

Cost of Management of Diabetes Mellitus: A Pan India Study

Annals of Neurosciences

27(3-4) 190–192, 2020

© The Author(s) 2021

Reprints and permissions:

in.sagepub.com/journals-permissions-india

DOI: 10.1177/0972753121998496

journals.sagepub.com/home/aon



Raghuram Nagarathna,¹ M Madhava,¹ Suchitra S. Patil,² Amit Singh,² K. Perumal,¹ Ganga Ningombam,¹ and Hongasandra R. Nagendra²

Abstract

Background: Diabetes mellitus is a major noncommunicable disease. While mortality rates are increasing, the costs of managing the disease are also increasing. The all-India average monthly expenditure per person (pppm) is reported to be ₹ 1,098.25, which translates to an annual expenditure of ₹ 13,179 per person.

Purpose: While a number of studies have gone into the aspect of the cost of disease management, we do not find any study which has pan-India reach. We also do not find studies that focus on differences (if any) between rural and urban areas, age or on the basis of gender. We planned to report the cost of illness (COI) in diabetes individuals as compared to others from the data of a pan-India trial.

Methods: Government of India commissioned the Indian Yoga Association to study the prevalence of diabetes mellitus in India in 2017. As part of the questionnaire, the cost of treatment was also captured. Data collected from 25 states and union territories were analyzed using the analysis of covariance (ANCOVA) test on SPSS version 21.

Results: There was a significant difference ($P < .05$) between the average expenses per person per month (pppm) of individuals with self-reported known diabetes (₹ 1,357.65 ppm) and others (unknown and/or nondiabetes individuals—₹ 999.91 ppm). Similarly, there was a significant difference between rural (₹ 2,893 ppm) and urban (₹ 4,162 ppm) participants and between those below (₹ 1,996 ppm) and above 40 years (₹ 5,059 ppm) of age.

Conclusion: This preliminary report has shown that the COI because of diabetes is significantly higher than others pointing to an urgent need to promote disease-preventive measures.

Keywords

Behavior, clinical medicine, function, physiology

Received 5 October 2020; accepted 7 October 2020

Introduction

There are 463 million people living in the world with diabetes today. It is projected that by 2045, 700 million people will have the disease worldwide. In India, from an estimated 50 million people in 2010, the count is expected to increase to 134 million by 2045.¹ Diabetes is responsible for a wide range of neurological manifestations. These can be the result of metabolic disorders or their treatment, or they can represent secondary manifestations.²

In the USA, the total estimated cost of diagnosed diabetes in 2017 is USD 327 billion including USD 237 billion in direct medical costs and USD 90 billion in reduced productivity.³ This represents a 26% increase between 2012 and 2017.³ People with diagnosed diabetes, on average, have

medical expenses ~2.3 times higher than what expenditure would be in the absence of diabetes.³ People with diagnosed diabetes incur average medical expenditure of USD 16,750 per year, of which USD 9,600 is attributed to diabetes.³

¹ Vivekananda Yoga Anusandhana Samsthana (VYASA), Kempegowda Nagar, Bengaluru, Karnataka, India

² Division of Yoga and Life Sciences, Swami Vivekananda Yoga Anusandhana Samsthana (SVYASA), Bengaluru, Karnataka, India

Corresponding author

Raghuram Nagarathna, Vivekananda Yoga Anusandhana Samsthana (VYASA), 19, Eknath Bhavan, Gavipuram Circle, Kempegowda Nagar, Bengaluru, Karnataka 560019, India.

E-mail: rnagaratna@gmail.com



In India, the median average annual direct and indirect costs associated with diabetes care were estimated at ₹ 25,391 and ₹ 4,970, respectively.⁴ Extrapolating from the Indian population, the annual cost of diabetes was found to be USD 31.9 billion in 2010.⁴

Over 400 papers have been published over the past 20 years.⁵ The cost of diabetes therapy increases linearly along with the duration of the disease.⁶ The average life-time cost of all drugs used in diabetes management is estimated at ₹ 19,45,135.⁶ The average total expenditure per patient per month (pppm) was ₹ 1,265, out of which medical expenditure was ₹ 993 and nonmedical expenditure was ₹ 271.⁶ The total COI for diabetic care without any complications was ₹ 22,456 per patient per annum and with complication was ₹ 30,634.⁷ There exists a high burden of missed clinic appointments among diabetes patients in tertiary care government health settings in India.⁸ This appears to be related to the high cost in terms of both time and money involved in attending appointments for the modest benefit of a dispensation of a 15-day drug refill.⁸ Nearly one-fourth of the income of the patient was spent for diabetic care.⁹ The total expenditure on diabetes is ₹ 912 per visit, the direct cost of health care for a diabetic individual was ₹ 553 and indirect expenditure was ₹ 359.¹⁰ The average time lost on each visit was 2.6 h and included travel time, waiting period, and consultation.¹⁰

While a number of studies have been conducted, to the best of our knowledge, there appears to be none which has an All-India sample. There appears to be no studies comparing costs between urban and rural areas. This article is an attempt to bridge the gap.

Methods

The Indian Yoga Association was commissioned in 2016 to 2017 by the Government of India to conduct this study which was undertaken in two phases (details of the methodology have also been published).¹¹ In brief, phase 1 was to estimate the prevalence of prediabetes and diabetes across the country, and phase 2 was to conduct a randomized controlled trial using a validated yoga lifestyle protocol. A detailed questionnaire was used to collect data on various parameters from the subjects. One of the parameters was the COI which has also been used for analysis in this article. Data was analyzed by using SPSS (23.0) version.¹²

Results

Table 1 provides the profile of the participants. Data of 7,055 participants is collated in this survey.

Out of the 7,055 participants from 50 districts of 25 states of India (over 200 villages and urban census enumeration blocks), 2014 reported that they had prior diagnosis of diabetes. The remaining 4,941 included those who marked “No” to the question “Have you ever been told by a health care

Table 1. Demographic Profile of 7,055 Respondents

Categories		Gender		Location		Age Categories	
N	Others	Male	Female	Urban	Rural	<40 Years	>40 Years
2,114	4,941	3,372	3,683	4,162	2,893	1,996	5,059

Note: N is number of participants.

provider that you have diabetes?” These were placed in the “others” category and included both those who were not aware that they had diabetes and those with no diabetes. Out of the 7,055 participants, 3,372 were males and 3,683 were females, and 4,162 were from urban and 2,893 from rural locations.

Table 2 provides the summary of the analysis of COI.

For the 7,055 participants, the average monthly health expenditure was calculated as ₹ 1,098.25, which translates to ₹ 13,179 per annum. Thus, about 17% of the expenditure of the household was spent on health care.

The average expenditure per month for males was found to be ₹ 1,120.59 (₹ 13,447.08/year), while for females it was ₹ 1,077.74 (₹ 12,932.88/year). The average amount spent in rural areas was ₹ 1,072.28 (₹ 12,867.36/year), while that in urban areas was ₹ 1,135.61 (₹ 13,627.32/year). For those below the age group of 40 years, the average monthly expense was ₹ 1,007.63 (₹ 12,091.56/year), while for those above the age of 40 years it was ₹ 1,132.90 (₹ 13,594.80/year).

Discussion

This pan-India study looking at self-reported COI for diabetes within one year from the data of a larger study planned for primary prevention of diabetes, covering 50 districts in 25 states/union territories, has shown that the average monthly health expenditure was ₹ 1,357.65 for diabetes and ₹ 999.91 in others. Similarly, the difference between the expenditure in

Table 2. Summary of Results of COI

	Mean Health Expenditure per Month	Significance P	Family Expenditure/ Month	% of Total Family Expenditure
Known DM	1,357.65	<.001	7,231.40	18.7%
Others	999.91		6,400.32	15.6%
Male	1,120.59	.78	6,883.60	16.2%
Female	1,077.74		6,315.57	17.0%
Rural	1,072.28	.02	6,415.55	17.6%
Urban	1,135.61		6,708.27	16.0%
Age<40	1,007.63	.02	6,559.16	15.4%
Age >40	1,132.90		6,595.94	17.1%

Note: The COI was 36% ($P < .001$) higher in diabetes individuals than others.

rural and urban households and the age of the patient are also statistically significant. Those below the age of 40 spend significantly less than those who are above the age of 40.

Approximately 17% of the total household expenditure was on health care.

While average monthly expenditure is in line with other studies, we find that the health expenditure goes up significantly for those who are aware of their diagnosis. This is an area that has a potential for further research.

Limitation

Analyses of multiple surveys per country or territory show how the estimated share of the household expenditure devoted to health (i.e., health expenditure share) would have varied if survey instruments with different characteristics had been employed.¹³ The questions in our survey were many and exhaustive, and could have had an impact on the response. The survey was administered by yoga practitioners and there is a possibility that bias of the yoga practitioner could not have been excluded.

Conclusion

A 17% share of medical expenses is a very high number and reinforces the belief that the current governmental interventions and medical insurance are highly inadequate. At a national level, the percentage spent on health care as a percentage of GDP is roughly around 1% to 1.5% and the near-term target is to achieve 2.5% of the GDP. Also, there is a need to look at why there is a significant difference in expenditure after diagnosis.

Author Contribution

RN: Concept, Design, Definition of Intellectual content, Manuscript preparation, Manuscript editing, Manuscript review, Guarantor. **MM:** Design, Definition of Intellectual content, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing, Manuscript review. **SSP:** Design, Data acquisition, Data analysis, Statistical analysis, Manuscript preparation, Manuscript editing, Manuscript review. **AS:** Concept, Design, Definition of Intellectual content, Data acquisition, Manuscript editing, Manuscript review, Guarantor. **PK:** Design, Definition of Intellectual content, Literature search, Data acquisition, Data analysis, Statistical analysis. **GN:** Design, Definition of Intellectual content, Data acquisition, Manuscript review. **HRN:** Concept, Design, Definition of Intellectual, Literature search, Manuscript editing, Manuscript review.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical Statement

Ethical clearance was obtained by the Ethics Committee of the Indian Yoga Association. The study was registered on CTRI (Registration Number – Trial REF/2018/02/017724).

This article complies with International Committee of Medical Journal editor's (ICMJE) uniform requirements for manuscript.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

References

1. Who Diabetes Atlas. <https://diabetesatlas.org/data/en/country/93/in.html> (accessed on September 11, 2020).
2. Watkins PJ, and Thomas PK., Diabetes mellitus and the nervous system. *J Neurol Neurosurg Psychiatry* 1998; 65: 620–632.
3. American Diabetes Association. Economic costs of diabetes in the USA in 2017. *Diabetes Care* May 2018; 41(5): 917–928.
4. Tharkar S, Devarajan A, Kumpatla S, et al. The socioeconomic of diabetes from a developing country: A population based cost of illness study. *Diabetes Res Clin Pract* September 2010; 89(3): 334–340. <https://doi.org/10.1016/j.diabres.2010.05.009>
5. Oberoi S, and Kansra P., Economic menace of diabetes in India: A systematic review. *Int J Diabetes Dev Ctries* June 2020; 17:1–12.
6. Singla R, Bindra J, Singla A, et al. Drug prescription patterns and cost analysis of diabetes therapy in India: Audit of an endocrine practice. *Indian J Endocr Metab* 2019; 23: 40–45.
7. Acharya LD, Rau NR, Udupa N, et al. Assessment of cost of illness for diabetic patients in South Indian tertiary care hospital. *J Pharm Bioallied Sci* 2016; 8: 314. doi: 10.4103/0975-7406.199336.
8. Basu S, Garg S, Sharma N, et al. The determinants of out-of-pocket health care expenses for diabetes mellitus patients in India: An examination of a tertiary care government hospital in Delhi. *Perspect Clin Res* 2020; 11: 86–91.
9. Mathew G, Fathima FN, Agrawal T, et al. “DIABETIC TAX”: Cost of care among persons with type 2 diabetes mellitus in an Urban Underprivileged Area of Bengaluru. *Indian J Community Med* 2019; 44: 113–117.
10. Javalkar R, and Sandhya. The economic burden of health expenditure on diabetes mellitus among urban poor: A cross sectional study. *Int J Community Med Public Health* February 2019; 6(3): 1162–1166. February 2019. ISSN 2394-6040. Available at: <https://www.ijcmph.com/index.php/ijcmph/article/view/4202> (accessed 24 September 2020). <https://dx.doi.org/10.18203/2394-6040.ijcmph20190604>
11. Nagendra HR, Nagarathna R, Rajesh SK, et al. Niyantrita Madhumeha Bharata 2017, Methodology for a Nationwide Diabetes Prevalence Estimate: Part 1. *International J Yoga* 2019; 12(3): 179–192. https://doi.org/10.4103/ijoy.IJOY_40_18
12. IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.
13. Lavado RF, Brooks BPC, Hanlon M, et al. Estimating health expenditure shares from household surveys. *Bull World Health Organ* 2013; 91: 519–524C. 10.2471/BLT.12.115535.