OPEN ACCESS
Saudi Journal of Medical and Pharmaceutical Sciences
Abbreviated Key Title: Saudi J Med Pharm Sci
ISSN 2413-4929 (Print) |ISSN 2413-4910 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com/journal/sjmps/home

Original Research Article

Awareness of Diabetes Mellitus among Apparently Healthy Adult Residents in a Metropolitan City: A Community-Based Study

Srabani Bhattacharya[1], Rucha Wagh[2*], Sachchidanand Wattamwar[1], Sundaram Kartikeyan[3]
[1]Physiology Department, Rajiv Gandhi Medical College, Kalwa, Thane, Maharashtra, India
[2]Assistant Professor, Physiology Department, Rajiv Gandhi Medical College, Kalwa, Thane, Maharashtra, India
[3]Community Medicine Department, Rajiv Gandhi Medical College, Kalwa, Thane, Maharashtra, India

***Corresponding author:** Rucha Wagh
| **Received:** 16.01.2019 | **Accepted:** 25.01.2019 | **Published:** 30.01.2019
DOI: 10.36348/sjmps.2019.v05i01.011

Abstract

This cross-sectional community-based study was conducted with the objective of determining the knowledge and awareness of diabetes mellitus among the general population in a metropolitan city in order to plan intervention programmes for early case detection. The respondents were apparently healthy individuals aged 18+ years, of either gender, who were residents of Thane city, Maharashtra, India. The prospective respondents were explained about the study and informed consent was obtained before they were interviewed using a pre-tested, formatted and validated questionnaire containing 20 questions (2 marks per question). A total of 255 persons (males=106; 41.57%; females=149; 58.43%) participated in the study. The gender difference in age of participants was not significant (Z=0.503; p=0.614). Significant gender differences were observed among separated and divorced respondents (Z=2.459; p=0.014); graduates (Z=2.421; p=0.015); retired persons (Z=3.896; p<0.0001) and those employed in the private sector (Z=3.308; p<0.0001). Female respondents obtained significantly higher scores in four out of 20 questions, while the gender differences were not significant for scores in the remaining 16 questions. The findings reveal moderate level of diabetes awareness. Large-scale awareness programmes would be necessary after identifying knowledge gaps.

Keywords: Awareness, Diabetes mellitus, Knowledge.

INTRODUCTION

Globally, diabetes mellitus (DM), a silent killer, is a chronic metabolic disorder, which has become a significant global public health problem [1] and a major risk factor for coronary heart disease, nephropathy [2], retinopathy, cataract, probability of limb amputation [3] and stroke. DM indirectly affects control of tuberculosis and HIV and also complicates pregnancy [4]. About 80% of patients with DM live in developing countries and about 50% are undiagnosed [5]. The modifiable risk factors associated with prevalence of DM in developing countries [6] include sedentary lifestyle, obesity, consumption of refined carbohydrates, tobacco and alcohol and deficient knowledge regarding this metabolic disorder [7-9]. South Asia is rapidly becoming the epicentre of DM epidemic [10]. Compared with other ethnic groups, South Asians are at higher risk for developing DM at relatively younger age and at a lower body mass index [11].

According to the Indian Council of Medical Research India Diabetes (ICMR-INDIAB) Study, an estimated 62.4 million Indians were diabetic [12, 13]. Indians are more at risk of developing DM due to the "Asian Indian Phenotype", which represents abnormal clinical and biochemical correlates, such as, higher waist circumference despite lower body mass index, lower adiponectin, increased insulin resistance, and higher levels of highly sensitive C-reactive protein levels [14]. Female predisposition to DM has been reported from north India [15], while male preponderance has been reported from south India [16]. Inadequate physical activity and observance of religious fasts hinders control of DM among females [17]. Walking barefoot increases the risk of diabetic foot ulcers [18].

Persistent dysglycemia is frequently the distinguishing feature of the onset of chronic complications of DM, which can be delayed or prevented by appropriate treatment of raised levels of blood glucose, blood pressure, and lipids [19, 20]. A lifelong adoption of a healthy lifestyle is necessary for prevention and control of DM.

DM is often detected while investigating patients who present with neurological deficits, visual

disturbances, or premature coronary, peripheral or cerebrovascular disease. Many early indicators of complications of DM that develop over time may be overlooked if the patient does not regularly follow up or get screened for them. Since DM is an insidious disease in its early stages, patients (irrespective of educational status) tend to be irregular in taking their prescribed treatment till the complications manifest. These complications are mostly irreversible and sometimes, untreatable. Moreover, complications of DM are known to occur even among patients on regular anti-diabetic treatment [21].

The present study was conducted with the objective of determining the knowledge and awareness of DM among the general population in a metropolitan city in order to plan intervention programmes for early case detection.

Materials and Methods

This cross-sectional community-based study was conducted through convenience sampling. The respondents were apparently healthy individuals aged 18+ years, of either gender, who were residents of Thane city, Maharashtra State, India. The prospective respondents were explained about the study and informed consent was obtained before they were interviewed. The interview was conducted in English, Hindi or Marathi, as per choice of the respondent, at a time and place that was convenient to the respondent. During the interview, the interviewer did not attempt to inform or enlighten the respondents about DM. Primary data were collected using a pre-tested, formatted and validated questionnaire that included questions pertaining to socio-demographic status of the respondents and 20 questions (2 marks per question) to test the knowledge and awareness regarding DM. The maximum obtainable marks were 40.

The data were tabulated in Microsoft Excel (Microsoft Corporation, Redmond, WA, USA) and were statistically analyzed using EpiInfo Version 7.0 (public domain software package from the Centers for Disease Control and Prevention, Atlanta, GA, USA). Categorical data were presented as percentages and continuous data as mean and standard deviation (SD). 95% Confidence interval (CI) was calculated using the formula: [Mean-(1.96)*Standard error)] - [Mean+(1.96)*Standard error)]. The standard error of difference between two proportions and standard error of difference between two means were calculated. Statistical significance was established at $p<0.05$.

Results and Discussion

Table-1: Socio-demographic profile of participants

Parameter		Males (n=106)	Females (n=149)	Z value #	p value
Religion	Hindu	87 (82.07%)	128 (85.90%)	0.816	0.414
	Muslim	04 (03.78%)	08 (05.37%)	0.608	0.543
	Christian	01 (00.95%)	01 (00.67%)	0.242	0.808
	Other	14 (13.20%)	12 (08.06%)	1.294	0.195
Marital status	Married	60 (56.60%)	72 (48.32%)	1.310	0.190
	Single	43 (40.56%)	62 (41.61%)	0.168	0.866
	Other †	03 (02.83%)	15 (10.07%)	2.459	0.014*
Education	< Graduate	59 (55.66%)	98 (65.77%)	1.632	0.102
	Graduate	35 (33.02%)	29 (19.46%)	2.421	0.015*
	Post-graduate	12 (11.32%)	22 (14.77%)	0.815	0.415
Occupation	Unemployed	...	04 (02.68%)	...	...
	Student	39 (36.79%)	58 (38.92%)	0.346	0.729
	Homemaker	...	55 (36.91%)	...	...
	Retired	23 (21.70%)	07 (04.70%)	3.896	<0.0001*
	Govt job	11 (10.38%)	07 (04.70%)	1.655	0.097
	Private job	26 (24.53%)	13 (08.73%)	3.308	<0.0001*
	Trader	07 (06.60%)	05 (03.36%)	1.146	0.251

Standard error of difference between two proportions; † Other = Separated / Divorced
*Significant

Socio-Demographic Profile

A total of 255 persons participated in the study. The mean age of male participants (n=106; 41.57%) was 38.48 ± 20.22 years (95% CI: 34.63 – 42.33 years) while that for female participants (n=149; 58.43%) was 37.21 ± 19.38 years (95% CI: 34.10 – 40.32 years). The gender difference in age of participants was not significant (Z=0.503; p=0.614). A majority of the respondents were Hindus. More than 50% of males and nearly half of the females were married. The gender difference among separated and divorced respondents was significant (Z=2.459; p=0.014). Nearly two-thirds of the female respondents were non-graduates, while nearly one-third of the males were graduates. The gender difference among the graduates was significant (Z=2.421; p=0.015). Occupation-wise, significant gender differences were observed among retired persons (Z=3.896; p<0.0001)

and those employed in the private sector (Z=3.308; p<0.0001) (Table-1).

Table-2: Question-wise scores (Two marks per correct response)

Q. No.	Topic of Question	Males (n=106)	Females (n=149)	Z value #	p value
		Mean ± SD	Mean ± SD		
1	Lifelong condition	1.23 ± 0.98	1.48 ± 0.88	2.094	0.036*
2	Hereditary condition	1.28 ± 0.96	1.22 ± 0.98	0.488	0.625
3	Caused by obesity	1.45 ± 0.90	1.56 ± 0.83	0.993	0.320
4	Caused by mental stress	1.49 ± 0.88	1.50 ± 0.87	0.090	0.928
5	Eyes affected	1.45 ± 0.90	1.57 ± 0.82	1.088	0.276
6	Heart affected	1.36 ± 0.94	1.45 ± 0.90	0.767	0.443
7	Liver affected	0.77 ± 0.98	0.94 ± 1.00	1.354	0.175
8	Kidneys affected	1.55 ± 0.84	1.68 ± 0.74	1.279	0.201
9	Nerves affected	1.06 ± 1.00	1.21 ± 0.98	1.190	0.234
10	Hypoglycemia	1.17 ± 0.99	1.33 ± 0.95	1.293	0.196
11	Hyperglycemia	1.23 ± 0.98	1.36 ± 0.94	1.062	0.288
12	Diet & exercise	1.83 ± 0.56	1.76 ± 0.65	0.920	0.357
13	Insulin	1.08 ± 1.00	1.10 ± 1.00	0.157	0.857
14	Complicates pregnancy	1.32 ± 0.95	1.45 ± 0.90	1.101	0.270
15	Induced by pregnancy	0.79 ± 0.98	0.90 ± 1.00	0.876	0.381
16	Excessive thirst	1.19 ± 0.99	1.54 ± 0.84	2.960	0.003*
17	Excessive hunger	1.13 ± 1.00	1.41 ± 0.92	2.278	0.022*
18	Excessive urination	1.45 ± 0.90	1.72 ± 0.70	2.583	0.009*
19	Vision disturbances	1.04 ± 1.00	1.13 ± 1.00	0.708	0.479
20	Tingling numbness	0.79 ± 0.98	0.89 ± 1.00	0.796	0.426

Standard error of difference between two means; SD = Standard deviation
*Significant

Knowledge and Awareness Scores

As compared to their male counterparts, female respondents had significantly higher awareness (Z=2.094; p=0.036) that DM was a lifelong condition. Females also obtained significantly higher scores on questions pertaining to early warning signs of DM viz. excessive thirst (Z=2.960; p=0.003), excessive hunger (Z=2.278; p=0.022) and excessive urination (Z=2.583; p=0.009). The gender difference was not significant for responses to the remaining 16 questions (Table-2). Though the maximum score for both genders was identical (40), the third quartile, median, first quartile and minimum score was higher for females, as compared to that for male respondents (Fig-1).

Researchers from Iran [22], Saudi Arabia [23] and Bangladesh [24], have reported that the correlates of adequate knowledge of DM were age, female gender, married status, higher income levels, higher educational attainment, family history of DM and urban residence [25]. In contrast, studies from Zimbabwe [26] and India [27] have found that female gender was associated with low knowledge of DM. Studies from Kenya [28] and Sri Lanka [29] have reported a gender-independent direct association between educational levels and knowledge of DM.

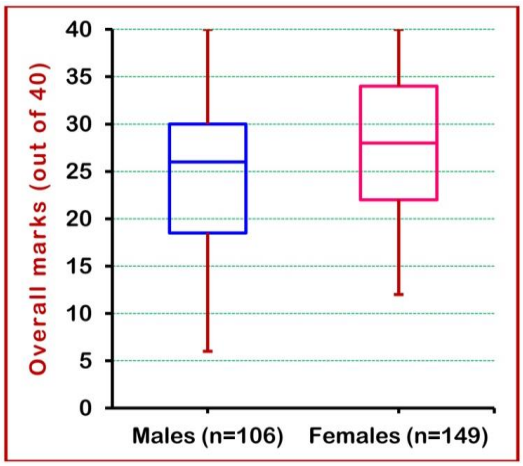

Fig-1: Boxplot depicting overall scores

Studies have reported varying levels of awareness about DM in developing countries, ranging from about 15% in Sudan [30], 20% in Mongolia [31], 27% in Kenya [28], 49% in Ethiopia [32], 49.9% among rural Indians [33], about 50% in Oman [34], and Pakistan [35], 58.1% in Malaysia [36], to 93% in rural Bangladesh. [24]

A study [37] from Chennai has reported the success of that public education and mass media campaigns under the PACE-5 Project reached an estimated two million people in Chennai over a period of three years. Such programs can considerably enhance the extent of awareness about DM and its complications.

Limitations

This being a cross-sectional, single-location, interview-based study, the findings cannot be extrapolated to the general population. Since the study was based on convenience sampling, more knowledgeable persons may have been unintentionally included; implying that the actual levels of knowledge among the general public may be lower than that observed in this study. Conversely, it is possible that some respondents may not have been forthcoming in their responses due to social desirability bias.

CONCLUSION

The findings of this study reveal moderate level of diabetes awareness. Large-scale awareness programmes would be necessary after identifying knowledge gaps. Educational campaigns ought to be tailored to the needs of various sub-groups and involve all stakeholders in the community.

REFERENCES

1. Wild, S., Roglic, G., Green, A., Sicree, R., & King, H. (2004). Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes care*, *27*(5), 1047-1053.
2. Morrish, N. J., Wang, S. L., Stevens, L. K., Fuller, J. H., Keen, H., & WHO Multinational Study Group. (2001). Mortality and causes of death in the WHO Multinational Study of Vascular Disease in Diabetes. *Diabetologia*, *44*(2), S14.
3. World Health Organization. (2006). *Prevention of blindness from diabetes mellitus: report of a WHO consultation in Geneva, Switzerland, 9-11 November 2005*. World Health Organization.
4. Young, F., Critchley, J. A., Johnstone, L. K., & Unwin, N. C. (2009). A review of co-morbidity between infectious and chronic disease in Sub Saharan Africa: TB and diabetes mellitus, HIV and metabolic syndrome, and the impact of globalization. *Globalization and health*, *5*(1), 9.
5. Unwin, N., Whiting, D., Guariguata, L., Ghyoot, G., & Gan, D. [Eds.] (2011). *Diabetes Atlas*, 5th ed, Brussels, Belgium: International Diabetes Federation, 11-74.
6. World Health Organization. (2015). *Global status report on non-communicable diseases 2014*. Geneva, Switzerland: World Health Organization.
7. Bollu, M., Nalluri, K. K., Prakash, A. S., Lohith, M. N., & Venkataramarao, N. (2015). Study of knowledge, attitude, and practice of general population of Guntur toward silent killer diseases: Hypertension and diabetes. *Asian J Pharm Clin Res*, *8*(4), 74-8.
8. Rathod, G. B., Rathod, S., Parmar, P., & Parikh, A. (2014). Study of knowledge, attitude and practice of general population of Waghodia towards Diabetes mellitus. *International Journal of Current Research and Review*, *6*(1), 63.
9. Ambigapathy, R., Ambigapathy, S., & Ling, H. M. (2003). A knowledge, attitude and practice (KAP) study of diabetes mellitus among patients attending Klinik Kesihatan Seri Manjung. *NCD Malaysia*, *2*(2), 6-16.
10. Kaveeshwar, S. A., & Cornwall, J. (2014). The current state of diabetes mellitus in India. *The Australasian Medical Journal*, 7(1), 45-48.
11. Gujral, U. P., Pradeepa, R., Weber, M. B., Narayan, K. V., & Mohan, V. (2013). Type 2 diabetes in South Asians: similarities and differences with white Caucasian and other populations. *Annals of the New York Academy of Sciences*, *1281*(1), 51-63.
12. Deepa, M., Bhansali, A., Anjana, R. M., Pradeepa, R., Joshi, S. R., Joshi, P. P., ... & Shukla, D. K. (2014). Knowledge and awareness of diabetes in urban and rural India: the Indian Council of Medical Research India diabetes study (phase I): Indian Council of Medical Research India diabetes 4. *Indian journal of endocrinology and metabolism*, *18*(3), 379-385.
13. Anjana, R. M., Pradeepa, R., Deepa, M., Datta, M., Sudha, V., Unnikrishnan, R., ... & Dhandhania, V. K. (2011). ICMR–INDIAB Collaborative Study Group: Prevalence of diabetes and prediabetes (impaired fasting glucose and/or impaired glucose tolerance) in urban and rural India: phase I results of the Indian Council of Medical Research-INdia DIABetes (ICMR-INDIAB) study. *Diabetologia*, *54*(12), 3022-3027.
14. Mohan, V., & Deepa, R. (2006). Adipocytokines and the expanding'Asian Indian Phenotype'. *The Journal of the Association of Physicians of India*, *54*, 685-6.
15. Misra, A., Pandey, R. M., Devi, J. R., Sharma, R., Vikram, N. K., & Khanna, N. (2001). High prevalence of diabetes, obesity and dyslipidaemia in urban slum population in northern India. *International Journal of Obesity*, *25*(11), 1722.
16. Ramachandran, A., Snehalatha, C., Vijay, V., & King, H. (2002). Impact of poverty on the prevalence of diabetes and its complications in

urban southern India. *Diabetic Medicine*, *19*(2), 130-135.
17. Kalra, B., Kalra, S., & Kumar, A. (2009). Social stigma and discrimination: a care crisis for young women with diabetes in India. *Diabetes Voice*, *54*(Special Issue), 37-39.
18. Gutch, M., Razi, S. M., Kumar, S., & Gupta, K. K. (2014). Diabetes mellitus: trends in northern India. *Indian journal of endocrinology and metabolism*, *18*(5), 731-734.
19. American Diabetes Association. (2010). Standards of medical care in Diabetes-2010, *Diabetes Care*, 33 (Suppl 1), S11-S61.
20. UK Prospective Diabetes Study (UKPDS) Group. (1998). Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). *The lancet*, *352*(9131), 837-853.
21. Powers, A. C. (2012), Diabetes Mellitus (Chapter 334). In: Longo, D. L., Fauci, A. S., Kasper, D. L., Hauser, S. L., Jameson, J. L., Loscalzo, J. (Eds.). *Harrison's Principles of Internal Medicine*. 18th ed., New York: McGraw Hill, 2980-2985.
22. Jazayeri, S. M. H. M., & Pipelzadeh, M. H. (2006). Barriers to diet self-care in outpatients with type 2 diabetes in Iran. *Pakistan Journal of Medical Sciences*, *22*(4), 412-415.
23. Bani, I. A. (2015). Prevalence, knowledge, attitude and practices of diabetes mellitus among Jazan population, Kingdom of Saudi Arabia (KSA). *Journal of diabetes mellitus*, *5*(02), 115
24. Islam, F. M. A., Chakrabarti, R., Dirani, M., Islam, M. T., Ormsby, G., Wahab, M., ... & Finger, R. P. (2014). Knowledge, attitudes and practice of diabetes in rural Bangladesh: the Bangladesh population based diabetes and eye study (BPDES). *PLoS One*, *9*(10), e110368.
25. Masood, I., Saleem, A., Hassan, A., Zia, A., & Khan, A. T. (2016). Evaluation of diabetes awareness among general population of Bahawalpur, Pakistan. *Primary care diabetes*, *10*(1), 3-9.
26. Mufunda, E., Wikby, K., Björn, A., & Hjelm, K. (2012). Level and determinants of diabetes knowledge in patients with diabetes in Zimbabwe: a cross-sectional study. *The Pan African Medical Journal*, *13*.
27. Thungathurthi, S. W. E. T. H. A., Thungathurthi, S. M. I. T. H. A., & Kumar, V. G. (2012). Self care knowledge on diabetes among diabetic patients in Warangal region. *Int J Life Sci Pharma Res*, *2*(2), 16-21.
28. Maina, W. K., Ndegwa, Z. M., Njenga, E. W., & Muchemi, E. W. (2010). Knowledge, attitude and practices related to diabetes among community members in four provinces in Kenya: a cross-sectional study. *Pan African Medical Journal*, *7*(1).
29. Herath, H. M., Weerasinghe, N. P., Dias, H., & Weerarathna, T. P. (2017). Knowledge, attitude and practice related to diabetes mellitus among the general public in Galle district in Southern Sri Lanka: a pilot study. *BMC public health*, *17*(1), 535.
30. Balla, S. A., Ahmed, H. A., & Awadelkareem, M. A. (2014). Prevalence of diabetes, knowledge, and attitude of rural, population towards diabetes and hypoglycaemic event, Sudan 2013. *Am J Health Res*, *2*(6), 356-60.
31. Demaio, A. R., Otgontuya, D., de Courten, M., Bygbjerg, I. C., Enkhtuya, P., Oyunbileg, J., & Meyrowitsch, D. W. (2013). Exploring knowledge, attitudes and practices related to diabetes in Mongolia: a national population-based survey. *BMC Public Health*, *13*(1), 236.
32. Asmamaw, A., Asres, G., Negese, D., Fekadu, A., & Assefa, G. (2015). Knowledge and attitude about diabetes mellitus and its associated factors among people in Debre Tabor town, Northwest Ethiopia: cross sectional study. *Science*, *3*(2), 199-209.
33. Rani, P. K., Raman, R., Subramani, S., Perumal, G., Kumaramanickavel, G., & Sharma, T. (2008). Knowledge of DM and diabetic retinopathy among rural populations in India, and the influence of knowledge of diabetic retinopathy on attitude and practice. *Rural Remote Health*, 8(3), 838.
34. Al Shafaee, M. A., Al-Shukaili, S., Rizvi, S. G. A., Al Farsi, Y., Khan, M. A., Ganguly, S. S., ... & Al Adawi, S. (2008). Knowledge and perceptions of diabetes in a semi-urban Omani population. *BMC Public Health*, *8*(1), 249.
35. Zuhaid, M., Zahir, K. K., & Diju, I. U. (2012). Knowledge and perceptions of diabetes in urban and semi urban population of Peshawar, Pakistan. *Journal of Ayub Medical College Abbottabad*, *24*(1), 105-108.
36. Minhat, H. S., & Hamedon, T. R. (2014). Understanding towards diabetes mellitus among rural adult community in Malaysia. *World J Med Sci*, *11*(2), 217-21.
37. Somannavar, S., Lanthorn, H., Pradeepa, R., Narayanan, V., Rema, M., & Mohan, V. (2008). Prevention awareness counselling and evaluation (PACE) diabetes project: a mega multi-pronged program for diabetes awareness and prevention in South India (PACE-5). *Journal of Association of Physicians of India*, *56*(6), 429-435.