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Frequency Distribution and Risk Factors Analysis of Diabetes in Local Population of Mardan, Pakistan

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Abstract

Diabetes is one of the non-communicable diseases posing great threat to the developing countries including Pakistan. This study aimed at finding the frequency distribution of diabetes along with associated risk factors in Mardan Pakistan. A cross sectional study was conducted in Mardan Medical Complex (MMC), during face-to-face interviews, through questionnaires about risk factors including positive family history, hypertension, literacy rate, income status, smoking, physical activity, age, gender and body weight to find their association with diabetes. A total 450 subjects including 230 diabetics as experimental subjects and 220 non-diabetics as control subjects were recruited in this study. Frequency of Diabetes Mellitus determined in present study was 51.1% with average fasting blood glucose level of diabetic subjects as 10.05 mmol/l (181 mg/dl). Chi square results (considering $p<0.05$ significant) showed that age ($\chi^2=66.189$), physical inactivity ($\chi^2=37.474$), hypertension ($\chi^2=38.014$), literacy rate ($\chi^2=8.37$), positive family history ($\chi^2=72.2$) were found associated with diabetes. While gender ($\chi^2=1.730$; $P>0.05$), smoking ($\chi2=0.006$; $P>0.05$), obesity ($\chi^2=1.39$; $P>0.05$), income status ($\chi^2=1.314$; $p>0.05$) showed no association. Prevalence of DM was significantly higher in subjects with hypertension (50.4%), no literacy (39.1%) and in subjects with low education level (36.5%), in age groups under 51-60 years (33%) and >60 years (30.4%), in physical inactive subjects (47.8%) and in those having positive family history of diabetes (60.9%). The result of this study will help to raise awareness about risk factors of diabetes and thereby help to reduce the incidence of diabetes and its complications.

Keywords: Diabetes; Risk factors; Complications; Public health

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Introduction

Diabetes Mellitus (DM) is one of the most prevalent non communicable diseases posing a continuous threat to developing countries including Pakistan [1]. Pakistan has been reported with 11.5% prevalence of diabetes and is speculated to be the 8th in prevalence of diabetes till 2035 [1,2]. This can cause severe short-term and long-term consequences ranging from brain damage to amputations and heart disease. DM affects the body's ability to make or use insulin hormone build in the pancreas that helps transport glucose (blood sugar) from the bloodstream into the cells so they can break it down and use it for fuel. People cannot live without insulin [1]. Diabetes Mellitus (DM) is an emerging public health concerns with multiple complications and an increasing prevalence. In spite of amazing improvement in both basic and clinical medical sciences, diabetes mellitus is still an incurable life-long disease and is speedily increasing among all age groups and in both genders [3]. According to world health organization, DM is one of the most important causes of premature illness and deaths globally, due to its relation with cardiovascular diseases [2]. It has also been listed among the leading causes for blindness and renal failure. Recently it was estimated that in 2017 there were 451 million (age 18-99 years) people with diabetes worldwide. These figures were expected to increase to 693 million by 2045. It was estimated that almost half of all people (49.7%) living with diabetes are undiagnosed. Moreover, there was an estimated 374 million people with Impaired Glucose Tolerance (IGT) and it was projected that almost 21.3 million live births to women were affected by some form of hyperglycaemia in pregnancy. In 2017, approximately 5 million deaths worldwide were attributable to diabetes in the 20-99 years age range. The global healthcare expenditure on people with diabetes was estimated to be USD 850 billion in 2017 [4].

The exact causes of type 1 diabetes are unknown. It was considered that type 1 diabetes is a result of a complex interaction between genes and no specific environmental risk factors have been shown to cause a significant number of cases. The majority of type 1 diabetes occurs in children and adolescents. Many studies have elaborated the associations between several risk factors and the risk of type 2 diabetes. Age, Body Mass Index (BMI), lipids, hypertension, smoking, physical inactivity, low education, dietary patterns, family history, and recently also specific genes are the most frequently documented risk factors for type 2 diabetes [2]. Physicians use glucose tests to diagnose diabetes. Often when people have a physical examination they are screened for diabetes with a Fasting Plasma Glucose test (FPG). FPG results below 100 mg/dl are normal. Glucose between 100 and 125 mg/dl is considered pre-diabetes. Glucose above 125 mg/dl indicates diabetes [5]. Many researchers have worked on the prevalence of diabetes and its associated risk factors on worldwide level and also in Pakistan. Meo et al. showed risk assessment calculator for diabetic patients who fast during Ramadan [6]. American Diabetes Association (ADA) in 2007 showed diagnosis and classification of diabetes mellitus. World Health Organization (WHO) showed in 2013 Diabetes Fact Sheet, Definition, Diagnosis and Classification of Diabetes Mellitus and its Complications [7]. In Pakistan Shaikh et al. exhibit Prevalence and Pattern of Tobacco use in diabetic patients at Civil Hospital Karachi [8]. Khuwaja et al. showed Cardiovascular Disease-Related lifestyle factors among people with type 2 diabetes in Pakistan [9]. Shera et al. showed Prevalence of diabetes in Pakistan [10]. This study aimed at examining diabetes mellitus and associated risk factors in local population of Mardan attending Mardan Medical Complex (MMC) Mardan Khyber Pakhtunkhwa to find major causes of diabetes.

Materials and Methods

Study population

A cross-sectional study was conducted in district Mardan of Khyber Pakhtunkhwa province to deduce the incidence of diabetes and associated risk factors. Study population comprised of 450 individuals in which 230 were diabetics taken as experimental subjects and 220 were non-diabetics as control subjects. An organized questionnaire was given to the patients. With the help of questionnaires and by face to face interview data was collected from patients attending Mardan Medical Complex (MMC). Data was collected for demographic risk factors positive family history, hypertension, literacy rate, income status, smoking, physical activity, age, gender and body weight. Information regarding exercise habit, insulin dependency, diet planning were also included in the study. Fasting glucose levels of patients (N=230) were examined for the conformation of diabetes.

Statistical analysis

Data obtained from study were presented as mean and percentage and were also subjected to graphical representation according to mean percentage. All statistical data were analysed using software Microsoft Excel version 2007. Relationship between diabetes and risk factors was evaluated by Chi-square test in which diabetes and non-diabetes were used as dependent variables and the independent variables were age (individuals of all ages), genders (male and female), body weight (categorized as; 60-82(Kg)=Normal weight, 82-92(Kg)=Over weight, >92(Kg)=Obese), positive family history, education (categorized as; Illiterate (no education at all), Low education (8th grade to FSc), higher education (>BSc), physical activity (categorized as; sedentary to mild and moderate to severe), Socioeconomic Status (categorized as; Lower class (<PKR 20,000 per month), Middle class (PKR 50,000 to 100,000 and less per month), high class (PKR 100,000 and above per month)), smoking, hypertension (categorized as; high blood pressure (>140/90), low blood pressure (90/60 or less), normal (120/80-140/90) using software IBM SPSS version 20). For Chi square test our null hypothesis for all factors was that there is no correlation between dependent variables and independent variables. Our alternative hypothesis was vice versa. $P<0.05$ was considered statistically significant.

Results

Among the 450 participants, frequency of diabetics was 230 (51.1%) and for non-diabetics as 220(48.9%). Average fasting glucose level of diabetic patients was 10.05 mmol/l (181 mg/dl).

Risk factors correlation with diabetes

Result revealed that risk factors including age, physical inactivity, hypertension, literacy rate, Positive family history correlated with onset of diabetes having p-value <0.05 **(Table 1)**. While for factors such as gender, smoking, obesity, income status there is no correlation of diabetes with these factors in our study having p-value >0.05 **(Table 2)**.

Out of 230 patients the prevalence of DM was significantly higher in subjects with hypertension as 116 (50.4%) than subjects which were normal and with hypotension in which prevalence rate were 106 (46.1%) and 8 (3.5) **(Figures 1 and 2)**, those subjects which were illiterate and low educated had high prevalence rate 90 (39.1%) and 84 (36.5%) than higher educated subjects 56 (24.3%). Prevalence rate was higher as 76 (33.0%), 70 (30.4%) in subjects with in age groups of 51-60 years and >60 years as compared to subjects in other age groups, i.e. 3 (1.3%) subjects in age group 10-20 years, 7 (3.0%) subjects in age group 21-30 years, 26(11.3%) subjects in age group 31-40 years and 48(20.9%) subjects in age group 41-50 years **(Figure 1)**. Those subjects which were physical inactive had higher prevalence rate as 110 (47.8) compared to physical active subjects with prevalence 120 (52.2%). Those subjects having positive family history of diabetes had high prevalence rate as 140 (60.9%) than those having no family history of diabetes in which prevalence rate was 90 (39.1%) **(Figure 3)**. Among them 106 (46.1%) subjects were insulin dependent and 124 (53.9%) subjects were using oral medicine **(Figures 4-6)**. 113 (49.1%) subjects were found to consume dietary food **(Figure 7)** with 91 (39.6%) subjects were doing exercise to control their blood sugar **(Figure 8)**.

Table 1: Chi square test for the factors correlated with the onset of diabetes.

Factors	Value of χ2	df	Asymp Sig. (2-sided)
Positive family history	72.259	1	0
Hypertension	38.014	2	0
Physical inactivity	37.474	1	0
literacy rate	8.376	2	0.015
Age	66.189	5	0

Table 2: Chi square test for the factors having no correlation with onset of diabetes.

Factors	Value of χ2	df	Asymp Sig. (2-sided)
Income status	1.314	2	0.518
Gender	1.730	1	0.188
Smoking	0.006	1	0.938
Obesity	1.392	2	0.499

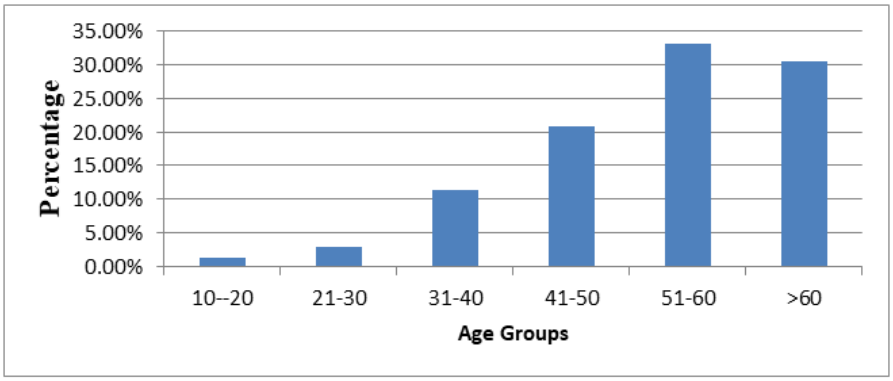

Figure 1: Prevalence of diabetes associated with age.

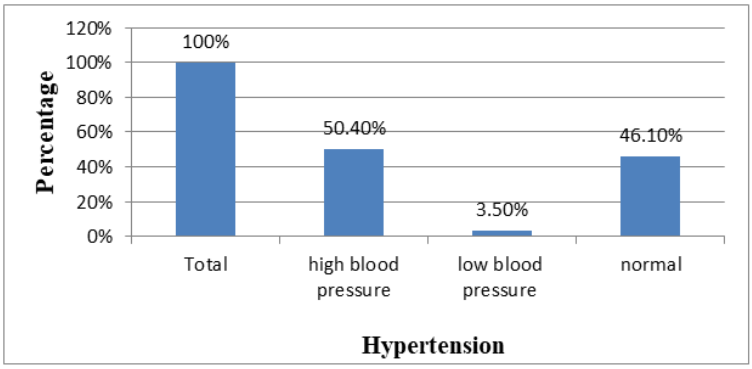

Figure 2: Prevalence of diabetes associated with hypertension.

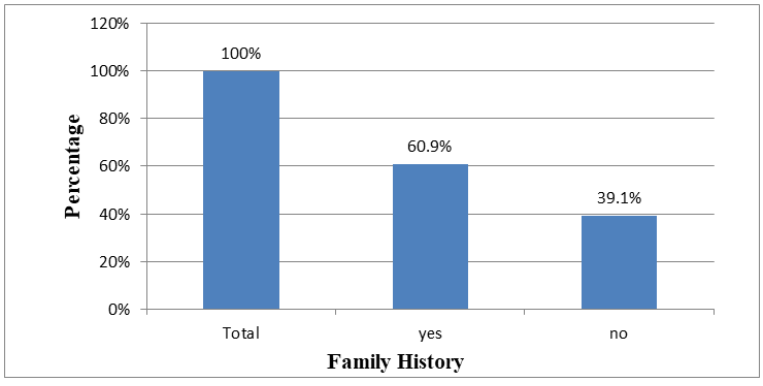

Figure 3: Prevalence of diabetes associated with positive family history.

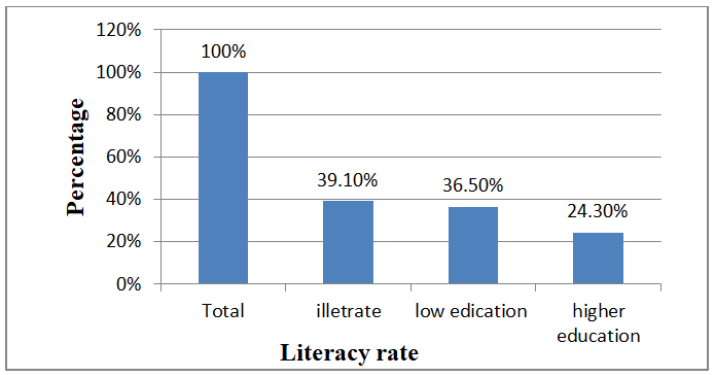

Figure 4: Prevalence of diabetes associated with literacy rate.

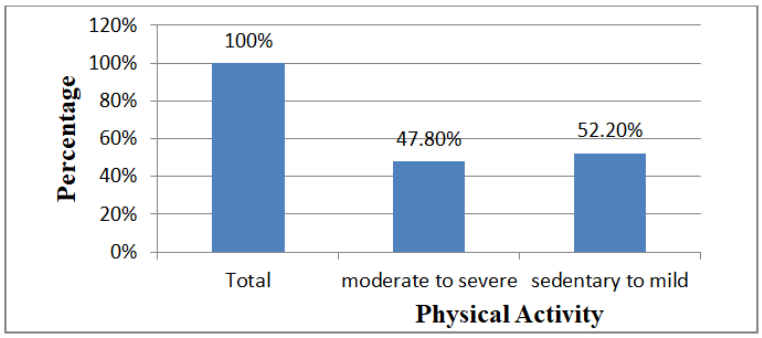

Figure 5: Prevalence of diabetes associated with physical inactivity.

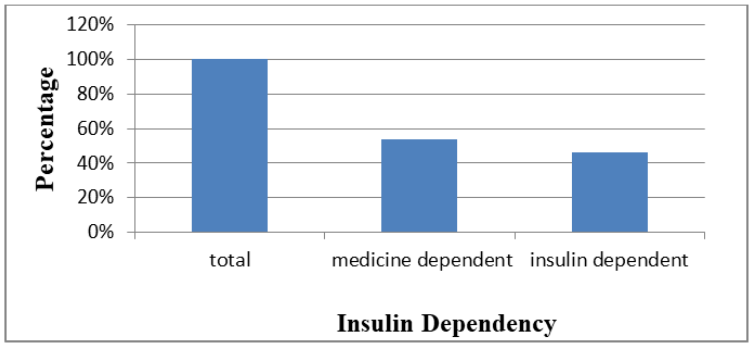

Figure 6: Patients with insulin dependent diabetes.

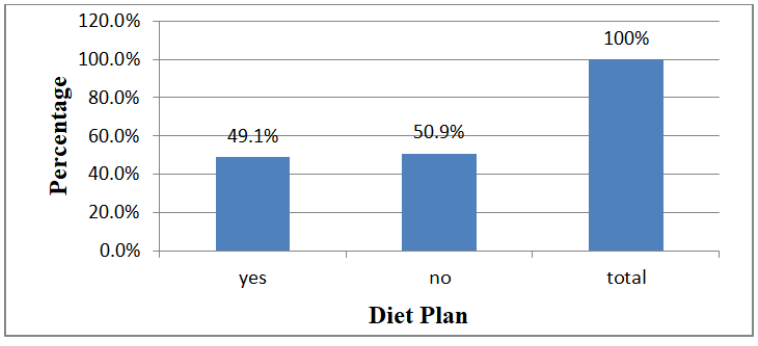

Figure 7: Patients with insulin dependent diabetes.

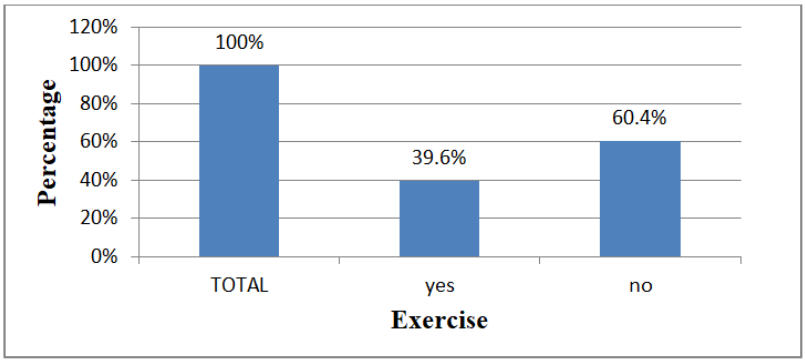

Figure 8: Patients having exercise habit to manage blood sugar.

Discussion

The study was to determine the frequency distribution of Diabetes Mellitus in local population of Mardan and to determine and find out the potential risk factors with Diabetes Mellitus. This population-based study showed that the frequency of diabetes among individuals screened in Mardan was 51.1%. A prior publication concerning a home survey in municipality of Aegaleo at distance of about 10 km from Salamis, found known diabetes in 5.4% population [11]. By comparing the prevalence of our findings which is 51.1% it is observed that it is higher than the prevalence reported by the previous studies. For the risk factors it was reported in previous studies that the major risk factors for the increasing diabetes prevalence in the city of Dakar are gender, age but the results of our study revealed that there is no correlation of gender with diabetes. In accordance with the current data, our studies showed a clear relationship between age and diabetes [12]. The previous "Aegaleo" studies showed that the increase in diabetes, between 1974 and 1990, begin in those older than 50 years [11], our data also showed clearly that the prevalence is higher in subjects after the age of 50 years.

After analysis we found a highly significant association between family history of diabetes and similar findings were noted by Saddaf et al. [13] in her study. Many studies have also reported a significant association of diabetes with family history [14-18]. Our study showed that diabetes mellitus was more prevalent in sedentary workers or those who perform mild activity. Same significant association was reported by Singh et al. and Shah et al. but Satman et al. in his study found that diabetes was inversely associated with physical activity [19,16,20]. Patrick et al. found that both physical inactivity and obesity seems to be strongly and independently associated with diabetes [21]. For obesity our findings, compared to the data reported from other similar studies led to the conclusion that obesity and overweight is not associated with diabetes. It is well known that diabetes is strongly associated with obesity [22,23].

Studies in some countries have shown that the increase in obesity has been attended strictly by an increase in the prevalence of DM [24,25]. Moreover, we found that obesity has a stronger effect on the prevalence of diabetes among women than men, which is not compatible with other studies previously reported [26]. According to Kritkantorn et al. [27] income status was significantly associated with DM but our study was inconsistent with their study and showed that there is no correlation of income status with DM. According to previous studies smoking was associated with diabetes and this risk may increase with the amount smoked by causing oxidative and inflammatory stress but our study showed no association of smoking with DM [28]. Previous study indicates educational level is not associated with diabetes [12]. But according to our studies there is association of diabetes with low education and illiteracy and our study is consistent with Kritkantorn et al. study who found that low educational attainment was associated with DM in Thais [27,28].

There were some limitations to our study. Firstly, data on self-reported diabetes were used which was likely to underestimate the exact frequency of diabetes. Secondly, we did not include high cholesterol levels that may constitute a strong risk factor for diabetes. We did not record this factor because patients didn't know about their cholesterol level.

Conclusion

Diabetes is a rising public-health problem in Mardan which reflects the same situation throughout the KP due to same and common socioeconomic and other risk factors studied. Risk factors like old age, positive family history of diabetes, illiteracy and low educational level, physical inactivity significantly contributed in the occurrence of diabetes. Keeping in view the findings of present research, awareness regarding risk factors in population is necessary for control of diabetes.

References

1. American Diabetes Association (2007) Diagnosis and classification of diabetes mellitus. Diabetes Care 37 Suppl.(1): 42-90.
2. World Health Organization (2016) Global report on diabetes.
3. Meo SA (2009) Diabetes mellitus: Health and wealth threat. Int J Diab Mellitus 1(1): 42.
4. Cho NH, Shaw JE, Karuranga S, Huang Y, da Rocha Fernandes JD et al. (2019) IDF Diabetes Atlas: Global estimates of diabetes prevalence for 2017 and projections for 2045. Diabetes Res Clin Pract 138: 271-281.

5. Samreen R (2009) Diabetes Mellitus. Sci Res 4(5): 367-373.

6. Meo SA, Asim H, Khan M (2015) Risk assessment calculator for diabetic patients who fast during Ramadan. Diabetes Technol Ther 17: 139-140.

7. World Health Organization (2013) Diabetes Fact Sheet.

8. Shaikh AN, Bhatty S, Baloch AA, Vaswani SA, Sumbhuani KA, et al. (2014) Prevelance and pattern of tobacco use in diabetic patients at Civil Hospital Karachi. Pak J Chest Med.

9. Khuwaja AK, Lalani S, Azam IS, Ali BS, Jabbar A, et al. (2011) Cardiovascular Disease-Related lifestyle factors among people with type 2 diabetes in Pakistan: A multicenter study for the prevalence, clustering, and associated Socio demographic determinants. Cardiol Res Pract 2011: 656835.

10. Shera AS, Jawad F, Maqsood A (2007) Prevalence of diabetes in Pakistan. Diabetes Res Clin Pract 76(2): 219-222.

11. Katsilambros N, Aliferis K, Darviri Ch, Tsapogas P, Alexiou Z, et al. (1993) Evidence for an increase in the prevalence of known diabetes in a sample of an urban population in Greece. Diabet Med. 10(1): 87-90.

12. Duboz P, Chapuis-Lucciani N, Boëtsch G, Gueye L (2012) Prevalence of diabetes and associated risk factors in a Senegalese urban (Dakar) population. Diabetes Metab 38(4): 332-336.

13. Saddaf NA, Preeti D (2017) Prevalence of diagnosed diabetes and associated risk factors: Evidence from the large-scale surveys in India. JOSH-Diabetes 5(1): 28-36.

14. Bener A, ZirieM, JanahiIetal (2009) Prevalence of diagnosed and undiagnosed diabetes mellitus and its risk factors in a population-based study of Qatar. Diabets Res Clin Pract 84(1): 99-106.

15. Rao CR, Kamath VG, Avinash S, Asha K (2010) A study on the prevalence of type 2 diabetes in coastal Karnataka. Int J Diabetes DevCtries 30(2): 80-5.

16. Shah SK, Saikia M, Barman NN, Snehlata C, Ramachandran A (1999) High prevalence of type 2 diabetes in urban population in north eastern India. Int J Diabetes Dev Countries 19: 144-147.

17. Ramchandran A, Simon M, Annasami Y, Narayanasamy M, Chamukuttan S (2008) High prevalence of diabetes and cardiovascular risk factors associated with urbanization in India. Diabetes Care 31(5): 893-898.

18. Ravikumar P, Bhansali A, Ravikiran A, Bhansali S (2011) Prevalence and risk factors of diabetes in a community-based study in North India: The Chandigarh Urban Diabetes Study (CUDS). Diabetes Metab 37(3): 216-221.

19. Singh RB, Bajaj S, Niaz MA, Rastogi SS, Moshiri M (1998) Prevalence of type 2 diabetes mellitus and risk of hypertension and coronary artery diseases in rural and urban population with low rates of obesity. Int J Cardiol 66(1): 65-72.

20. Satman I, Yilmaz T, Sengül A, Salman S, Salman F, et al. (2002) Population-based study of diabetes and risk characteristics in turkey-results of turkish diabetes epidemiology study. Diabetes Care 25(9): 1551-1556.

21. Patrick WS, Elaine HM, Vahram G, Holly RW, James OH (2005) Obesity, inactivity, and the prevalence of diabetes and diabetes-related cardiovascular comorbidities in the U.S., 2000-2002. Diabetes Care 28(7): 1599-1603.

22. Zimmet P, Alberti KG, Shaw J (2001) Global and societal implications of the diabetes epidemic. Nature 414: 782-787.

23. Kannel WB, Gordon T, Castelli WP (1979) Obesity, lipids, and glucose intolerance: The Framingham Study. Am J Clin Nutr 32(6): 1238-1245.

24. Dunstan DW, Zimmet PZ, Welborn TA, de Courten MP, Cameron AJ, et al (2002) The rising prevalence of diabetes and impaired glucose tolerance: the Australian Diabetes, Obesity and Lifestyle Study. Diabetes Care 25(5): 829-834.

25. Cameron AJ, Welborn TA, Zimmet PZ, Dunstan DW, Owen N, et al (2003) The Australian Diabetes, Obesity and Lifestyle Study (AusDiab)-methods and response rates. Med J Aust 57(2): 119-129.

26. Choi BCK, Shi F (2001) Risk factors for diabetes mellitus by age and sex: Results of the National Population Health Survey. Diabetologia 44(10): 1221-1231.

27. Kritkantorn S, Wongsa L, Nattapong P, Jiamjit S, Teerasak P (2017) Association between Socioeconomic Status and Diabetes Mellitus: The National Socioeconomics Survey, 2010 and 2012. J Clin Diagn Res 11(7): 18-22.

28. Centers for Disease Control (CDC) (2014) Office on Smoking and Health: Smoking and Diabetes. CDC.