Exploration of Type 2 Diabetes Risk Among Health Sciences Center Students

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Abstract

The aims of this study were to 1) explore type 2 diabetes risk prediction among students at Kuwait University Health Sciences Center (KUHSC), 2) assess the Body Mass Index (BMI) and, 3) find correlation between the risk of type 2 diabetes and BMI among students at KUHSC.

A stratified random cross-sectional study of a population size of 1,799 registered students at KUHSC was conducted. Five hundred and thirty-two questionnaires were distributed based on statistical power calculations. A modified FINnish Diabetes RIsk SCore (FINDRISC) questionnaire was adopted to investigate the risk of type 2 diabetes among students. The BMI was calculated explored the correlation with the type 2 diabetes risk scores. ANOVA, X2 test and Pearson correlation coefficient test were used. $p < 0.05$ was considered statistically significant.

The response rate was 498 (93.6%). More than half of the sampled population, 273 (54.82%) of the students were in the very high-risk group of developing diabetes. One hundred and eighty- one (36.35%) were in the high-risk category and 44 (8.83%) were in the low -moderate risk group. The BMI analysis showed 235 (47.30%) participants were within normal range (18.50 – 24.99), while 184 (37.0%) were in the BMI pre-obese range (25 – 29.99), and 67 (13.5%) students were in the obese range, with a BMI $\geq$ 30.

The diabetes risk prediction was high compared to same age groups in different regions. The correlation of type 2 diabetes risk prediction and BMI was statistically significant. The results of this study indicated that students at a relatively younger age have all the early indicators for type 2 diabetes risks in the future.

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Introduction

Diabetes affects more than 366 million people and is anticipated to increase to 552 million by 2030.[1] Type 2 diabetes could be related to many factors, to name few genetics, dietary behavioral changes, excessive caloric intake, and obesity. Obesity has it's own share with the global growing wave as approximately 1.5 billion adults classified as overweight.[2] Developing countries are also reporting a similar trend, with the potential increase in diabetes and cardiovascular diseases. The Body Mass Index (BMI) along with waist circumferenceare the underpinning criteria of the World Health Organization (WHO) classification of obesity; It is estimated that more than 1 in 10 adults worldwide are obese.[3]

Kuwait has a high obesity prevalence, with nearly one-third of Kuwaiti adults considered obese; partly due to the rapid modernizations that lead to changes in dietary habits paralleled with reduced physical activities.[4-7] Other influences included genetic factors, education level and the socioeconomic status.[8] Kuwait was third vis-à-vis the prevalence of diabetes, with a 23.3% prevalence reported in 2014. The WHO forecasts a worldwide increase from the current 104,000 to 319,000 diabetics by the year 2030.[9] Of concern, more than one third of diabetic patients may not be aware they are affected.[10]

The WHO confirmed the positive association between the risk of developing type 2 diabetes and obesity. Further, in 2010, it was concluded that with respect to type 2 diabetes, all anthropometric measures (BMI, waist

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circumference, waist–hip ratio and waist–height ratio) presented similarly in predicting risk of type 2 diabetes. Conversely, data from most of the cross sectional studies suggested that waist circumference might be more accurate indicators than BMI of the risk of diabetes.[11,12] The WHO have recommended sex specific cut-off points for waist circumference with respect to risk of metabolic diseases where measurement of waist circumference for males <94 cm and females < 80 cm are considered low risk of metabolic complications. Males of 94 cm – 102 cm and females of 80 cm – 88 cm are increased risk. Last, males with waist circumference of > 102 cm and females > 88 cm are considered at substantially increased risk of metabolic complications.[11]

There are a number of diabetes risk predictors essentially designed to detect individuals at risk and who should undergo regular testing for diabetes.[13,14] Of these, the FINnish Diabetes RIsk SCore (FINDRISC) is a well-established, reliable and validated screening tool that estimates the risk of developing type 2 diabetes.[15] The FINDRISC has been adopted by several countries such as Canada, Greece, United Kingdom, Sweden.[16-19] This survey tool is made up of eight self-reporting questions tailored to fit the purpose of predicting the risk of developing type 2 diabetes in 10 year forecasting range.[20]A modified version of FINDRISC was adopted inthis study to fit the selected age group; the age related question was eliminated since the age range of this cohort was ≤ 25 years of age and the scores were adjusted accordingly. The selected sample involved students who were matriculated and registered atKuwait University Health Sciences (KUHSC) Faculties(Medicine, Dentistry, Pharmacy, and AlliedHealth).

The aims of this study were to 1) explore type 2 diabetes risk prediction among students at the KUHSC, 2) assess the Body Mass Index (BMI) and, 3) find correlation between risk of type 2 diabetes to BMI among students at KUHSC.

Materials and methods

This was a stratified random cross-sectional study of the type 2 diabetes risk prediction and the exploration of correlation with BMI. The sampled population was registered students at the KUHSC four faculties (Allied Health, Dentistry, Medicine and Pharmacy). A study protocol approval was granted from the Health Sciences Center ethics committee (VDR/EC/1361). Following the students' agreement to participate, informed consent forms were completed. The students were assured of anonymity and privacy as well as data protection. There were no identifiable information in the questionnaire and participants were advised that their involvement in the study was voluntary.

A stratified random sample was proportionally selected according to the size of each faculty from overall enrolled 1799 students, at KUHSC in September 2013. Based on statistical power calculation and a confidence level of 99%, a margin of error of 0.05, a sample of 498 students was deemed satisfactory for this study. The distribution and collection process of the questionnaires were completed over a period of 4 months (September to December 2013). Further details on the research design and methods used in the 2016 study were published previously .[21]

Questions	Responses
1. Gender	☐ Male ☐ Female
2. Please indicate your height and weight	☐ Height cm ☐ Weight kg
3. What is your waist circumference? (Please use the provided measuring tape)	 ☐ > 94cm or 37inches ☐ Between 94-102cm or 37-40 inches ☐ Over 102cm or 40 inches  ☐ > 80cm or 31.5 inches ☐ Between 80-88cm or 31.5-35 inches ☐ Over 88cm or 35 inches
4. Do you usually have daily at least 30 min of physical activities at work and / or during leisure time?	☐ Yes ☐ No
5. How often do you eat vegetables, fruits or berries?	☐ Everyday ☐ Not everyday
6. Have you ever taken antihypertensive medication regularly?	☐ Yes ☐ No
7. Have you ever been informed to have blood glucose (e.g. in a health examination, during an illness, during pregnancy)?	☐ Yes ☐ No
8. Have any of the family members of your immediate family or other relatives been diagnosed with diabetes (type 1 or type 2)?	☐ No ☐ Yes: grandparent, aunt, uncle or first cousin (but not own parent, brother, sister or child) ☐ Yes: parent, brother, sister or own child

Appendix 1: FINDRISC questionnaire.

The original FINDRISC has 8 questions where each question was assigned a certain

score. The lowest score is less than 7 and the highest is more than 20. In this study, the sampled population were college students with the average age of 17-25 years, therefore; the question with regards to age was omitted and the scores were adjusted (Appendix 1).

In addition, the original FINDRISC have a question about the BMI withprovided instructions on how to calculate and fill the right box. In this study, the author elected to ask the participants to fill in the height and weight separately, then the BMI was calculated at the data entry phase. Also, the participants were asked to fill in the waist circumference; trained research assistants provided measuring tapes for accuracy and offered assistant as well. Three ranges of risk scores were developed based on the calculated total score for each participant. A score of zero to 14 was considered *low to moderate* risk, with a 1 – 17% chance of developing diabetes within the next 10 years. A score of 15 to 20 was considered *high risk*, with a 33% chance of developing diabetes within the next 10 years. Scores of > 21were considered a*very high risk* with a 50% chance of developing diabetes within the next 10 years.

The reliability of this part of the questionnaire was confirmed in a pilot study performed on 30 randomly selected students. The reliability and internal consistency were measured. The questionnaire was then adjustedconsequently to minimize measurement errors.

SPSS version 22(SPSS Inc., Chicago, Ill., USA) was used to perform all data analyses procedures. ANOVA and chi-square tests were used to test for differences between independent. Pearson correlation coefficient test is used to determine the correlation. p- values < 0.05 were considered statistically significant.

Results

A total of 532 questionnaires were distributed to reach the desired calculated sample size, that is 498 responses with a response rate of 93.6%. The reliability coefficient was 0.77 indicating a high level of reliability. Cronbach's alpha test was used to evaluate the internal consistency and averaged 0.69. The mean age was 22.4(±0.4),age range of the participants was 17 - 25 years, 389 (78.11%) females and 109 (21.89%) males. The mean height of participants was 1.64 cm (0.091), and mean weight was 69.03 kg (14.22). The mean BMI was 25.7 (4.4).

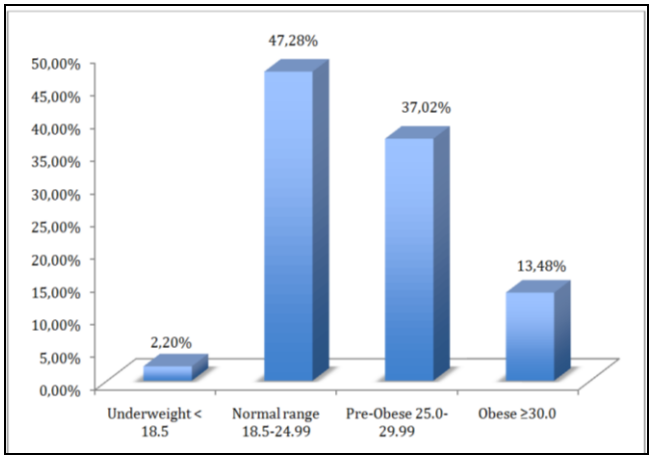

Figure 1. BMI percentages with respect to the WHO obesity criteria.

In the BMI analysis, 235(47.3%)participants were within normal range (18.50 – 24.99), while 184 (37.0%) were pre-obese with a BMI range (25 – 29.99), and 67(13.5%) were in the obese range, with a BMI ≥ 30. A slim percentage, 11 (2.2%), participants were underweight with a BMI ≤18.50. Figure 1 demonstrated the WHO BMI grouping of the sampled population. The differences in BMI in the four faculties were not statistically significant, (one way ANOVA, p = 0.313), indicating a pattern of similarity within the sample from the four faculties.

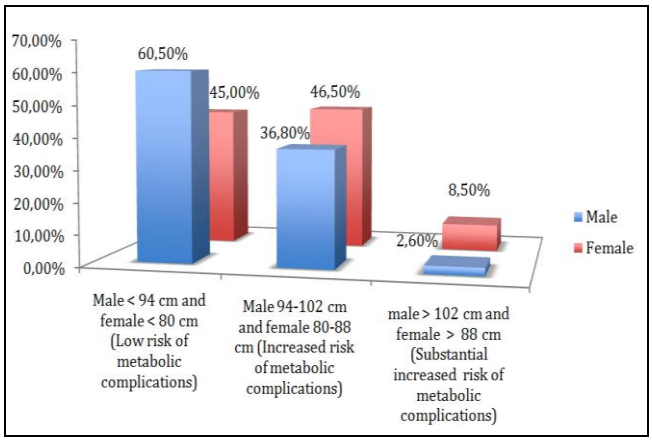

Figure 2. Waist circumference for males and females.

Of the sampled population, 66 (60.52%) males and 175(45%) females had a waist circumference of, male < 94 cm and female <80

cm. Male participants of waist circumference of 94 cm -102 cm, measured 40 (36.8%) for males and 80 cm – 88 cm for females, measured 181 (46.5%). Last, 3 (2.6%) of male participants measured > 102 cm, and females measured 33(8.5%) for waist circumference > 88(Figure 2).

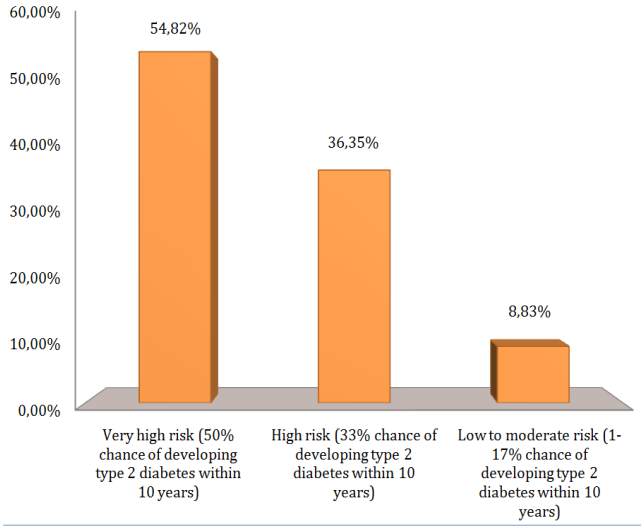

Figure 3. Risk scores of developing diabetes.

The average risk score (FINDRISC score) of developing diabetes was 20.77(4.63), which was within the high-risk category. More than 50% of the students, 273 (54.82%) were in the very high-risk group with a 50% chance of developing diabetes within the next 10 years. Besides, 181 (36.35%) participants were in the high-risk category with a 33% chance to develop diabetes within the next 10 years. Forty- four students (8.83%) were in the moderate risk group with a 1 – 17% (Figure 3).

The correlation test revealed that there was a correlation between the risk of developing type 2 diabetes and BMI detected (Pearson correlation coefficient test, r = 0.12, level of significance p = 0.033).

Discussion

The study indicated that the risk of developing diabetes among students, who are considerably young at age, was noticeably high especially when compared to similar age groups in different regions.[22,23]The FINDRISC results showed that more than 50% of the students fall in the high-risk group with a 50% chance of developing diabetes within the next 10 years,however;less than 10% had a low chance of developing diabetes within the next 10 years. Similar results were reported in older Kuwaiti age group by Al-Khalaf et al., where the sampled population were in the mid-30s, hadalso a high risk of developing diabetes.[10]Previous studies have attributed the risk of developing diabetes among college students to the college lifestyle [17] and behavioral factors.[24] The hectic Lifestyle of college students as well the behavioral risk factors could be among the most dominant influences for diabetes risk.[24]

This alarming result indicated an urgent need for awareness campaign targeting younger population for the purpose of educating them about diabetes as well as promotes healthier lifestyle by incorporating healthier diet and regular physical activities.

The BMI results illustrated that obesity starts at a young age in Kuwait, since more than one third of the participants were pre-obese and less than half of the sampled populationfall in the normal range. These results are in agreement with previous studies reported that Kuwait had high scoresfor BMI in the general population as well as among college students.[25,26]

Furthermore, The waist circumference scores exhibited that more than one third of male participants and approximately half of the female participants fall in the increased risk of developing type 2 diabetes according to the WHO cut-off points. The results conquered with previous studies that explored waist circumference and BMI in Kuwait.[7,10]

According to data from prospective studies show a wide range of relationships between waist circumference measures and risk of type 2 diabetes; henceforward, it would be difficult to conclude that measures of abdominal obesity are always superior to BMI in predicting risk.[27] However, most of the cross sectional studies showed that the waist circumference measures was slightly more accurate than BMI. Both measures, waist circumference and BMI, can both be used as tools for early detection of type 2 diabetes and cardiovascular diseases.[28]

The limitations of the study rested in that the data depended entirely on self-reported questionnaire where bias can be an issue due to the potential of over/underreporting of responses. Further, the accuracy of measuring the waist circumference might be perplexed.

Future plans to explore the relationship between college students' from different faculties

at Kuwait University and compare the results with various universities in the Persian Gulf region.

Conclusions

The type 2 diabetes risk prediction was high especially for the selected population. Besides, the BMI results indicated high percentages of pre-obesity and obesity results.Moreover, the correlation between the risk prediction of type 2 diabetes and BMI was statistically significant as confirming the results of previous studies.The results of this study suggest that authorities andhealth care professionals need to focus on the preventative lifestyle at an earlier stage that will impact positively on the present and future prevention of diabetes and cardiovascular diseases.
Clinical significance: The results of this study indicated that students at a relatively younger age have all the early indicators for type 2 diabetes risks in the future.

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Declaration of Interest

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