Perceived Risk of Diabetes (PRD) and Self-reported Diabetes (SRD) Risk Factors among University of Guyana Students

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Authors' contributions

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ABSTRACT

Aims: The purpose of this research was to assess Perceived Risk of Diabetes (PRD) and Self-reported Diabetes Risk Factors (SRDRF) among University of Guyana Students.
Study Design: Cross-sectional descriptive research.
Place and Duration of Study: University of Guyana, February-April 2019.
Methodology: The study had a total of 300 participants with 48.7% females and 51.3% males. Random blood sugar (RBS) was done to categorize participants in prediabetes and diabetic groups. Written informed consent was obtained from each participant and approval from the Institutional Review Board – Ministry of Public Health (Guyana).
Results and Discussion: Majority of participants were significantly of African descent 39.7% (n=119, P<0.001), followed by mixed ancestry 34.7% (n=104) and East Indian descent 22.0% (n=66). The study found 32% participants in no risk category among the entire participants, 31% no risk among the pre-diabetic population and 35% no risk among the diabetic population, moreover, a large majority of the participants are not worried for developing diabetes. The fact that a relatively high percentage of the sample has a low perception of the risk for developing diabetes must be of concern because the prevalence of this condition in the Guyanese population is estimated 9.1%.

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Conclusion: This study showed that although there is a good level of knowledge that exist within the study population about the diabetes there is still need to improve and with the relatively high no risk perception for developing diabetes among the sample it is cause to worry given the severity of the disease and the preventive measures available.

1. INTRODUCTION

Diabetes Mellitus (DM) is a chronic metabolic disorder characterized by elevated levels of blood glucose, which can lead over time to serious damage to the heart, blood vessels, eyes, kidneys, nerves and other organs of the body [1]. DM has become a significant and growing public health problem in Guyana and the world at large. The number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014. The global prevalence of diabetes among adults over 18 years of age has risen from 4.7% in 1980 to 8.5% in 2014. Diabetes prevalence has been rising more rapidly in middle- and low-income countries and is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation. In 2016, an estimated 1.6 million deaths were directly caused by diabetes. Another 2.2 million deaths were attributable to high blood glucose in 2012 [2]. DM has been predicted to become the seventh leading cause of death by 2030 with the International Diabetes Federation envisaging a rise in prevalence of 642 million people by 2040 and a rise in the annual global healthcare spending on DM to $ 802 billion USD [3]. Metabolic syndrome is often apparent in patients with increased weight, sedentary lifestyle, and a positive smoking history [4]. Guidelines from the ADA recommend persons age 45 years or older be screened for prediabetes or diabetes, especially if they are overweight [5]. Younger individuals may be screened if they are overweight and have additional risk factors [5]. Obesity is often associated with a sedentary lifestyle. The morbidity and mortality associated with obesity is concerning considering the increase in risk of several disease states, including hypertension, coronary heart disease, and diabetes [4,6]. Almost 1 in 10 persons of the global population has diabetes and this number varied from one country to another. Moreover, one in four people with diabetes does not know that he or she has the disorder. An estimated 84.1 million Americans aged 18 years or older have pre-diabetes [7]. Pre-diabetes is a condition in which individuals have blood glucose levels higher than normal, but not high enough to be classified as diabetes. Pre-diabetes can be prevented if people participate is such measures as weight loss, healthy eating and moderate physical activity, if not many people living with pre-diabetes will go on to develop fully blown diabetes [8]. Guyana being a small population of less than a million people, diabetes and related complications could cripple the working class and as such have a rippling effect through all sectors of this developing country. Therefore, this study aims to look at the perceived risk of diabetes and self-reported diabetes risk factors among students attending University of Guyana, Guyana.

2. MATERIALS AND METHODS

2.1 Research Design

This was a cross-sectional descriptive research, which was conducted at the University of Guyana during February-April 2019. Participants were screened and a written informed consent was obtained from each participant after approval from Institutional Review Board – Ministry of Public Health (Guyana).

2.2 Instrumentation

A survey was designed with the intent to measure PRD and SRDRF among University of Guyana students. The prevalence of diabetes was defined to include all individuals with known diabetes and those in whom GRBS (Glucometer random blood sugar) was ≥ 200 mg/dL and fasting glucose ≥ 126 mg/dL. Pre-diabetics were defined as those with GRBS between 140 and 199 mg/dL and fasting glucose between 100 and 125 mg/dL (ADA recommendation). Based on BMI, participants were categorized into undernourished (BMI < 18.5 kg/m^2); Normal (BMI =18.5 to 24.99 kg/m^2); Overweight (BMI =25 to 29.99 kg/m^2); and Obese (BMI > 30 kg/m^2). A waist circumference of >80 cm in females and 90 cm for males were considered as abnormal. Participants diagnosed with diabetes and pre-diabetes were referred to a clinic and educated on symptoms, complications, treatment and prevention of diabetes using a flip chart. A

pilot study was conducted pre-survey of this study.

2.3 Data Analysis

All data were coded and entered into MS Excel and later analyzed using SSPS version 23.0. Descriptive statistics was used to explain socio-demographic variables, morbidity profile and risk factor data were analyzed using frequencies, mean and standard deviation. Chi-square test of association or Fishers exact probability test was used to assess the association between diabetes/pre-diabetes and associated variables. A p-value of <0.05 was considered to be significant for all analysis.

3. RESULTS

3.1 Demographic Status

Majority of participants were male (51.3%) and Afro-Guyanese (39.4%) ethnic group. Table 1 shows general demographic and anthropometry data inclusive of GRBS of the general population. The study had a significantly higher participant with 51.7% pre-diabetic status followed by diabetic status (13.3%), and 35.0% with normal status (p<0.001).

Modifiable risk factors among diabetic and pre diabetic groups.

Risk factors among diabetic and prediabetes group is shown in Table 2. Significantly high percentage of participants in diabetic group had minimal risk. Among diabetes group 25% had family history of diabetes. Within the pre-diabetic

group 7% were in high-risk group, 27% in moderate risk, 35% in minimal risk and 31% in no risk group (p<0.05). A similar pattern was observed in the diabetic group of participants.

3.2 Life Style Practices

Table 3 shows the participants life style practices among diabetes and prediabetes group. The Table 3 show a fluctuating life style practices among individuals. A majority use to drink, smoke and undergo stress. Eating habit also showed that majority do not consume healthy food all the time.

Table 1. General demographic and anthropometry data

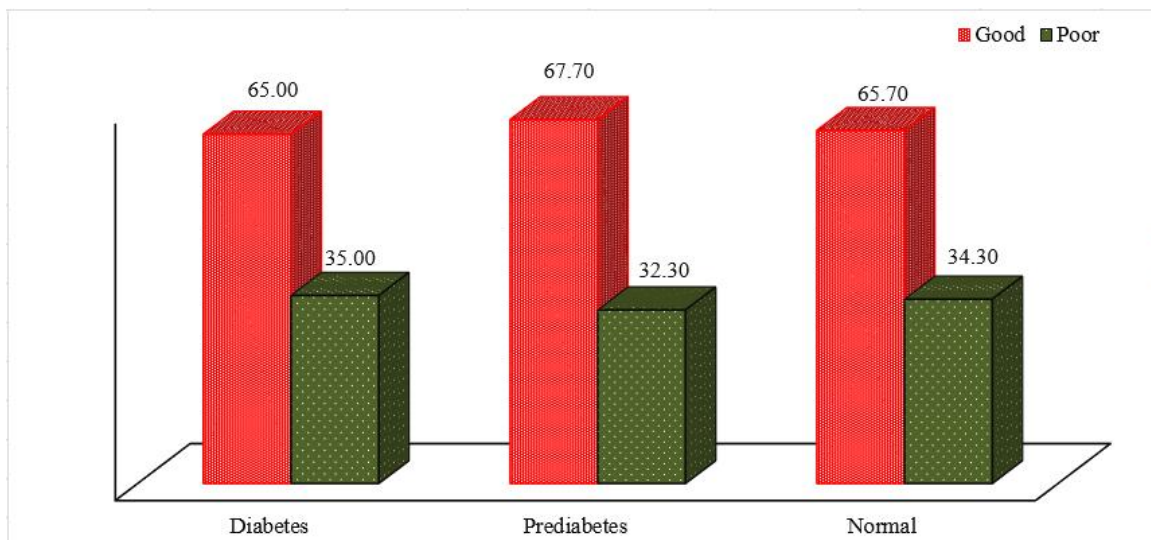| Variables	N (%)	P-value
Gender		
Female	146 (48.7)	
Males	154 (51.3)	0.6
Ethnicity		
Afro-Guyanese	119 (39.7)	
Amerindians	7 (2.3)	
Indo- Guyanese	66 (22.0)	
Portuguese	1 (0.3)	
Mixed	104 (34.7)	
Europeans	1 (0.3)	
Chinese	2 (0.7)	<0.001
	Mean±SD	**Min-Max**
Age	21.3±4.5	17-54
Height (m)	1.6±0.2	1.1-2.3
Weight (kg)	65.5±12.9	44.0-99.0
BMI	25.7±8.8	10.4-68.5
RBS (mg/dL)	108.4±22.6	71-357
Waist (cm)	81.8±13.8	24.0-175.6

Fig. 1. Knowledge of diabetes, prediabetes and healthy participants

Table 2. Data showing risk factors among the diabetic and pre-diabetic groups

Perceived risk facto	Prediabetes group		Diabetic group	
	n (%)	p value	n (%)	p value
No risk	48 (31.0)		14 (35.0)	
Min risk	55 (35.5)		15 (37.5)	
Mod risk	41 (26.5)		9 (22.5)	
High risk	11 (7.1)	<0.001	2 (5.0)	<0.05
Ever diagnosed with diabetes?				
No	149 (96.1)		39 (97.5)	
Yes	3 (1.9)	<0.001	1 (2.5)	<0.001
If Yes, Which type?				
Type 1	9 (5.8)		4 (30.8)	
Type 2	6 (3.9)		6 (46.2)	
Gestational	1 (0.6)	0.05	3 (7.5)	0.60
Is anyone in your family diabetic?				
No	95 (62.1)		23 (57.5)	
Yes	26 (17.0)	<0.001	10 (25.0)	0.02
Unsure				
If yes, who is diabetic and which type?				
Mother	8 (5.2)		4 (36.4)	
Father	13 (8.4)		6 (54.5)	
Brother	1 (0.6)	.010	1 (9.1)	0.2
Do observe more belly fat compared to other parts of your body				
No	87 (56.5)		16 (41.0)	
Yes	67 (43.5)	0.11	23 (59.0)	0.3
Did you developed diabetes during pregnancy?				
No	105 (99.1)		20 (100.0)	
Yes	1 (0.6)	0.00		
If a doctor ever told you that you have high blood sugar?				
No	140 (90.9)		39 (97.5)	
Yes	14 (9.1)	<0.001	1 (2.5)	<0.001
If a doctor ever told you that you have high blood pressure?				
No	142 (91.6)		36 (90.0)	
Yes	12 (7.8)	<0.001	4 (10.0)	<0.001
If a doctor ever told you that you have high cholesterol?				
No	143 (92.9)		37 (94.9)	
Yes	11 (7.1)	0.001	2 (5.1)	0.00
If a doctor ever told you that you have high triglyceride?				
No	148 (97.4)		38 (95.0)	
Yes	4 (2.6)	0.001	2 (5.0)	0.00

3.3 Knowledge Score among Diabetic and Pre-diabetic Group

Among the diabetic group, participants had good knowledge on diabetes (65.0%, p=0.06) (Fig. 1). The mean (±SD) knowledge score was 9.1±2.1 with a SE mean of 0.3. Within pre-diabetic group, participants had good knowledge on diabetes. (67.7%, p<0.001). The mean (±SD) knowledge score was 9.0±2.5 with a SE mean of 0.2. Among the healthy participants also showed a significantly good knowledge (65.7%, p<0.001). The mean (±SD) knowledge score among

healthy groups were 9.1±2.1 with a SE mean of 0.2.

4. DISCUSSION

Persons of African descent made up a majority of the study participants for both the general population and those within the diabetic and pre-diabetic groups. This finding is important because, although this study did not concentrate entirely on ethnic differences, it is necessary to point out it has been documented that persons of African descent are at a higher risk for T2DM

[9,10]. Although genetics is a significant risk factor for T2DM, heredity alone is not generally sufficient to cause diabetes in the absence of environmental triggers [9].

The underlying pathogenic changes that take place predispose a patient to several metabolic alterations, including abnormal changes to glycemia, decreased HDL cholesterol levels,

Table 3. Lifestyle practices among diabetes and prediabetes groups

Food habits	Prediabetes group		Diabetic group	
	n (%)	p value	n (%)	p value
How often you drink alcohol?				
Never	34 (22.1)		15 (37.5)	
Once per month	61 (39.6)		16 (40.0)	
2-4 times per month	41 (26.6)		3 (7.5)	
2-3 times per week	11 (7.1)		4 (10.0)	
4 times per week	7 (4.5)	0.001	2 (5.0)	0.00
How much alcoholic beverages do you consume daily?				
Never	106 (68.8)		27 (69.2)	
1-2	35 (22.7)		7 (17.9)	
3-4	6 (3.9)		0	
5-6	3 (1.9)		0	
>6	4 (2.6)	0.001	5 (12.8)	0.00
How often you have 3-4 units of spirits (180 ml), 3-4 beers (1800ml) or 6dcl of wine?				
Never	49 (31.8)		19 (47.5)	
<1 monthly	52 (33.8)		11 (27.5)	
Monthly	28 (18.2)		4 (10.0)	
Weekly	18 (11.7)		5 (12.5)	
Almost daily	7 (4.5)	0.001	1 (2.5)	0.001
Do you smoke tobacco/cigar at least once a day?				
No	143 (92.9)		39 (100.0)	
Yes	11 (7.1)	0.001		0.001
Do you engage in physical activity at least 3hrs/week?				
No	52 (34.0)		11 (27.5)	
Yes	101 (66.0)	0.001	29 (72.5)	0.004
Do you have a sleeping problem throughout night?				
No	100 (65.4)		31 (77.5)	
Yes	53 (34.6)	0.000	9 (22.5)	0.001
Do you experience more stress?				
No	63 (40.9)		20 (50.0)	
Yes	90 (58.4)	0.2	20 (50.0)	0.03
How often you consume junk food (Aerated drinks, fast food etc.)?				
Once a week	39 (25.3)		13 (32.5)	
Twice a week	51 (33.1)		14 (35.0)	
> twice a week	64 (41.6)	0.05	13 (32.5)	0.97
Do you consume a balance diet on a daily basis?				
No	111 (71.6)		24 (60.0)	
Yes	43 (27.7)	0.0001	16 (40.0)	0.2
Do you know about the symptoms of diabetes mellitus?				
No	85 (55.2)		20 (50.0)	
Yes	69 (44.8)	0.2	20 (50.0)	1.0
Are you aware of long term complications of diabetes?				
No	63 (40.9)		14 (35.0)	
Yes	91 (59.1)	0.02	26 (65.0)	0.06
Are you aware that daily moderate exercise and diet modification can control your diabetes?				
No	41 (26.6)		7 (17.9)	
Yes	113 (72.9)	0.00	32 (82.1)	0.00

increased small dense atherogenic LDL cholesterol levels, increased triglyceride levels, hypertension, and hypercoagulable states [6]. Genetic predisposition may have a role; however, lifestyle choices appear to have a tremendous role in development. Metabolic syndrome is often apparent in patients with increased weight, sedentary lifestyle, and a positive smoking history [4]. While, there are several modifiable risk factors associated with diabetes, it is important to identify those that are non-modifiable. The development of diabetes is often linked within families. People who have a first- or second-degree relative with diabetes have an increased genetic predisposition for the disease. Increased age is also associated with diabetes development. Majority of the study population did not have a family member with diabetes, regardless of the recorded good knowledge level among participants. Family history of diabetes has been reported to influence the level of knowledge and perception of diabetes [11]. This is probably because persons will be directly involved in patient care, which also involves family health education.

It is a known fact that once and individual is under prediabetes group it definitely elevates the risk of diabetes, if not control. Such individual is also at risk of developing many diseases most commonly cardiovascular disease [12,13]. It should be of no surprise that just in US alone out of 86 million prediabetes people around 1.7 million develop diabetes each year [14]. Similar to our study, Cameroon found that larger abdominal circumference is associated with higher prevalence of prediabetes and diabetes [15]. Other studies have found male gender and increases in body weight were also found as risk factor for prediabetes [16].

Within this study population there was good knowledge about diabetes and its related signs and symptoms. However, to the contrary a study in Saudi Arabia [17] showed knowledge scores being less than 30% as compared to a study done in Libya [18] where the results were similar to this current study were participants' scores on average 76.7%. This data is however skewed since the target population was final year medical students who are expected to be knowledgeable about such things. Although this study was conducted among university students whose health status was unknown, the fact that a relatively high percentage of the sample has a low perception of the risk for developing diabetes must be of concern because the prevalence of this condition in the Guyanese population is estimated 9.1% and it increases constantly [13,19]. It is therefore urgent to plan health education interventions that can increase the public knowledge and the correct perception of the risk for developing diabetes. In particular, the results indicate that more efforts must be made by policy makers and healthcare workers to make the population aware of the fact that the correct lifestyles are an effective preventive measure of diabetes.

5. CONCLUSION

This study showed that although there is a good level of knowledge that exist within the study population about the diabetes there is still need to improved, and with the relatively high no risk perception for developing diabetes among the sample it is cause to worry given the severity of the disease and the preventive measures available. Policy makers and healthcare workers should plan more effective educational interventions to increase knowledge of diabetes and to improve the lifestyle, adopting healthy behaviors in order to reduce the social and medical burden of diabetes.

CONSENT

Written consent was obtained from every participants.

ETHICAL APPROVAL

Permission was sought from the Ministry of Health and Institutional Review Board, Guyana to access patients' records. Additionally, permission was sought from the Director of Georgetown Public Hospital Corporation (GPHC) and Head of the Oncology Department. No patient's identity was used in this study.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. American College Health Association (ACHA). National College Health Assessment: Reference group data report, spring; 2008.
(Retrieved August 23, 2019)

Available:http://www.achancha.org/docs/A CHA-NCHA_Reference_Group_Report_Spring2 008.pdf

2. Sarwar N, Gao P, Seshasai S, Gobin R, Kaptoge S, DiAngelantonio E, et al. Diabetes melltius, fasting blood glucose concentration and risk of vascular disease: A collaborative meta analysis of 102 prospective studies. Lancet. 2010; 375(9733):2215-2222.

3. Wnachai A, Phrompayak D. Use of complementary and alternative medicine among Thai patients with type 2 diabetes mellitus. Journal of Integrative Medicine. 2016;14(4):297-305.

4. Hu F, Manson J, Stampfer M, Colditz G, Liu S, Solomon C, et al. Diet, lifetstyle and the risk of type 2 diabetes mellitus in women. N Engl J Med. 2001;345(11):790-797.

5. American Diabetes Association. Clinical practice recommednations. Diabetes Care. 2007;30(Suppl 1):S4-S65.

6. Grundy S, Cleeman J, Daniels S, Donato K, Eckel R, Franklin B, et al. Diagnosis and managemnt of the metabolic syndrmoe: An American Heart Association/National Heart, Lung and Blood Institute Scientific Statement. Circulation. 2005;112(17): 2735-2752.

7. US Department of Health and Human Services. National Institute of Diabetes and Digestive and Kidney Diseases; 2018. (Retrieved August 31, 2019) Available:https://www.niddk.nih.gov/health-information/diabetes

8. Tuso P. Prediabetes and lifestyle modifica-tion: Time to prevent a preventable disease. Perm J. 2014;18(3): 88-93.

9. American Diabetes Association. (n.d.). Genetics of diabetes. (Retrieved January 14, 2020) Available:http://www.diabetes.org/diabetes-basics/genetics-of-diabetes.html

10. Centers for Disease Control and Prevention. (n.d.). National diabetes fact sheet; 2007. (Retrieved January 14, 2020)

Available:http://www.cdc.gov/diabetes/pub s/pdf/ndfs_2007.pdf

11. Al-Mahrooqi B, Al-Hadhrami R, Al-Amri A, et al. Self-reported knowledge of diabetes among high school students in Al-Amerat and Quriyat, Muscat Governate, Oman. Sultan Qaboos Univ Med J. 2013;13(3): 392-398.

12. Unwin N, Shaw J, Zimmet P, Alberti KGMM. Impaired glucose tolerance and impaired fasting glycaemia: The current status on definition and intervention. Diabet Med. 2002;19:708–723.

13. World Health Organization (WHO). Obesity: Preventing and managing the global epidemic. Geneva: World Health Organization; WHO Technical Report Series, No. 894; 2000.

14. Centers for Disease Control and Prevention. National Diabetes Statistics Report [Internet]; 2015. Available:http://www.cdc.gov/diabetes/data /statistics/2014StatisticsReport.html (Accessed 22 September 2015)

15. Rhee JY, Bahtila TD, Palmer D, et al. Prediabetes and diabetes among HIV-infected adults in Cameroon. Diabetes Metab Res Rev. 2016;32:544–549.

16. Gebreyesus HA. Prevalence of prediabetes in HIV-1 infected adults receiving antiretroviral therapy in Addis Ababa, Ethiopia. Int J Pharm Sci Res. 2015;6:440–443.

17. Al Wadaani F. The knowledge attitude and practice regarding diabetes and diabeteic retinopathy among the final year medical students of King Faisal University Medical College of Al Hasa region of Saudi Arabia: A cross sectional survey. NIger J Clin Pract. 2013;16(2):164-168.

18. Sagar A. Practocal diabetes knowledge of final year medical students in Tripoli, Libya. Ibnosina Journal of Medicine and Biomedical Sciences. 2011;3(1):36-41.

19. Pelullo CP, Rossiello R, Nappi R, Napolitano F, Di Giuseppe G. Diabetes prevention: Knowledge and perception of risk among Italian population. BioMed Research International; 2019.