

Assessment of College Students' Risk Level, Behaviors, Knowledge and Attitude of Type 2 Diabetes at the University of Tampa

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ABSTRACT

The purpose of this study was to assess the risk of type 2 diabetes among Black/African American and White/Caucasian male and female students at the University of Tampa using a validated survey instrument for comparison based on a point system for level of risk. Secondly, it was to determine through descriptive statistics if there is the need for a Diabetes Awareness Program at the university based on the current behaviors, attitudes and knowledge of students. Researchers surveyed students to evaluate type 2 diabetes risk levels. The surveys were hand delivered to students at the Vaughn Student Center during normal school hours. Questions based on known risk factors were assigned point values and given a total score that ranged from 0 to 18. These scores were then used to assess low, intermediate and high risk levels. Additional questions on behaviors, attitudes and knowledge regarding type 2 diabetes assessed the need for an awareness program. The researchers used SPSS (ver. 22) to analyze the descriptive statistics to establish the means, standard deviations and percentages of data collected. Total scores were higher for men who averaged 4.000 ($s = 1.431$) while women averaged 2.633 ($s = 1.537$). Total scores were also higher for Black/African Americans who averaged 4.086 ($s = 1.380$) as opposed to White/Caucasians who averaged 2.546 ($s = 1.606$). Risk levels ranged between low and intermediate, with no student having a high-risk level. Students scored very high when asked about their attitude and knowledge of type 2 diabetes. However, percentages for the questions regarding their behavior were much lower, except for the question regarding physical activity.

1 INTRODUCTION

In preparation for this study, the authors researched available literature concerning the prevalence of type 2 diabetes, specifically amongst college students. The results of this literary review produced only a small amount of information and revealed that very few type 2 diabetes studies have been conducted on this target population. With cases of diagnosed type 2 diabetes increasing in younger populations, it is vital to gain an understanding of college students knowledge and attitudes towards this disease (Centers for Disease Control and Prevention., 2014a). Since they are oftentimes leaving home for the first time and are no longer under the direct supervision of parents, it is up to them to establish how they will eat and how much physical activity they will schedule in their weekly routine. Decisions regarding smoking, alcohol, and stressful situations will be solely up to them. Type 2 diabetes, the most common form in the USA, is a condition that causes

blood glucose (sugar) levels to rise due to insulin resistance, a condition in which the body is incapable of using insulin properly (American Diabetes Association, 2014). Insulin receptor sites on cell membranes become blocked by fat deposits, thus preventing insulin from signaling the cell to pull glucose out of the bloodstream (Willis & Hunt, 2012). When this occurs, the pancreas attempts to compensate by producing more insulin but eventually cannot make enough to keep blood glucose levels normal (American Diabetes Association, 2014). It is important to know the risk factors that contribute to the disease so appropriate steps can be taken to minimize risk; however, people cannot control all their inherent risk factors and need be aware of them. The impact from factors that cannot be controlled (age, gender, personal medical history, family history, and race/ethnicity) can be reduced by modifying the factors that can be changed. These modifications include minimizing weight, tobacco and alcohol use, staying physically active and regulating diet (Harvard School of Public Health, 2008). Changes in lifestyle and/or the use of medication can also reduce the likelihood of getting the disease. Results obtained through a study conducted by Knowler et al. (2002) showed that type 2 diabetes could be prevented or delayed for many people. In this study, lifestyle modifications lowered the incidence rate of type 2 diabetes by 58 percent, while the use of the medication metformin lowered it by 31 percent.

Studies conducted on college students, which assessed their knowledge of type 2 diabetes, have shown varying levels of knowledge mostly ranging from fair to poor. Many students are unable to identify the cause of diabetes, or the problem the body has in processing dietary sugar (Yahia et al., 2014). Risk factors are often confused with the cause and there is a predominant belief that type 2 diabetes is a result of being overweight and not eating right. Though most students believed that a healthy lifestyle was important, many could not explain what lifestyle could prevent diabetes. Most mentioned that there were good and bad foods, but were not able to explain what they were other than bad foods consisting of sweets, hamburgers and fries. Many students indicated that cardiovascular exercise was important, but did not know that exercise should last for at least 30 minutes (Reyes-Velazquez et al., 2011). Finally, there is a fair level of knowledge that heredity is a major risk factor for diabetes (Yahia et al., 2014). Unfortunately, many students do not believe that type 2 diabetes is preventable for people who have family members diagnosed with the disease (Reyes-Velazquez et al., 2011).

Periodically, a survey is administered by the National Diabetes Education Program (NDEP) known as the NDEP National Diabetes

Survey (NNDS). The purpose of this survey is to gain insight from the U.S. adult population on what their knowledge, perceptions, and behaviors are regarding diabetes. Piccinino et al. (2015) analyzed survey data and placed participants into one of four categories: people with diabetes, people with pre-diabetes, people at risk, and all others. Current trends deduced from these surveys indicate that diabetes awareness is increasing but risk perceptions are still low in spite of exposure to awareness programs. Except for those diagnosed with pre-diabetes, perceptions of acquiring the disease remained for the most part unaffected by educational programs. This implies that knowledge of the disease is not translating into behavioral modifications necessary to prevent or reduce the risk of developing it. In fact, Dickerson et al. (2011) reported in their study that students acknowledged the importance of behavioral risk factors in the development of diabetes, but then noted that students personal behaviors were still not affected by this awareness. Students placed greater influence on ethnicity and heredity as causes for diabetes, minimizing the impact that behavioral risk factors have on developing diabetes. With this current point of view, students are less likely to participate in behaviors that could help prevent the disease. However, many students are at an increased risk for diabetes due to being overweight, not engaging in enough physical activity, and not having a proper diet (Burke et al., 2009). While type 2 diabetes might not yet be perceivable among college students, some already have pre-diabetes. Huang et al. (2004) studied metabolic syndrome in 163 college students at the University of Kansas and found 6% of them to have pre-diabetes.

The Centers for Disease Control and Prevention (CDC) has provided data on their website documenting the trends in diagnosed diabetes for race/ethnicity from 1997–2011. As of 2011, the CDC found that rates of diabetes are higher in African-Americans (12.4 per 1,000) than in Caucasians (7.0 per 1,000) (Centers for Disease Control and Prevention, 2014b). The CDC has also documented trends in diagnosed diabetes by sex from 1980–2011. As of 2011 rates of diabetes is slightly higher in men (7.7 per 1,000) than in women (7.5 per 1,000) (Centers for Disease Control and Prevention, 2014c). These timelines show that African-Americans have a history of having higher rates of diagnosed diabetes and are thus typically at a greater risk than Caucasians for developing the disease, and that men have a higher rate of diagnosed diabetes and are typically at a greater risk than women. The latest studies, as of 2012, from the CDC reinforce this fact by showing that 13.6 percent of men versus 11.2 percent of women have been diagnosed with diabetes, and that 7.6 percent of non-Hispanic whites versus 13.2 percent of non-Hispanic blacks have been diagnosed with diabetes (Centers for Disease Control and Prevention., 2014a). Additionally, statistics from a youth study conducted in 2009 show type 2 diabetes is starting to become more prevalent in younger populations with several cases appearing between the ages of 10–19. More frightening is the appearance of type 2 diabetes among children less than 10 years old. Out of a population of 3,458,974 youth, 837 of them were recognized as having type 2 diabetes (0.24 per 1,000) (Pettitt et al., 2014).

Over 20 million people in the United States have type 2 diabetes, even though it is a preventable disease. Although diabetes rates are beginning to decline, the incidence rate is still very high. Knowing current behaviors, attitudes and knowledge regarding diabetes could lead to a better understanding as to why the rates are still elevated. The purpose of this study was to assess the risk of type 2 diabetes

among Black/African American and White/Caucasian male and female students at the University of Tampa using a validated survey instrument for comparison based on a point system for level of risk. It is hypothesized that the risk levels of college students will follow the current national trends published by the CDC in that a greater number of men vs women and a greater number of Black/African Americans vs White/Caucasians will be at risk for type 2 diabetes. The second purpose for this study was to determine through descriptive statistics if there is the need for a Diabetes Awareness Program at the university based on the current behaviors, attitudes and knowledge of students.

2 METHOD

Once the group received approval from the university's institutional review board, we conducted a cross-sectional study with a systematic sampling of the population. The University of Tampa is a private college. As of Fall 2014 there were 7,752 students enrolled, which consisted of students from 50 states, as well as 1,355 international students from 137 countries. Approximately 55.2% of the undergraduate students were women and 44.8% were men. The ethnicity of students from the U.S. consisted of 66.1% White, 6.4% Black/African-American and 27.4% other ethnicities. Participants surveyed were male and female college students currently attending the university. No ethnicities were excluded from the survey; however, our comparison of the CDC's ethnicity statistics with our results only focused on White/Caucasian and Black/African-American race/ethnicities.

The survey asked students to assess their risk of developing type 2 diabetes, along with behaviors, attitudes and knowledge of the disease. Questions from the survey were both quantitative and qualitative in nature. The surveys were hand delivered to students at the Vaughn Student Center during normal school hours. No personally identifiable information was included in the survey, which could tie the survey to the participant. The group compared the results of the risk assessment portion of the survey with the CDC national trends of diagnosed diabetes in the United States to determine if the students risk levels followed the current national trends for gender and race. Approximately 1% of the student population was surveyed. The sample population ($N = 91$) averaged 54% women ($N = 49$) and 46% men ($N = 42$). The ethnicities averaged 48% White/Caucasian ($N = 44$), 39% Black/African American ($N = 35$), and 13% other ($N = 12$).

3 DATA ANALYSIS

All variables were analyzed on SPSS for descriptive statistics. Quantitative variables (number of students, age, height, weight) were treated as continuous using the ratio scale of measurement to establish measures of mean and standard deviation. All other variables were quantitative and treated as categorical using the nominal scale of measurement to establish percentages. Questions 1 through 13 of the survey were used to acquire the data necessary to assess disease likelihood in participants. These questions were based off risk factors known to contribute to type 2 diabetes. The point system used for this survey was developed by the American Diabetes Association (2015) and the Harvard School of Public Health (2008), and are commonly weighted data points that were

developed to determine the level of risk for acquiring type 2 diabetes. Using this validated scale, points were attributed to the various risk factors and totaled to determine risk. The total score, determined by the sum of the point values given for each answer, was used to ascertain each participants level of risk for developing type 2 diabetes. The total score for each person ranged from 0 to 18. A participant was considered to be at low risk if they had a total score of 1 to 5, intermediate risk with a score of 6 to 11, and high risk with a score of 12 to 18. In SPSS, low risk was assigned a value of one, intermediate risk a value of two, and high risk a value of three. Thus, the statistical value of the risk level a person could fall into ranged from 1 to 3.

Questions 7 through 11 assessed student behavioral patterns while questions 14 and 18 examined their attitudes towards type 2 diabetes. Questions 15 through 17, 19 and 20 focused on students knowledge of the disease. Answers to the questions were then analyzed to determine what percentage of the sample population answered each one correctly. Tables 3 through 6 list the correct answer for each question followed by the percentage of students who answered the question correctly. A higher percentage indicated a greater knowledge, a healthy attitude, or correct behavioral patterns amongst the sample population depending on the particular question being answered, whereas a lower percentage indicated the opposite. The percentages were then used to assess the need for a diabetes awareness program at the University. If a high percentage of students knew the correct answers then an awareness program might not be beneficial. However, if only a low percentage of students knew the correct answers then an awareness program could prove beneficial.

4 RESULTS

Based off the point system used in this study, total scores were higher for men who averaged 4.000 ($s = 1.431$) while women averaged 2.633 ($s = 1.537$). Total scores were also higher for Black/African Americans who averaged 4.086 ($s = 1.380$) as opposed to White/Caucasians who averaged 2.546 ($s = 1.606$). Upon conducting the risk assessment, risk levels were higher for men who averaged 1.143 ($s = 0.354$) while women averaged 1.044 ($s = 0.208$). Risk levels were also higher for Black/African Americans who averaged 1.143 ($s = 0.355$) as opposed to White/Caucasians who averaged 1.050 ($s = 0.221$). Risk levels ranged between low and intermediate risk, and no student showed a high risk of developing type 2 diabetes. This data follows the established trends published by the CDC in that men and Black/African Americans are typically at a greater risk than women and White/Caucasians. See tables 1 and 2 for risk assessment results.

Students scored very high concerning their attitude and knowledge of type 2 diabetes. The researchers analyzed student attitude and knowledge by gender and by ethnicity. For questions on attitude by gender, "Do you believe diabetes is something to be concerned about?" had the highest percentage (90.1%) with women (93.9%) having a higher percentage than men (85.7%). The question "People get type 2 diabetes because they are lazy and eat too much" had a lower percentage (80.2%) with women (89.8%) having a significantly higher percentage than men (69.0%). The same questions for attitude by ethnicity, "Do you believe diabetes

Table 1. Risk levels for diabetes by gender.

	Females	Males
Total Score	2.633 ± 1.537	4.000 ± 1.431
Score Range	0–6	2–8
Risk Level	1.044 ± 0.208	1.143 ± 0.354
Risk Level Range	1–2	1–2

Table 2. Risk levels for diabetes by ethnicity.

	White	Black
Total Score	2.546 ± 1.606	4.086 ± 1.380
Score Range	0–8	2–8
Risk Level	1.050 ± 0.221	1.143 ± 0.355
Risk Level Range	1–2	1–2

is something to be concerned about?" had the highest percentage (90.1%) with White/Caucasians (90.9%) having a higher percentage than Black/African Americans (88.6%). The question "People get type 2 diabetes because they are lazy and eat too much" had a lower overall percentage (80.2%) with Black/African Americans (80.0%) having a higher percentage than White/Caucasians (77.3%). All percentages for attitude questions are located in tables 3 and 4.

For questions on knowledge by gender, "Can type 2 diabetes be prevented?" had the highest percentage (91.2%) with women (91.8%) having a higher percentage than men (90.5%). The question "Can type 2 diabetes be reversed through diet and exercise?" had the lowest percentage (76.9%) with men (81.0%) having a higher percentage than women (73.5%). The same questions for knowledge by ethnicity, "Do you believe diabetes is something to be concerned about?" had the highest percentage (91.2%) with White/Caucasians (95.5%) having a higher percentage than Black/African Americans (85.7%). The question "Can type 2 diabetes be reversed through diet and exercise?" had the lowest percentage (76.9%) with White/Caucasians (81.8%) having a higher percentage than Black/African Americans (71.4%). All percentages for knowledge questions are located in tables 3 and 4.

Percentages for the questions regarding the behavior of college students were much lower except for the question regarding physical activity. Less than half of the students by gender (45.1%) and ethnicity (45.1%) eat 3 or more servings of whole grains per day. A little over half of the students by gender (52.7%) and ethnicity (52.7%) use oil-based salad dressing or liquid vegetable oil for cooking. However, the percentage of students who exercise on a regular basis was significantly higher by gender (84.6%) and by ethnicity (84.6%). All percentages for behavior questions are located in tables 5 and 6.

Table 3. Students' attitude and knowledge of diabetes by gender.

Question	Correct Answer	Female (N = 49)	Male (N = 42)	Total (N = 91)
Attitude				
Do you believe diabetes is something to be concerned about?	Yes	93.9%	85.7%	90.1%
People get type 2 diabetes because they are lazy and eat too much	No	89.8%	69.0%	80.2%
Knowledge				
Can type 2 diabetes be prevented?	Yes	91.8%	90.5%	91.2%
Can type 2 diabetes be reversed through diet and exercise?	Yes	73.5%	81.0%	76.9%
Only people who are overweight or obese get type 2 diabetes.	No	85.7%	85.7%	85.7%
Type 2 diabetes is a result of chronically high blood sugar.	Yes	75.5%	83.3%	79.1%
Can stress contribute to high blood sugar?	Yes	81.6%	85.7%	83.5%

Table 4. Students' attitude and knowledge of diabetes by ethnicity.

Question	Correct Answer	White (N = 44)	Black (N = 35)	Total (N = 91)
Attitude				
Do you believe diabetes is something to be concerned about?	Yes	90.9%	88.6%	90.1%
People get type 2 diabetes because they are lazy and eat too much	No	77.3%	80.0%	80.2%
Knowledge				
Can type 2 diabetes be prevented?	Yes	95.5%	85.7%	91.2%
Can type 2 diabetes be reversed through diet and exercise?	Yes	81.8%	71.4%	76.9%
Only people who are overweight or obese get type 2 diabetes.	No	84.1%	82.9%	85.7%
Type 2 diabetes is a result of chronically high blood sugar.	Yes	79.5%	77.1%	79.1%
Can stress contribute to high blood sugar?	Yes	90.9%	77.1%	83.5%

Table 5. Student behavior by gender.

Question	Correct Answer	Female (N = 49)	Male (N = 42)	Total (N = 91)
On an average day, do you eat 3 or more servings of whole grains per day (wheat bread, whole grain pasta, brown rice, oatmeal, whole grain breakfast cereal, bran or popcorn)? A serving is one slice of bread, 1 ounce of breakfast cereal or 1/2 cup of cooked cereal, pasta or rice.	Yes	55.1%	33.3%	45.1%
On an average day, do you eat more than 3 servings of refined starch per day (white bread, white rice, white pasta, white potatoes or low fiber cereals like crispy rice and corn flakes)? A serving is one slice of bread, 1 ounce of breakfast cereal or 1/2 cup of cooked cereal, pasta or rice.	No	65.3%	52.4%	59.3%
Do you eat oil-based salad dressing or use liquid vegetable oil for cooking on most days?	Yes	46.9%	59.5%	52.7%
Do you walk continuously (or do other moderate activity) for at least 30 minutes on most days, or at least 3 hours per week?	Yes	87.8%	81.0%	84.6%

Table 6. Student behavior by ethnicity.

Question	Correct Answer	White (N = 44)	Black (N = 35)	Total (N = 91)
On an average day, do you eat 3 or more servings of whole grains per day (wheat bread, whole grain pasta, brown rice, oatmeal, whole grain breakfast cereal, bran or popcorn)? A serving is one slice of bread, 1 ounce of breakfast cereal or cup of cooked cereal, pasta or rice.	Yes	40.9%	51.4%	45.1%
On an average day, do you eat more than 3 servings of refined starch per day (white bread, white rice, white pasta, white potatoes or low fiber cereals like crispy rice and corn flakes)? A serving is one slice of bread, 1 ounce of breakfast cereal or cup of cooked cereal, pasta or rice.	No	38.6%	40.0%	40.7%
Do you eat oil-based salad dressing or use liquid vegetable oil for cooking on most days?	Yes	47.7%	57.1%	52.7%
Do you walk continuously (or do other moderate activity) for at least 30 minutes on most days, or at least 3 hours per week?	Yes	88.6%	80.0%	84.6%

Table 7. Demographics and student characteristics by gender.

	Females	Males	Total
Number of students	N = 49	N = 42	N = 91
Age (Years)	20.1 ± 1.6	21.1 ± 3.2	
Height (in)	64.9 ± 2.5	70.0 ± 4.3	
Weight (lb)	138.7 ± 25.1	175.7 ± 23.7	
Waist size	≥ 35 in = 43 < 35 in = 5	≥ 40 in = 38 < 40 in = 4	
Ethnicity			
White	22	22	44
Black/African American	20	15	35
Other	7	5	12
No. Cigarettes Smoked	> 14 = 0 15 – 25 = 0	> 14 = 2 15 – 25 = 1	3
Diagnosed w/High Blood Pressure	1	0	1
Family History of Diabetes	15	7	22

5 DISCUSSION

The results of the study proved our hypothesis to be correct. We hypothesized that the risk levels will follow the current national trends in that a greater number of men vs women and a greater number of Black/African Americans vs White/Caucasians will be at risk for type 2 diabetes. The risk assessment portion of the survey showed this to be true. In addition, even though most of the students showed only a low risk for type 2 diabetes, some students did fall into the intermediate range. Unless these students change their lifestyles, it is a good possibility that they will eventually develop the disease.

Statistics published by CDC indicate that the number of those diagnosed with diabetes is starting to decrease. This could be due to an increased awareness of the disease and how to prevent or reverse it. The students in this survey showed a high level of knowledge regarding type 2 diabetes in that over 90% know that it is preventable, with none of the total percentages for knowledge and attitude falling below 76.9%. It is interesting to note however, that though most students seemed to know that type 2 diabetes is preventable and indicated diabetes as something to be concerned about, their current eating behaviors seemed to indicate little belief of being in any danger of getting the disease. This seems to corroborate what Piccinino et al. (2015) and Dickerson et al. (2011) noted in their study. Their participants showed a high level of knowledge regarding type 2 diabetes, but their perceived risk of actually getting the disease remained low.

Furthermore, it is also interesting to note that though most students know type 2 diabetes is avoidable, fewer of them knew that it is caused by chronically high blood sugar. Therefore, even though students knew it could be prevented, they had less knowledge on how to actually do so. This finding is in agreement with the outcome of Reyes-Velazquez et al. (2011). When asked about how to prevent diabetes, many students could not explain what type of lifestyle was needed to prevent diabetes. Furthermore, most students mentioned that there were good and bad foods, but were not able to explain what they were.

The strength of this study is that it is the first of its type conducted at the university. It provides a baseline of information regarding type 2 diabetes on the students, and gives initial insight into their current risk levels. It also provides an understanding of the current behaviors, attitudes, and knowledge of type 2 diabetes, giving an initial starting point for determining the need for an awareness program. A limitation for this study was that questions regarding alcohol consumption were omitted from the survey due to many participants being under the age of 21. Alcohol is a known contributor to type 2 diabetes and is commonly consumed by college students. This information would have provided a more accurate risk assessment and would have aided in establishing student behavior. In addition, students found some of the questions confusing, which might have resulted in a different answer than what was intended. Also, since questions were not worded to be medically accurate they could be perceived as being misleading and might have been a reason for students' confusion. Another limitation for this study is that only a basic analysis of the data was conducted to establish means, standard deviation, and percentages. Statistical tests were not conducted, preventing the ability to establish statistical significance of data. Finally, the size of the sample population was low and only represented approximately 1%

of the total student body. A small sample size along with a lack of statistical tests prevented the ability of applying study findings to the entire student population.

If given the opportunity to repeat the study, a change to the grading scale for the risk assessment portion of the study is worth considering. There is always a risk when using a height/weight chart to determine if a person is overweight in that the result may not be an accurate reflection of overall body composition. A person who has a large amount of muscle mass could weigh more than what is allowed for on the chart even though their fat percentage is low. Using an alternate method, such as a skinfold analysis, to assess whether a person is overfat instead of overweight could potentially provide a more accurate risk assessment. Although it would take more time to conduct, along with a willingness from participants to have body measurements taken. Also, a larger sample size is necessary in order to make inferences predicated on research findings.

6 CONCLUSION

It is our hope that this study will be a springboard off which more in-depth and detailed studies regarding type 2 diabetes in college students can be conducted. This is the first of this type of study conducted at the university, and has provided a great deal of insight regarding type 2 diabetes among college students. A more in-depth study into the perceptions of college students belief on actually getting type 2 diabetes could give direction on how to proceed with creating an effective awareness program. In addition, a cohort study following students starting as freshmen through college and beyond could provide a great deal of insight into what habits started in college may contribute to type 2 diabetes later in life.

Currently there is no diabetes awareness program at the University of Tampa. With our findings on the behaviors, attitudes, and knowledge of college students regarding type 2 diabetes there does seem to be a place for an awareness program. It is important to educate students about the possible future consequences of their current actions. Students need to know what causes type 2 diabetes and how to prevent it. It is also important to know that type 2 diabetes is reversible and lifestyle choices are necessary to make that happen.

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