Research Article

Perceived and Actual Risks of College Students for Developing Type 2 Diabetes

Claudia Sealey-Potts[1]* and Wanda Reyes-Velazquez[2]

[1]Department of Nutrition and Dietetics, University of North Florida, USA

[2]Department of Applied Communication, Higher Colleges of Technology-Dubai Men's College, UAE

*Corresponding author: Claudia Sealey-Potts, Department of Nutrition and Dietetics, University of North Florida, 1 UNF Drive, Jacksonville, FL.32224, USA

Abstract

Objectives: To examine college students' actual risk and perceived susceptibility for developing Type 2 diabetes (T2D).

Methods: A cross-sectional study involved 660 college students who consented to complete a questionnaire. Self-reported height and weights were obtained for Body Mass Index (BMI) calculations. Demographics and other lifestyle factors including perception of risks for the disease were obtained. Data were analyzed using SPSS version 21.0.

Results: College students underestimated their personal risk for T2D. Risk prevalence among this group was 30% and significant mean differences between perceived and actual risk scores were found. Higher proportion of Blacks/African Americans and Hispanic/Latino scored 10 or higher on actual risk for developing T2D.

Conclusion: These findings signify a need for intervention among college-age students.

Introduction

Diabetes affected 26 million (8.3%) people in the United States in 2010 (Centers for Disease Control and Prevention [1]. Of those, 10.9 million were older than 65 years, approximately 1.9 million new cases were over the age of 20 years, but 215,000 individuals were younger than 20 years old. Research has also shown an increase prevalence of Type 2 Diabetes (T2D) among people in their 30s [2-4], and data from the SEARCH for Diabetes in Youth [5] multicenter study reported an increase in T2D prevalence among 10-19 years old. This increasing trend of T2D can have devastating consequences unless urgent prevention strategies are applied.

Obviously, T2D affects the young. College students are not exempted and should be targeted for assessment and preventive interventions that can foster appropriate lifestyle changes. This study sought to assess college students' T2D knowledge, actual risk profiles, and perceived susceptibility for developing the disease.

T2D accounts for 90-95% of all diagnosed cases of diabetes and it is linked to an interaction between non-modifiable risks (i.e. family history) and behavioral and/or environmental risk factors [6]. Obesity and physical inactivity are major contributors to the number of diagnosed cases of T2D and research has documented that addressing modifiable risk factors like obesity, diet, and physical inactivity can delay the onset of the disease [7-9].

Diabetes now affects about 1 in every 400 children and adolescents in the United States [1,10]. Prevalence data on the young is sparse, but existing literature noted that common risk factors such as obesity, physical inactivity, family history, gender and socio-economic status are observed in youths diagnosed with T2D [11-14].

The diabetes trend is likely to expand in the next few decades. With79 million adults in the United States now classified as having pre-diabetes, a condition defined as blood sugar levels higher than normal, but not high enough to be diagnosed as T2D, it is important to recognize that these individuals are at greater risk for developing T2D[1]. Researchers suggest that the increasing occurrence of these conditions seen in younger age groups may be linked to larger numbers of high-risk ethnic groups, the obesity epidemic, and other lifestyle factors [1,16-17]. In addition, family history of diabetes is strongly connected to an individual's risk for future development of the disease. Valdez, Yoon, Liu, and Khoury [18] reported that independent of sex, race and ethnicity, age, and Body Mass Index (BMI), family history of diabetes had a significant, independent and marked connection with diabetes. The evidence showed that individuals with at least one first-degree relative in the same maternal or paternal ancestry with T2D (moderate familial risk) and at least two first-degree relatives (high familial risk) with T2D from the same lineage were 2.3 and 5.5 times more likely to have T2D, respectively [18].

Identification of risk factors for developing T2D is critical for use in the development of multi-strategy intervention and prevention programs. College-age students have consistently exhibited high prevalence of T2D risk factors such as overweight, or obesity, physical inactivity, and unhealthy dietary practices [9,19-21].

Research on diabetes prevention programs have shown that among high risk individuals, the incidence of developing T2D can be significantly decreased by means of lifestyle modifications [22,23]. However, common challenges encountered in diabetes prevention efforts include identification and lack of awareness on the part of those individuals at high risks for developing T2D [24]. Individuals must acknowledge their susceptibility to disease risks, so that prevention programs can be tailored to meet their behavioral needs [24].

Perceptions of risks have been the basis of health behavioral

theories like the Health Belief Model [25,26] and Common Sense Model [27]. Some health behavior theories claimed that a high perceived risk of impairment or perceived severity and perceived susceptibility are key factors in predicting whether an individual can gain confidence and adopt healthy behaviors to reduce the risk of specific diseases [25,28,29]. It is also well established that perceptions about specific lifestyle diseases that individuals have may suggest how the particular diseases are viewed and signify health protective measures the individuals may or may not obtain to decrease potential risks for the diseases [30-32].

How individuals perceive their risk for specific diseases is frequently and substantially incongruent with their actual risk. An individual's judgment of his or her personal risks is often blurred by a sense of invulnerability. Studies have found that most individuals judge themselves to be at a lower risk for negative occurrences than the average person similar to them [33,34] and young people do not appreciate their risk for developing chronic disease [34]. There is a common tendency of individuals to be over confident about the scope of their disease knowledge [35]. The evidence suggests that risk perceptions may be an important determinant of behavior change.

In relation to diabetes prevention, higher, accurate perceptions of personal risks may encourage a healthier lifestyle, including a healthy diet and sufficient physical activity. On the other hand, lower personal perception of risks may act as a barrier to preventive health behaviors and foster behavioral interventions. In addition, perception of risks for developing T2D may have an influence on how preventative health communications are received by individuals. Consequently, identification of T2D knowledge, personal risk perceptions and actual risk profiles for college students is important for effective health promotion and disease prevention applications.

There is a dearth of evidence on college students' personal perception of risks and knowledge for developing T2D [34,36]. Smith et al. [34] reported that college students considered the risks for developing diabetes to be less than other chronic disease conditions and did not appreciate nor acknowledge their risks for developing T2D. This seems to suggest that college students are underestimating their T2D risks. Andriaanse et al. [32]found that individuals with high and low risk profiles perceived diabetes as a serious disease, but approximately one-half of the individuals (high risks included) did not know their personal risks. Findings of this nature have practical implications and highlight a greater need for educators to address personal risk perceptions, increase diabetes awareness and foster deeper understanding of T2D and its risk factors among the young.

The present study

Derived from the literature reviewed, the following Research Questions (RQ) were developed to guide this exploratory research:

RQ1: What is the actual risk score and T2D risk prevalence for this target audience?

RQ2: Are there significant mean differences for actual risk scores and college students' perceived susceptibility for developing T2D?

Materials and Methods

urvey instrument/measures

A closed-ended, 27-item survey was developed and employed by the investigators in order to examine perceived and actual risks for T2D, Body Mass Index (BMI), and lifestyle behavior factors associated with the disease. The survey instrument was developed based on a comprehensive review of literature and the questionnaires that had been used in similar studies across the United States [7,37-39]. The instrument consisted of the following subsections:

Demographics: The demographics included ethnic background, age, gender, weights and heights. BMI was calculated using self-reported weights and heights and used to classify participants' weight status as underweight (BMI= <18.5), healthy weight (BMI=18.5-24.9), overweight (BMI=25.0-29.9), obese (BMI=30-39.9) or morbidly obese (BMI >40). A 5-point rating scale ranging from 1 (poor) to 5 (excellent) was used in assessing participants' opinion of their health status, nutrition quality of their diet, and nutrition knowledge.

Perceived susceptibility: Two dimensions of this construct were measured. First based on the work of Weinstein [37], college students were asked to identify whether they perceived themselves to be at risk, or if they thought their peers were the ones more at risk for developing T2D in the future. That dimension will be referred to as personal risk and the response option for that statement was "I am at risk or my peers are at risk". The second dimension referred to as perceived likelihood [38] used two statements. A sample statement was: "*Based on your lifestyle, do you think you are at risk for developing T2D?*" Response options for this statement were: I have "great risk, some risk, no risk, not sure of my risk". Reliability coefficient of .621was obtained for the two statements measuring perceived likelihood.

Actual risk of participants: Risk factors for developing T2D, as established in literature [15,39] were measured and participants' actual risk was calculated using CDC's [39] diabetes screening guidelines. Indicators used for scoring actual risk include: Parents with diabetes (1 point), sister or brother with diabetes (1 point), overweight or obese classification (5 points), age younger than 65 years with less than 3 days/week of physical activity (5 points), family background as African American, Hispanic/Latino, American Indian, Asian, American or Pacific Islander (1 point). Interpretation for actual risk was as follows: a score of 3-8 points means low risk, and 9 points or more means an individual is at high risk for developing prediabetes or T2D [39].

Other lifestyle factors: Fruit and vegetable consumption was measured with 2 questions using a like rt-type scale format. A sample of the question was: "*On average, how many servings of fruits do you eat each day*"?Response options for these questions were: none, one, two, three, and four or more.

Validity and reliability of instrument

Eight professionals in the field of nutrition, health and communication reviewed the questionnaire to establish face validity. Other measures of validity included factor analysis that verified how well various items were related to the theoretical concepts under observation, and literature review. Feedback from the experts resulted in necessary changes prior to administration. Internal consistency was computed using Cronbach's alpha for various sections.

Participants: Participants were students enrolled in various programs and courses at a midsized State University. The criteria for study participation included enrolment in any university course

Table 1: Demographics characteristics and participants' rating for specific variables (N = 660).

Variables	Number	Percentages
Gender		
Males	243	36.8
Females	417	63.2
Ethnicity		
Caucasian	446	67.6
Black/African American	103	15.6
Hispanic/Latino	77	11.7
Other	30	4.5
No Response	4	0.6
Health Status		
Excellent	44	6.7
Very good	169	25.6
Good	319	48.3
Fair	113	17
Poor	15	2.4
Nutrition Quality of Diet		
Excellent	17	2.6
Very good	74	11.2
Good	245	37.2
Fair	250	38
Poor	74	11
Nutrition Knowledge		
Excellent	47	7.1
Very good	163	24.7
Good	242	36.6
Fair	167	25.3
Poor	38	5.8
No Response	3	0.5
Weight Status		
Healthy weight (BMI=18.5-24.9)	363	55
Overweight (BMI =25.0-29.9)	162	24.6
Obese (BMI =30-39.9)	73	11.1
Morbid Obesity (BMI ≥40)	32	4.8
Underweight (BMI <18.5)	28	4.2
No Response	2	0.3

and reading and signing an informed consent form approved by the university's Institutional Review Board.

Data collection and analyses: Professors and Instructors representing five colleges were contacted via e-mail prior to the start of the fall semester and asked to participate in the study. Fifty (50) professors agreed to have investigators utilize a period of their class time for recruitment and administration of the questionnaire. A six-page, self-administered questionnaire was distributed during the first 15 minutes of a class period to consenting students. Participation was voluntary. Researchers instructed the students to read, sign and retain a copy of the consent form. Once the questionnaire was administered students were given approximately 15 minutes for completion and a researcher collected the completed questionnaires. Statistical Package for Social Sciences (SPSS version 21.0, SPSS Inc., Chicago IL, 2012) was used to analyze the data.

Results

Six hundred and sixty (660) students participated in the study. The mean age was 20.9±3.8 years and mean Body Mass Index (BMI) was 24.91±5.8. While 55% of the participants reported weights within healthy range, 40.5% were classified as overweight, obese, or morbidly obese. Table 1 shows the overall distribution for demographic categories. More females and Caucasians were enrolled and the majority rated their nutrition knowledge and health status as good, very good, or excellent. Results also showed that more males (55.4%, n=134) were in the overweight to morbidly obese categories than females (30.2%, n=126).

The first research question asked what were the actual risk scores and the risk prevalence for the participants. Results showed an overall mean of 6.63±3.8 for participants' actual risk score. Further breakdown of actual risk scores by ethnicity indicated that 41.3% -African American, 39% -Hispanic/Latino, 26% -Caucasian and 29% -classified as "Other" scored 10 points or higher on actual risk for developing T2D. The risk prevalence for developing T2D among this group was 30%.

The second research question asked: are there significant mean differences for actual scores and college students' perceived susceptibility for developing T2D? One-way ANOVA was used to analyze personal risk, and a significant difference was found between groups (I am at risk $\bar{x}$ =8.74±3.3, n=157, my peers are at risk $\bar{x}$ =5.98±3.7, n=494; F=69.617, df =1, p=0.000). A two-way ANOVA was conducted for perceived likelihood. The main effect revealed that actual risk scores were significantly different for participants' responses related to lifestyle $F(4,650)$ =7.085, p<0.001, partial η^2= 0.42). Actual risk scores were not significantly different for responses based on family background $F(4,650)$ =.948, p>0.05, partial η^2= 0.004). Bonferroni's post-hoc test was conducted to determine which group was significantly different in actual risk scores for both statements. Results showed that individuals who reported they had "great risk" or "some risk" for developing T2D because of their lifestyles scored significantly higher (p<0.001) on actual risk than individuals who stated they had "no risk" or were "not sure of their risk" for developing the disease. Similarly, post-hoc results for participants' responses to the question based on family background showed that participants who reported they had "great risk" scored significantly higher than participants who stated they had "no risk" (p<0.001) and were "not sure" of their risk (p =0.003). Participants who reported "some risk" scored significantly higher (p<0.001) on actual risk scores than participants who reported "no risk" for developing the disease.

Results of the descriptive analysis for fruits and vegetables consumption showed mean intakes of 1.15±.91 servings of fruits and 1.50±1.03 servings of vegetables were consumed. These results indicate that participants did not meet the recommendation for at least five servings of fruits and vegetables each day.

Discussions

The notion that college students are healthy may be widely

accepted, but the findings of this study indicated that over 40% of the participants surveyed were found to be heavier than what is considered healthy weight. Specifically, more males (55.4%) were overweight or obese than females (30.2%). Similar findings were reported by the American College Health Association [19] which showed that 28.9% of college females and 39.3% of college males were likely to be overweight or obese. In addition, T2D risk prevalence was found to be 30% and participants were not consuming the recommended intake of at least 5 servings of fruits and vegetables each day. These findings are supported by other studies using college students [21,40,41].

According to Valdez et al., [18] individuals with at least two first-degree relatives with diabetes were 5.5 times more likely to develop T2D. Actual risk was calculated using CDC's [39] risk screening tool and an overall mean of 6.63 was found which indicates a low risk for T2D in the overall group. However, further analysis of the data showed that 30.4% of the sample scored more than 9for actual risk and as such is classified as having high risk for developing T2D. Findings from this study therefore suggest that there is need for T2D intervention in college-age students.

Smith et al. [34] reported that college students showed high perception of cancer risks, but underrated their risk for other diseases that were related to being overweight or obese. Similar findings were observed in this study; more students (n=494) perceived their peers to be at greater personal risk for developing T2D than self (n=175). Evidence from theoretical frameworks has indicated that low perceived susceptibility promotes inaction [25], as such; educators and healthcare professionals must provide early intervention so as to decrease the prevalence rate among the young.

Smith et al. [34] also found incongruence between college students' perceived likelihood for developing disease over their lifetime and actual disease risk. Post-hoc multiple comparisons tests showed that actual disease risk scores were significantly different (p<.001) among students who reported great risk ($\overline{x}$ = 10.14) compared to those who stated they had no risk ($\overline{x}$ difference = 4.50) or were not sure ($\overline{x}$ difference = 3.34) of their risk for T2D. These findings indicate that there was congruency in this sample; college students whose actual disease risk scores were high also stated they had great risk based on their lifestyle and family background compared to those who reported no risk or not sure of their risk. Although this study' results show a need for more research on perceived susceptibility and actual disease risk among college students, it is important to note that this sample acknowledges its risk and is poised for prevention programs as suggested by Graham et al. [24].

Another important observation in this study was that almost half (n=300) was unsure of their personal risks based lifestyle behaviors and 26% were not sure of the risk based on family history. This mirrors the findings of Andriaanse et al. [32] who found that individuals with high and low risk profiles did not know their personal risk and as such underestimated their disease risks. Evidently, there is need for T2D education among college students. Current data depicts increasing diabetes trend among the young [1,10]; as such this study's findings are essential and underscore needed areas for prevention of T2D in college-age students.

Limitations

There are limitations to this study that should be considered carefully. First, the study included the convenience sample from one university, so it is necessary to investigate other locations. Secondly, the study relied on self-reported data for heights, weights, exercise and dietary intakes of fruits and vegetables and any of these could have skewed the outcome of the study. Finally the study did not account for cultural differences as it related to identifying risk perceptions.

Conclusion

Literature search showed that limited studies exist on perceived risks and actual disease risks. Data is scarce for this group, but documented evidence exists to support the increasing prevalence of T2D among the young. Conflicting evidence now exist for congruence on perceived and actual risk of college students in the development of T2D, so it is important that educators conduct more research in this area. It may necessary to isolate groups,and address these issues through targeted awareness educational intervention.

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