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DIABETES MELLITUS AND ITS RISK FACTORS

L N Liyanage

University of Kelaniya,
Dalugama, Kelaniya,
Sri Lanka

ABSTRACT

Prevalence of diabetes mellitus has raised faster in low and middle income countries than in high income country. Diabetes Mellitus is a cardiovascular metabolic condition with characteristics of chronic high blood glucose levels and a high risk of difficulties like, eyes damage, kidneys damage, nervous system damage, hearing deficiency, Alzheimer and cardio vascular diseases. There were 1.16 million cases of diabetes in Sri Lanka in 2016. There are numerous risk factors of diabetes mellitus. But the majority of the humankind is unaware of the factors of the prevalence of this. Therefore the main purpose of this study was to determine the factors effecting for diabetes mellitus. The data were obtained from a cross sectional survey conducted through a structured questionnaire using 100 participants chose from cluster sampling and simple random sampling. Descriptive statistics including mean, standard deviation, frequency, proportion, and percentage and inferential statistics comprising χ^2 test, factor analysis, and discriminant analysis were used to analyze the data using SPSS and Excel. Prevalence of diabetes mellitus in females was higher than in males. Higher educated population had a less prevalence of the disease. Diabetes mellitus showed a positive relationship with age, less physical activity, and BMI value. Among these diabetic patients, 56.9% had family history of diabetes; and 47.10% were performance sedentary work. There was a significant association between diabetic community and BMI $\chi^2 (3) = 31.041, p = .000$. Therefore, measures must be taken to implement health policies to aware the society about the diabetes mellitus.

KEY WORDS: *Diabetes Mellitus, Economic Burden, Risk Factors*

I. INTRODUCTION

According to Brunner et al. (2008), diabetes mellitus influence on all kind of socio-economic countries but the low-income countries are more influenced. In low and middle-income countries, the number of diabetic patients in urban areas is 186.2 million while 126.7 million live in rural areas (International Diabetes Federation, 2015).

People tend to use more high sugar food and do sedentary work with the changing lifestyles, as a result of globalization and industrialization. With that Diabetes Mellitus has increased (Kolb & Mandrup-Poulsen, 2010). Abegunde et al. (2007) mentioned that governments should take actions to control Diabetes Mellitus in countries; specially the low and middle-income countries possess an enormous economic burden due to diabetes mellitus. In the WHO South-East Asia Region, the number of diabetic patients has been increased from 17 million in 1980 to 96 million in 2014 (Ramachandran et al., 2010). According to them, lack of physical activity is the main reason for the rise of Diabetes Mellitus in the region. Nearly 9% of the adult population of the WHO South-East Asia Region has Diabetes Mellitus. It is the second highest WHO Diabetes prevailing region, after the Eastern Mediterranean Region (WHO, 2016).

According to Begic et al. (2016), diabetes mellitus has some risk factors including hyperglycemia, irregular fat profiles, changes in seditious mediators and clotting. It has been detected that type 2 diabetes mellitus is matrimonial; there is a high chance that children will have type 2 diabetes if both parents have it. A study done in India stated that hypertension, overweight, obesity, smoking, tobacco use, alcohol consumption, and exercise pattern are main risk factors of diabetes mellitus (Venugopal & Iyer, 2010). According to Hu et al. (2017), risk factors of diabetes are older age, lower educational level, being married/live together, higher BMI, larger waist circumference, having an unhealthy diet and having more comorbidities. A study done in Pakistan stated that there is a high positive relationship between diabetes mellitus and lack of exercise, diabetic family history, poor dietary pattern, unhealthy food supply, and television viewing (Shaikh et al., 2013). Many risk factors contribute to the pathogenesis of diabetes, including sedentary behaviour, diet, smoking and alcohol consumption (Bi et al., 2012).

In order to reduce the prevalence of diabetes mellitus, at first we should know about the risk factors of it. There are only few amount of analyses carried out in Sri Lanka on that topic. So this study is carried out to find the risk factors of Diabetes Mellitus in Sri Lanka.

II. METHODOLOGY

A Cross-sectional study was conducted in Kirillawala – West Grama Niladhari (GN) Division in Mahara Divisional Secretary's (DS) Division in Gampaha District, Sri Lanka. In this study, multistage cluster sampling method was used. A study done in Sri Lanka also used the multistage cluster sampling method (Katulanda et al., 2012). Gampaha District was selected because it is one of the top 3 diabetes prevailing districts in Sri Lanka. As well as it is the second highest population district. Not only that Gampaha district is consisting with people from all over Sri Lanka.

It represents all kinds of ethnicity groups, religious groups, income groups and employment status. From that randomly, Mahara PS Division was selected. And out of 92 GN Divisions, Kirillawala – West GN was selected randomly.

Individuals with age of ≥ 18 years were included in the study, because the prevalence of Diabetes Mellitus in children is very low. According to the Medical Statistical Unit (2015), the incidence of Diabetes Mellitus under age 16 was 1.1%. So it is meaningless to add people who are under 16 years to the survey. And another reason for selecting adults who are aged older than 18 is because the sampling frame can only make with adults. The sampling frame for this research was the election registry.

The Kirillawala – West GN Division has a population of 2491 people. It has 1793 people who are older than 18 years. So the population size of this study was 1793. Also, the study has used the "population proportion sample size" formula to choose the sample size (Israel, 2013). The sample size derived was 100 units.

Questionnaire was used as schedules to collect data from the participants. Illiterate participants were explained regarding the study and essential details were collected from them. The parameters studied were demographic features, and socioeconomic status. Body mass index of each participant was calculated and was categorized into underweight, normal, overweight and obese.

Moreover, the data has been analyzed by SPSS Version 21 Software and Ms. Excel 2010 Software. Statistical tools such as descriptive statistics, chi-square test, were used to analyze the collected data.

III. RESULTS

Among all the participants, 49% people who are not suffering from diabetes mellitus and 51% people who are suffering from diabetes mellitus were included in the study. Table 1 depicts the socio demographic characteristics of the sample.

The study revealed that in the diabetic community, out 51 participants, 61% were female and the rest 39% were male. On the contrary, in the non-diabetic community, among 49 participants, 53% were male and the rest 47% female. In the diabetic community, the majority (49%) of the participants were in the age group 41-55 years. Factors like religion, occupation, monthly income was not directly affected to the prevalence of diabetes mellitus. But overwhelming majority of the participants with negative family history did not suffer with diabetes mellitus, while those were positive with diabetes family history suffered from the disease.

Table 1: Demographic Characteristics

	Diabetic		Non-diabetic	
	N	%	N	%
Gender				
Male	20	39	26	53
Female	31	61	23	47
Age				
18-25	1	1.9	5	10.2
26-40	7	13.8	19	38.8
41-55	25	49.1	16	32.7
56-70	9	17.6	7	14.2
70<	9	17.6	2	4.1
Religion				
Buddhist	40	78.4	41	83.7
Hindu	5	9.8	1	2
Christian	2	3.9	3	6.1
Islam	4	7.8	4	8.2
Occupation				
Unemployed	16	31.4	11	22.4
Student	1	2	1	2
Businessman	4	7.8	3	6.1
Housewife	17	33.3	10	20.4
Clerk	1	2	0	0
Labourer	1	2	3	6.1
Mason	4	7.8	3	6.1
Other	7	13.7	18	36.7
Monthly Income (Rs.)				
Below 20,000	8	15.7	3	6.1
20,000 - 40,000	16	31.4	16	32.7
40,000 - 60,000	17	33.3	15	30.6
60,000 - 80,000	7	13.7	4	8.2
80,000 - 100,000	1	2	5	10.2
Above 100,000	2	3.9	6	12.2
Weight (kg)				
40-60	18	35.3	25	51
60-80	27	52.9	22	44.9
80-100	6	11.8	2	4.1
Height (cm)				
130-150	5	9.8	5	10.2
150-170	39	76.5	35	71.4
170-190	7	13.7	9	18.4
Smoking				
Never	29	56.90	37	75.50
Former	4	7.80	6	12.20
Current	15	29.40	2	4.10
Occasional	3	5.90	4	8.20

Alcoholism				
Never	27	52.90	35	71.40
Former	3	5.90	4	8.20
Current	17	33.30	3	6.10
Occasional	4	7.80	7	14.30

Source : Survey (2017)

There was a significant association between the smoking and diabetes mellitus $\chi^2 (3) = 11.418, p = .010$. As well as, there was a significant association between the consumption of alcoholism and diabetes mellitus $\chi^2 (3) = 11.758, p = .008$

Among the diabetic community, the majority (51%) was in overweight, followed by 29.40% normal weight and 7.80% were underweight. On the other side, in the non-diabetic community, the majority (81.60%) was in average weight while both underweight and overweight was 8.20%. There was a significant association between diabetic community and BMI $\chi^2 (3) = 31.041, p = .000$.

There was no any significant association between diabetic community and intake of bread, fish, egg, fruit juice, and milk. But there was a significant association between diabetic community and fast food intake $\chi^2 (1) = 4.137, p = .042$. There was a significant association between diabetic community and cake intake $\chi^2 (1) = 9.159, p = .002$. There was a significant association between diabetic community and toffee intake $\chi^2 (1) = 13.431, p = .000$. There was a significant association between diabetic community and sugary food intake $\chi^2 (1) = 25.130, p = .000$.

A principal component analysis (PCA) was conducted with varimax rotation. The Kaiser Meyer Olkin (KMO) measure tested the sampling adequacy for the analysis, KMO = .710. Bartlett's test of sphericity $\chi^2 (45) = 530.751, p = 0.000$, indicated that correlations between items were sufficiently large for PCA. To sum up, the analyses revealed three primary scales in our study that may relate to risk factors for diabetes mellitus. By considering the variables, factors were given a name. Factor one is the consumption of food; factor two is the consumption of drug and factor three is the physical relationship.

IV. DISCUSSION

It has been observed though this research that, females have a highest prevailing rate of diabetes mellitus than males. A study done in Sri Lanka, by Ambepitiyawaduge et al. (2012) also found that prevalence of diabetes mellitus in the female is higher. But it was not statistically significant. But a study done in Pakistan revealed that there's no difference in prevalence of diabetes mellitus with the gender (Shaikh et al., 2013). A study done by Ambepitiyawaduge et al. (2012) showed that highest diabetes current age group is between 55 to 59 years. In this study, the highest prevailing age group is between 41 to 55 years. It seems to be that the onset of diabetes mellitus occurs early as stated by International Diabetes Federation (2015).

When compared to the previous researchers, Katulanda et al. (2012) found that Sri Lankan Tamils suffer from diabetes mellitus (58.8%) rather than Muslims (28.9%) or Sinhalese (15.8%). That result is different to

the results of this study. It may be due to the fact that this precise research was conducted in defined GN Division while the study of Katulanda et al. (2012) was carried out countrywide with a larger sample.

From this study we could conclude that BMI is truly a high factor that affects diabetes mellitus. Majority of the obsessed participants were suffered with diabetes mellitus. A study done in Sri Lanka by Pinidiyapathirage et al. (2012), showed that there is a definite relationship between BMI and prevalence of diabetes mellitus. Another study was done in Sri Lanka by Katulanda et al. (2012) proved that prevalence of diabetes mellitus was higher in provinces where the BMI value is higher when compared to the provinces with a lower BMI value. International Diabetes Federation (2015) has stated that the obesity is a major risk factor for diabetes and its prevalence. They have further explained that obesity is becoming a major issue especially in Low and Middle-Income Countries.

When compared to the previous researchers, studies showed that there is a positive relationship between diabetic family history and prevalence of diabetes mellitus (Padaki et al., 2011; Pinidiyapathirage et al., 2012). A study was done in Pakistan also stated that there is a high number of the patients (73%) in their study had a positive family history of diabetes (Shaikh et al., 2013).

From this study, it was revealed there is a positive relationship between diabetes mellitus and drug consumption. But a study done in Sri Lanka by Pinidiyapathirage et al. (2012), showed that there is a negative relationship between smoking diabetes mellitus. Another study showed a positive relationship between diabetes mellitus and drug consumption (Bi et al., 2012).

V. CONCLUSION

Prevalence of diabetes mellitus is increasing at a rapid pace in Sri Lanka. Many diabetic cases remain undiagnosed as a result of lack of screening and adequate diagnostic facilities in the country. Besides, diagnosed diabetic patients suffer from severe complications of the diabetes mellitus due to unawareness of self-care, lack of financial comfort, regular checkup and facilities for medical supervision.

The government should take measures to aware the public about diabetes mellitus and its impact on the economy and the health (as a person and as a whole). As well as government should aware the public about the correct managing styles diabetes mellitus such as self-monitoring and periodic checkup for the disease.

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REFERENCES

1. Abegunde, D. O., Mathers, C. D., Adam, T., Ortegon, M., & Strong, K. (2007). The burden and costs of chronic diseases in low-income and middle-income countries. *The Lancet*, 370(9603), 1929–1938. [https://doi.org/10.1016/S0140-6736\(07\)61696-1](https://doi.org/10.1016/S0140-6736(07)61696-1)
2. Ambepitiyawaduge, P. D. S., Sudirikku Hennadige, P. D. S., Liyanage, I. K., Rajapakse, L. C., Jayasinghe, K. S. A., Katulanda, P., Wijeratne, S. (2012). Social, cultural and economical determinants of diabetes mellitus in Kalutara district, Sri Lanka: a

- cross sectional descriptive study. *International Journal for Equity in Health*, 11, 76. <https://doi.org/10.1186/1475-9276-11-76>
3. Begic, E., Begic, E., Arnautovic, A., & Masic, I. (2016). Assessment of Risk Factors for Diabetes Mellitus Type 2 Assesment Of Risk Factors For Diabetes, (June), 1–5. <https://doi.org/10.5455/msm.2016.28.187-190>
4. Bi, Y., Wang, T., Xu, M., Xu, Y., Li, M., Lu, J., ... Ning, G. (2012). Advanced research on risk factors of type 2 diabetes. *Diabetes/Metabolism Research and Reviews*, 28, 32–39. <https://doi.org/10.1002/dmrr.2352>
5. Brunner, L. S., Suddarth, D. S., & Smeltzer, S. C. O. (2008). *Brunner & Suddarth's textbook of medical-surgical nursing*. Lippincott Williams & Wilkins.
6. Hu, M., Wan, Y., Yu, L., Yuan, J., Ma, Y., Hou, B., ... Shang, L. (2017). Prevalence, Awareness and Associated Risk Factors of Diabetes among Adults in Xi'an, China. *Scientific Reports*, 7(1), 10472. <https://doi.org/10.1038/s41598-017-10797-x>
7. International Diabetes Federation. (2015). *IDF Diabetes Atlas*. International Diabetes Federation. <https://doi.org/10.1289/image.ehp.v119.i03>
8. Israel, G. D. (2013). *Determining Sample Size*. University of Florida, IFAS Extension, PEOD6(April 2009), 1–5. <https://doi.org/10.4039/Ent85108-3>
9. Katulanda, P., Rathnapala, D., Sheriff, R., & Matthews, D. (2012). Province and ethnic specific prevalence of diabetes among Sri Lankan adults. *Sri Lanka Journal of Diabetes Endocrinology and Metabolism*, 1(1), 2–7. <https://doi.org/10.4038/sjdem.v1i1.4180>
10. Kolb, H., & Mandrup-Poulsen, T. (2010). The global diabetes epidemic as a consequence of lifestyle-induced low-grade inflammation. *Diabetologia*, 53(1), 10–20. <https://doi.org/10.1007/s00125-009-1573-7>
11. Medical Statistical Unit. (2015). *Annual Health Bulletin*.
12. Padaki, S., Vijayakrishna, K., Dambal, A., Ankad, R., Manjula, R., Surekharani, C., ... Patil, S. (2011). Anthropometry and physical fitness in individuals with family history of type-2 diabetes mellitus: A comparative study. *Indian Journal of Endocrinology and Metabolism*, 15(4), 327–30. <https://doi.org/10.4103/2230-8210.85595>
13. Pinidiyapathirage, M. J., Kasturiratne, A., Ranawaka, U. K., Gunasekara, D., Wijekoon, N., Medagoda, K., ... Wickremasinghe, A. R. (2012). Research : Epidemiology The burden of diabetes mellitus and impaired fasting glucose in an urban population of Sri Lanka. <https://doi.org/10.1111/dme.12013>
14. Ramachandran, A., Ma, R. C. W., & Snehalatha, C. (2010). Diabetes in Asia. *Lancet (London, England)*, 375(9712), 408–18. [https://doi.org/10.1016/S0140-6736\(09\)60937-5](https://doi.org/10.1016/S0140-6736(09)60937-5)
15. Shaikh, Z., Akhund, S., Ali, M., & Khan, M. (2013). Type 2 diabetes, Effects of socio-demographic factors among patients. *Professional Med J*, 20(2), 244–249.
16. Venugopal, S., & Iyer, U. M. (2010). Risk factor analysis and trends of dyslipidemia in type 2 diabetes mellitus subjects of an industrial population. *Biomedical Research*, 21(4), 371–375. Retrieved from <https://www.scopus.com/inward/record.uri?eid=2-s2.0-80051508015&partnerID=40&md5=90663be3cc20fe395d939182276d59d8>
17. WHO. (2016). *Global Report On Diabetes*.