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Behavioral and psychosocial correlates of adiposity and healthy lifestyle in Asian Indians

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ABSTRACT

Aims: Adiposity is an important diabetes risk factor, and Asian Indians have elevated diabetes risk. This analysis assessed the relationship between behavioral and psychosocial factors and adiposity among Asian Indians to better understand factors driving elevated weight/waist circumference in this population.

Methods: This study used screening data ($N = 1285$) from the D-CLIP study, a randomized controlled diabetes prevention trial in Chennai, India. Correlation tests and linear regression models were done to describe relationships among exposure variables (weight loss/exercise self-efficacy, fruit/vegetable intake, weekly exercise, past weight loss experience) and between these exposures and BMI or waist circumference.

Results: Exercise and weight loss self-efficacy were positively correlated with average minutes per week exercising ($R = 0.26$, $p < 0.0001$) and fruit ($R = 0.07$, $p < 0.05$) and vegetable intake ($R = 0.12$, $p < 0.0001$). Weekly fruit consumption, past weight loss experience, and weight loss self-efficacy, along with sex, age, and marital status, explained 13.6% and 25.9% in the variation in BMI and waist circumference, respectively.

Conclusions: Low fruit consumption, unsuccessful past weight loss attempts, and low self-efficacy for weight loss are associated with higher BMI and waist circumference in this population. Understanding factors related to adiposity is important for preventing and treating weight gain.

1. Introduction

India is experiencing a rise in the prevalence of overweight and obesity; from 2005 to 2030, the number of Indians classified as overweight or obese is predicted to increase from 88.3 million to 342.8 million [1]. This probably underestimates the true magnitude of the problem, since these estimates are not based on the lower body mass index (BMI) ranges recommended for Asian Indians (overweight: 23–24.9 kg/m^2 obesity: ≥25 kg/m^2)

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[2]. Excess body weight is a major risk factor for the development of type 2 diabetes, the predominant form of diabetes. Compared to other populations, Asian Indians get type 2 diabetes at younger ages and a lower BMI and fare worse once they have diabetes [3–8]. India currently has the second highest number of people with diabetes [9], a problem that will be compounded by the increasing prevalence of overweight and obesity.

Although the cause of weight gain in most individuals is clear (excess calorie intake, insufficient calorie expenditure, and/or poor quality macronutrients) the underlying factors that contribute to these behaviors are varied and complex. Food and activity choices are determined by preference, culture, the environment, and psychosocial factors. Understanding how these behavioral and psychosocial factors relate to weight in different populations, particularly those like Asian Indians who develop weight-related conditions like diabetes frequently and at lower BMIs, is important for developing lifestyle intervention programs that are culturally appropriate and with tools for prevention that are meaningful to them.

The Diabetes Community Lifestyle Improvement Program (D-CLIP, NCT01283308, clinicaltrials.gov) [10] is a community-based, randomized, controlled, translational research study in Chennai, India testing a step-wise model of diabetes prevention. Community-level screening on almost 20,000 people was followed by extensive screening/cross-sectional data collection on 1285 people (344 normoglycemic, 685 with prediabetes, and 256 with type 2 diabetes) to identify a sample with prediabetes for randomization. This analysis reports on data collected at the D-CLIP detailed screening visit.

The analysis in this paper was conducted to better understand the relationship between select factors related to adiposity in Asians Indians. The analysis aimed to answer the following: in a sample of Asian Indian adults being screened for a randomized trial of a diabetes prevention lifestyle program:

1. Do behavioral markers (fruit and vegetable consumption, past weight loss experience, and exercise) and certain psychosocial measures (exercise and weight loss self-efficacy) correlate with each other and with adiposity as measured by BMI or waist circumference (WC)? Do these correlations differ depending on sex, marital status, income, or education level? We hypothesized that more exercise, higher self-efficacy, increased fruit and vegetable consumption, and successful past weight loss attempts would be correlated with lower adiposity and waist circumference; that higher exercise and more frequent fruit and vegetable consumption would be positively associated with increased exercise and weight loss self-efficacy and with a successful past weight loss history; and that these correlations would be similar across sex, marital status, and income, and education level.
2. What is the relative association of fruit and vegetable consumption, past weight loss experience, exercise, and exercise and weight loss self-efficacy with BMI and WC? We hypothesize that these factors will all contribute to BMI and WC in this population and that exercise and fruit and vegetable consumption, as a marker of healthy diet, will be the most influential of these factors.

2. Methods

The ethics boards at Emory University and the Madras Diabetes Research Foundation (MDRF) approved the D-CLIP study protocol. All subjects provided written informed consent at each screening visit. Details of the D-CLIP methodology are described elsewhere [10]. Briefly, men and women, aged 20–65 years, were recruited for the study at community-wide and targeted screening events at housing complexes, places of worships, schools, and workplaces, through hand-searching of clinic records, and by direct referral by physicians or other study participants. First level screening included a short self-administered survey, a random capillary blood glucose test, and anthropometric measurements. Individuals with a random capillary blood glucose of greater than or equal to 6.1 mmol/L and no major health issues were invited to the clinic for further screening tests.

This analysis includes participants attending clinic-based screening ($n = 1285$), which included a study questionnaire, anthropometric measurements, and laboratory tests. Testing was conducted at the Translational Research Center at MDRF. All staff was trained in proper collection methods, and the study testing staff included dieticians, health educators, and phlebotomists. Data collection methods pertinent to this analysis are described below.

The outcomes for this analysis were BMI and WC. Body weight was measured in kilograms without shoes, heavy clothing or jewellery using a standardized, calibrated scale. Height was measured barefoot using a standardized stadiometer. BMI was calculated by dividing the weight in kilograms by the height in meters squared. WC was measured while participants were standing using a non-elastic measuring tape at the midway point between the lowest point of the costal margin and the highest point of the iliac crest [11]. Overweight was defined using Asian-specific cut-points: a BMI of 23 kg/m^2 or greater or a WC of greater than or equal to 80 cm for women or 90 cm for men [2,12].

Measurement of exposure variables: the exposure variables included in this analysis were collected using self-administered study questionnaires, which were available in either English or Tamil (the regional language). Study staff created the main questionnaire specifically for the D-CLIP trial. The questionnaires were pilot tested among study and clinic staff to assess clarity of the questions and quality of data collected from the instrument. The main study questionnaire collected data on demographic information, diet and physical activity behaviors, and weight loss history (methods used, outcomes of prior weight loss attempts). Current physical activity behaviors were assessed by asking about number of days per week exercising, average length of each exercise session, type of activities done, and location of activities. Average weekly frequency of fruit and vegetable intake (days per week eating fruit or vegetables) was assessed by the following questions: in a typical week, how many days do you eat fruit? In a typical week, how many days do you eat vegetables?

Exercise self-efficacy was measured using an instrument developed by Sallis and colleagues to measure self-efficacy for exercise behaviors [13]. This survey instrument measures an