiometers and step-up scales.³¹ For measuring height, participants were asked to remove hats, socks and shoes. Measurement of height was conducted by moving the participant's head down (tucking the chin) so the Frankfort plane was in a horizontal position (i.e. the bottom of eyes lined up with the middle of ear- flap of the skin). We used an electronic step-up scale to measure weight. Partitions were used while measuring weight to increase privacy.

Statistical Analysis

Descriptive data on the total sample (n=47) were conducted on gender and age. Height and weight data were used to calculate frequencies of normal (<25 kg/m²), overweight (25-29.99 kg/m²) and obese (>30 kg/m²) BMI. An independent samples *t*-test was conducted to compare differences in age and dietary intakes previously shown to be related to cardiometabolic disease between those with pre-existing cardiometabolic conditions/syndromes (Type 2 diabetes, cardiovascular disease, high blood pressure and high cholesterol) and those without any health conditions. Similarly a chi square analysis was conducted to measure gender and BMI (normal, overweight, obese) differences between the two groups. Each psychosocial scale was summed and an independent *t*-test was conducted to measure differences for each scale between those with pre-existing cardiometabolic conditions and those without any health conditions. The level used to specify significance for each test was $p \leq 0.05$.

Talk Story Qualitative Analysis

The talk story conversations were audio recorded and transcribed. A content analysis was performed on each conversation (n=37). The content analysis coded themes that were of particular issue to the research group such as foods that were said to have cultural value, issues that made eating healthy or eating Hawaiian foods difficult, and ideas that would motivate change. The data was also coded for themes that frequently emerged in the conversations

such as memories of growing up in Hawai'i and its impact on their thoughts about food.

Results

The mean age for the total sample ($n=47$) was $59 (\pm 15)$, and 18 (38%) were males and 29 (62%) were females. BMI was as follows: 13% normal, 30% overweight and 57% obese. Of those reporting health conditions, 72% reported having a pre-existing cardiometabolic condition, and of those with pre-existing cardiometabolic health conditions, 13 (62%) reported having diabetes and the remaining included coronary artery disease, hypertension and high cholesterol.

Table 1 shows frequencies of BMI and mean dietary intakes for those with pre-existing cardiometabolic conditions. No significant differences were observed for BMI or dietary intakes between the two groups. For those with pre-existing cardiometabolic conditions, the daily vegetable consumption was 2.57 servings (± 1.66) and the mean fruit consumption was 1.43 servings ($\pm 0.1.99$). The mean fiber intake was 16.24 grams (± 6.92), the mean percentage energy from fat was 34.82% (± 6.40) and the mean % energy from carbohydrate was 47.15 (± 6.77).

Variable	Cardiometabolic Conditions (Yes)	Cardiometabolic Conditions (No)
Body Mass Index, n (%)		
Normal (< 25 kg/m ²)	2 (9.52%)	4 (15.38)
Overweight (25 – 29.9 kg/m ²)	6 (28.57)	8 (30.77)
Obese (> 30 kg/m ²)	13 (61.90)	14 (53.85)
Dietary variables, (mean $\pm$ SD)		
Vegetable (servings)	2.75 $\pm$ 1.66	2.41 $\pm$ 1.45
Fruit (servings)	1.43 $\pm$ 1.99	1.79 $\pm$ 1.37
Fiber (servings)	16.24 $\pm$ 6.92	17.11 $\pm$ 6.94
Whole grain (servings)	1.79 $\pm$ 1.59	1.49 $\pm$ 1.74
Refined grain (servings)	3.29 $\pm$ 1.59	3.95 $\pm$ 2.28
% energy from fat	34.82 $\pm$ 6.40	34.68 $\pm$ 8.20
% energy from saturated fats	11.68 $\pm$ 3.10	10.78 $\pm$ 3.17
Trans fats, g	3.58 $\pm$ 2.02	3.96 $\pm$ 2.36
Cholesterol, mg	178.21 $\pm$ 83.48	194.52 $\pm$ 70.67
% energy from carbohydrates	47.15 $\pm$ 6.77	48.49 $\pm$ 8.81
Sodium, mg	2796.8 $\pm$ 1328.2	3122.1 $\pm$ 1983.4

Psychosocial factors related to diet/exercise for those with pre-existing cardiometabolic conditions and those without are shown in Table 2. Mean scores for self-monitoring of exercise, social interactions related to exercise and “how often did you prepare healthy foods with your family and friends” were significantly ($p \leq 0.05$) lower for those with pre-existing cardiometabolic conditions compared with those without cardiometabolic conditions. Mean scores for social support for exercise and cognitive behavioral strategies related to exercise were borderline significantly different ($p=0.07$, 0.06, respectively) between the two groups.

Table 3 shows three talk story themes that are of particular relevance for the present paper. These themes included concerns over diseases associated with weight, diet and exercise, and the tension between individual change and community change. All eight of the talk story groups mentioned concern about diabetes and obesity among the Hawaiian population. Four groups mentioned concerns regarding heart disease and cancer as well. The conversations in the groups always began with discussions of obesity. Because of their concern over diabetes and obesity, the conversation would then turn to talk about their ability, or lack thereof, to exercise on a regular basis or to the food portions consumed. Discussions regarding exercise focused on many of the difficulties of living in Southern California where commuting long distances (an hour or more) to work or locations of leisure are a standard expectation. Three of the groups mentioned the stressfulness of working and living in California as a hindrance to exercise and safety concerns when exercising. Other themes related to potential intervention strategies included cooking classes, walking groups, and informational brochures that provided locations of stores that sold Hawaiian food.

Discussion

The team determined that of those Native Hawaiians in Southern California with a health condition, nearly 75% reported having a cardiometabolic-related condition. Further, 87% were either overweight or obese, and were not meeting the American Diabetic Association's dietary guidelines for vegetable, fiber, whole grains, % energy from fat, % energy from saturated fat and % energy from carbohydrates, specifically for diabetes and cardiovascular disease prevention.²⁹ Individuals with pre-existing cardiometabolic conditions reported lower scores, compared with those without a pre-existing health condition, for several psychosocial scaled related to exercise.

Previous findings reveal higher glucose intolerance, type 2 diabetes, obesity and cardiovascular disease in Native Hawaiians compared with other ethnic groups in Hawai'i.^{6,10,11,21,30,31} A study of glucose intolerance among Native Hawaiians in rural Hawai'i showed that the crude prevalence of impaired glucose tolerance was between 15% - 20%.⁶ Analysis of existing Hawai'i state-wide data demonstrated that 11.5% of Native Hawaiians had been told by their doctors that they had diabetes.³⁰ A study on overweight and obesity in the Native Hawaiian population showed that 63.6% were overweight (based on BMI ≥ 27.8) and 44.6% were severely overweight.³¹ Most studies on weight report overweight to obese BMI frequencies for Native Hawaiians.^{15,21,31,32} Our findings, based on the total sample of $n = 55$, reveal that 24% were diabetic, and of those with pre-existing cardiometabolic conditions, 91% were either overweight or obese. The primary pre-existing health condition that was reported for Native Hawaiians in Southern California was cardio-metabolic related. The slightly higher crude prevalence of diabetes in our study may be due to a higher mean age for participants enrolled.

Native Hawaiian dietary patterns have been studied,^{15,20–22,32} however few studies report on dietary intakes in Native Hawaiians with cardiometabolic disease.^{15,21,32} A recent study in rural Hawai'i compared dietary patterns, including vegetable and fruit, local ethnic dishes and a Western diet dominated by fast-food, among various ethnic groups.²¹ The findings suggested that Caucasians showed higher scores for consuming fruits and vegetables compared with the other ethnic groups, while the Filipino and Hawaiians in rural

Variable/Scales	Value range	Cardiometabolic conditions (Yes)		Cardiometabolic conditions (No)	
		N	Mean (SD)	N	Mean (SD)
Social Support for Diet ^a	3 - 12	18	7.28 (1.94)	24	6.5 (2.60)
Social Support for Exercise ^{a,e}	7 - 28	18	11.83 (3.00)	24	14.5 (6.11)
Self-Monitoring for Diet ^a	6 - 24	17	16.71 (5.69)	25	16.32 (4.56)
Self-Monitoring for Exercise ^{a,d}	4 - 16	18	7.83 (2.90)	25	9.8 (3.16)
Self-efficacy for diet skills ^b	3 - 12	19	8.10 (2.60)	26	9.38 (2.40)
Self-efficacy for sticking with diet ^b	5 - 20	19	11.84 (4.34)	25	13.92 (4.55)
Outcome Expectations for Diet ^c	9 - 45	19	37.16 (6.73)	26	36.77 (8.40)
Outcome Expectations for Exercise ^c	9 - 45	19	38 (4.64)	25	38.56 (8.12)
Planning for diet ^a	5 - 20	19	11.26 (3.03)	26	12.08 (3.14)
Preparation/Buying for diet ^a	6 - 28	18	15 (4.04)	25	15.44 (5.47)
Portion Control ^a	5 - 20	19	13.58 (3.31)	26	13.81 (3.90)
Social Interaction for diet ^a	3 - 12	19	7.26 (1.76)	26	7.19 (2.33)
Social interaction for exercise ^{a,d}	4 - 16	18	5.56 (2.28)	25	7.2 (2.84)
Cognitive-behavioral strategies for exercise ^{a,e}	5 - 20	18	9.94 (3.65)	25	12.4 (4.66)
Cognitive-behavioral strategies for diet ^a	5 - 20	19	9.29 (3.88)	25	12.16 (4.84)
How often did you prepare healthy foods with your family and friends? ^{a,d}	1 - 4	19	2.11 (0.81)	25	2.64 (0.95)

a: response options "almost never, sometimes, often and almost always"; b: response options "not at all sure, a little sure, somewhat sure, very sure"; c: response options "strongly disagree, disagree, neutral, agree, strongly agree"; d: $p < 0.05$ between males and females; e: $p = 0.06 - 0.07$

Hawai'i consumed more of the ethnic foods. However no differences in dietary patterns were reported between diabetic and non-diabetic Hawaiians.²¹ Our team found no differences in dietary intakes of foods related to cardiometabolic disease between those with and without pre-existing metabolic conditions. These observations may be due to collection of "prevalent" pre-existing conditions, and by not assessing dietary intakes prior to or at diagnosis of disease. Also, it is possible that dietary intakes may have changed after diagnosis. However, our findings show that the present study population should be encouraged to reach the dietary guidelines endorsed by the American Dietetic Association (and the United States Department of Agriculture), specifically related to 5 servings of vegetables, 25 – 30 g fiber, < 30% energy from fat, 0 g trans fat, < 10% energy from saturated fat and 2300 mg sodium.²⁹

Our findings on psychosocial factors and talk story discussions provide potential avenues for developing interventions to reduce and/or control cardiometabolic disease in Native Hawaiians. Participants with pre-existing cardiometabolic conditions, compared with those without any health conditions, scored lower on several psychosocial scales related to exercise. Specifically, improving social support for exercise, such as having other individuals provide encouragement, offer to exercise and provide helpful reminders to exercise may increase exercise levels in Native Hawaiians with cardiometabolic conditions. Other strategies include improving social interactions related to exercise such as asking friends or relatives to engage in physical activity. Further, participants with pre-existing cardiometabolic disease were less likely to self-monitor their exercise behavior, including keeping record of their physical activity, increasing their physical activity based on reduced activity and finding ways to fit in small amounts of activity during the

Table 3.— Pressing Health Problems and Concerns Related to Diet and Exercise in Native Hawaiians (n = 37) Residing in Southern California

Summary of Talk Story points
Pressing health problems: Diabetes Obesity Heart Disease Cancer
Concerns related to diet and exercise:
Dietary concerns ~ Expectations of large amounts of food at social events Expectations of large food portions Respecting the food by eating everything that is on the plate Eating too much white rice Inability to find healthy Hawaiian foods in California
Exercise concerns ~ Stress of living in California ~ fast paced life does not allow time for exercise Longer work hours Large distances between home, work, and locations where family can engage in health activities Concern over safety of local environment prevents people from exercising in local areas
Community solutions ~ Create opportunities for family gatherings by focusing on youth Distribute information on locations where Hawaiian food can be purchased Hawaiian cooking courses Community walks

day. Additionally, cognitive-behavioral scores related to exercise, such as rewarding and praising oneself for being physically active, and thinking about the positive aspects of physical activity were lower for those with cardiometabolic disease compared with those

without disease. Therefore, as reported in one previous study,¹⁷ strategies focusing on improving group/social activities, as well as self-monitoring and cognitive-behavioral modifications related to exercise could increase physical activity and potentially improve cardiometabolic outcomes in Native Hawaiians residing in Southern California.

The talk story sessions revealed that the participants are profoundly aware of the high rates of diabetes and obesity among Native Hawaiians. Their concerns over diet and exercise also show that they understand that these are practices in which they must engage if the disease rates are to decrease. Their awareness is layered in the complexities of living as Native Hawaiians in California. On the one hand they understand that the cultural expectation of large food portions and eating everything on one's plate must be changed at the individual and social level. On the other hand, however, they also critiqued the long commuting distances and the difficulty of finding spaces for community exercise associated with life in California. Coinciding with the psychosocial data, the talk story discussions revealed that supporting individuals in dietary and exercise efforts can be primarily achieved through the support of community activities.

Limitations must be acknowledged when interpreting the data. We conducted a CBPR study of Native Hawaiians living in Southern California and therefore, the results are only generalizable to Native Hawaiians in Southern California. Also, the cross-sectional study design limits establishing temporal sequence between risk factors, psychosocial factors and disease. Further, detecting differences between groups may be limited by the small sample size; however even with the small sample size, we observed differences related to the psychosocial factors.

Our team established that Native Hawaiians in Southern California reported relatively high levels of cardiometabolic disease and that nearly 90% were either overweight or obese. Intervention programs should focus on improving dietary intakes for vegetable, fiber, % energy from fat and other cardiometabolic-related dietary variables. Because *ohana* values, and community and group interactions are central to the Hawaiian culture, our results on improving social interaction/behaviors related to exercise could be readily applied to a diet and physical activity intervention program for Native Hawaiians with cardiometabolic disease in Southern California. Future studies, with larger sample sizes, should be conducted to further decipher effective diet and exercise strategies for Native Hawaiians residing in Southern California.

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