IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Human Journals
Research Article
March 2023 Vol.:26, Issue:4

Diabetic Tax – Cost of Care in Diabetes Patients of Urban Raichur, Karnataka

IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Sarfaraz Md *[1], Ashik C James[2], Sarmashvali K[2], Arshiya Begum[2], Md Nayeem[2]

1. Department of Pharmaceutics, NET Pharmacy College, Raichur- 584103, Karnataka, India.

2. Department of Pharmacy Practice, NET Pharmacy College, Raichur- 584103, Karnataka, India.

Submitted: 22 February 2023
Accepted: 28 February 2023
Published: 30 March 2023

Keywords: Cost of illness, Economic burden, Diabetes mellitus, Direct cost, Indirect cost, Intangible cost.

ABSTRACT

Diabetes mellitus is one of the major non-communicable diseases that need lifelong care. It poses enormous economic and disability burden to the victims, society and the country. This study aims to unveil the burden of diabetes mellitus in urban area of Raichur by measuring the cost of illness of diabetes, direct cost, indirect cost, loss of productivity and its impact on the subjects. An observational study was conducted among 426 participants admitted in the Navodaya medical college hospital & research center and patients in the local community of Raichur, Karnataka for a period of six months. The results reveal that diabetic persons spent direct cost of around 19,892 rupees annually for diabetic care without hospitalization and with hospitalization about 36,870 rupees. The average annual indirect cost for a diabetic patient was 6,408 rupees and the overall mean health expenditure of diabetic subjects was 43,278 rupees. Direct cost and indirect cost accounted for 85% and 15% of costs. The study showed that nearly 11% of the patient income was spent for diabetic care. For low-income patients, around 49.14% of the patient income was spent for diabetic care. These findings show that there is an urgent need to tackle the situation by promoting public awareness campaigns, awareness about Government facilities available and providing information on health insurance schemes which help to reduce economic burden of the diabetic patients.

INTRODUCTION

Diabetes mellitus (DM) is a disorder caused by insufficient or absent production of hormone 'insulin' by the pancreas. [1] WHO estimates that more than 180 million people worldwide have diabetes? [2] Studies in India estimate that, for a low-income Indian family with an adult with diabetes, as much as 25% of family income may be devoted to diabetes care. The costs of diabetes affect everyone, everywhere, but they not only cause financial problem; it also causes pain, anxiety, inconvenience and generally lower quality of life. [3] It is predicted that diabetes prevalence for 2025, total direct healthcare expenditure on diabetes worldwide for that year will be between 213-396 billion international dollars. In some countries this will be as much as 40% of their total healthcare budget. The studies conducted in India stated that economic burden of diabetes care on families in developing countries is rising rapidly, even after accounting for the inflation. [4, 5] Cost of illness (COI) studies generally assess the direct and indirect costs of a particular illness, where the former represents the opportunity cost of resources lost due the illness, most commonly those caused by losses in productivity due to mortality and morbidity as measured in lost earnings. [6] Self-reported prevalence is lower in urban areas ranging from 3.1 % in rural areas to 7.3 % in urban areas. The disease appears to be more prevalent in the south of country as compared to north and eastern parts. Financing and delivery of health care in India has been left largely to private sector. [7-9] Estimates of current and future economic burden of the disease on the health system can assist decision makers understand the magnitude of the problem prioritize research efforts, and plan resource allocation to properly manage the condition. Disease cost estimates also help prioritize interventions, which must be done in the face of limited health care resources in our country. [10] Over 400 papers have been published over the past 20 yrs. [11] The cost of diabetes therapy increases linearly along with the duration of the disease. [12] There exists high burden of missed clinical appointments among diabetes patients in tertiary care government health settings in India. 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. [13] The financial burden of type 2 DM can have catastrophic implications. The economic burden of DM is enormous as it perpetuates and exacerbates poverty. As India stands on the brink of a DM epidemic due to the rapid increase in population, increased longevity and high ethnic susceptibility to DM, coupled with rapid urbanization and changes from a traditional lifestyle. [14] There is a need to increase awareness of these facts among all health professionals involved in the care of diabetes in developing countries, as well as health

policy makers of these countries. Any efforts at cost reduction should, therefore, have the family as its focus and relieving the family of this financial burden needs to be prioritized. [15] Improvement in quality and quantity of services coupled with increasing awareness will encourage people to avail Government facilities, thereby reducing the financial burden of the treatment, ensured by health institutions by promoting awareness regarding the consequences of complications of DM through public awareness campaigns. Measures need to be taken not only to halt the epidemic of diabetes mellitus but to reverse it. There is an urgent need to focus on the community health insurance system that reduces the economic burden of Diabetes among urban patients. [16]

In this context, the present study was carried out to determine direct and indirect cost attributable to diabetes and quantify the economic burden of diabetes caused by increased health resource use and lost productivity.

MATERIALS AND METHODS

This descriptive, observational study was conducted for a period of six months from March 2022 to August 2022 in general public and out-patient and in-patients of general medicine, orthopaedics and surgery departments of Navodaya Medical College Hospital & Research Centre (NMCH & RC) Raichur. Permission was obtained from Institutional Ethics Committee of Navodaya Medical College Hospital and Research Centre. The study was approved by the committee by issuing ethical clearance certificate.

A KAP questionnaire was developed in english language and validated using Cronbach's alpha value statistical tool. The questionnaire contained socio-demographic details of the study participants and 37 questions which were categorised to evaluate direct cost and indirect cost. A Cronbach's alpha value of 0.781 was found for the questionnaire which indicated that the tool has good internal consistency. The structured questionnaire was prepared and given to subject experts for their comments. According to the subject expert's comments or suggestions changes in the questions were made. Questions were open ended and closed ended containing either dichotomous or multiple-choice questions.

The validated Questionnaire was distributed among patients in the study area, i.e., hospital premises and local community and for those who don't know the language, questions were asked in their regional language. The project team briefed them about the study to the participant. A consent form is obtained from each participant and questionnaire was

distributed to each patient at a time and the responses were collected. The targeted population for this study were residents of north Karnataka aged above 30 years and below 80 years old. The information provided by the study participants in the questionnaires were kept confidential and only the collected data was processed. Based on the responses obtained from the questionnaires were analysed.

The filled KAP questionnaires were analysed and monitored for the following variables; 1) Socio-demographic data 2) Direct cost, indirect cost and intangible cost incurred by patients with DM and 3) Quality of life of patients with DM. The data from the KAP questionnaire were analyzed using descriptive statistics namely total numbers, percentage and mean. Microsoft excel and word were used to generate graphs, tables and results etc.

RESULTS AND DISCUSSION

The present study **"Diabetic Tax – Cost of care in diabetes patients of urban Raichur, Karnataka"** was the first attempt to evaluate the cost of diabetes in Raichur and its impacts on healthcare budget. The study was conducted among general public and out-patient and in-patients of general medicine, orthopaedics and surgery departments of Navodaya Medical College Hospital & Research Centre (NMCH & RC) Raichur. It provides information on direct cost, indirect cost, opportunity cost and intangible cost associated with managing diabetes mellitus and costs linked with loss or reduction in productivity of the patients, or people caring the patients. This attempt was challenging with limited clinical, epidemiological and expenditure data, so that there is little information on costs. Unlike cost estimates derived from the data of diabetic individuals identified from the general population or diabetic registers, this study design has the advantage of interviewing individuals face to face, thus obtaining relatively precise estimates of the cost of diabetes. In this study, total 426 participants were selected, sample size was calculated based on recorded prevalence of 6.5%. Taking 95% confidence interval, the required sample size for the study was minimum of 426 study subjects.

Our study results need to be viewed in the context of potential limitations: Some cost may be underestimated; some cost may be overestimated and some costs are omitted.

The result of the cost of illness study clearly indicate that diabetes places a considerable financial burden on patients of Raichur.

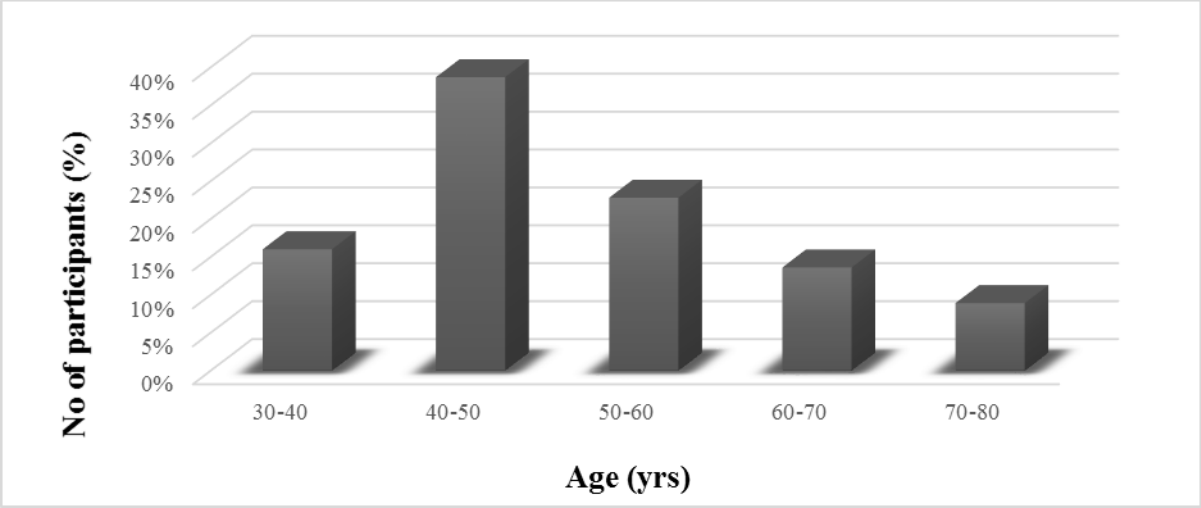

Figure No. 1: Age distribution of study subjects

A total of 426 patients who met the inclusion criteria were recruited into the study. Out of the 426 patients who were willing to participate in the study 165 (38.7%) of them were in the age group of 40-50 yrs, followed by 97 (22.8%) patients in the age group of 50-60 yrs. This is depicted in **Figure 1.** Age is a big risk factor for diabetes mellitus. Diabetes mellitus really start to spike in middle age. The rate for developing diabetes in age group of 40-50 yrs is five times more when compared to 18-40 years. This result was similar to the study conducted by **Ali K Khuwaja et al.** They reported that mean age of diabetic patients was 48.12 which comes under 40-50 age category. Another survey by **Sarah Cuschieri et al** also noted that diabetic patients younger than 55 yrs of age were predominant.

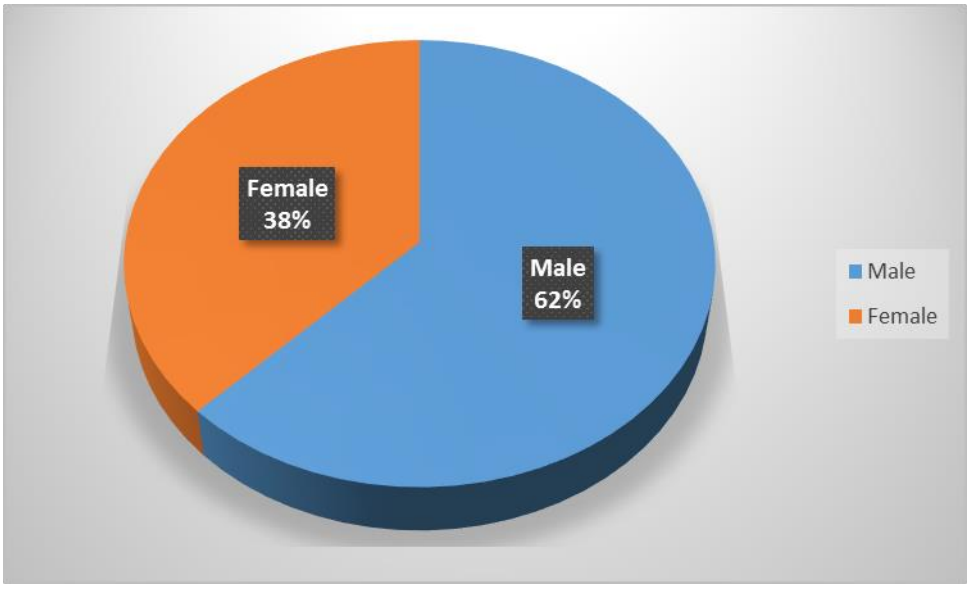

Figure No. 2: Gender distribution of study subjects

On categorizing the study population based on gender group it was evident that most of the study population were Male i.e., 266 (62.4%) of the total population were males and 160 (37.6%) were females. The results are shown in **Figure 2.** Male patients are prone to DM than females because men have larger amounts of visceral fat than women. Having more visceral fat is strongly linked to having a higher risk of metabolic syndrome, such as diabetes mellitus.[105] This result was similar to the study conducted by **Birhanu Demeke Workneh et al.** In their study 56.2% were males from total participants.

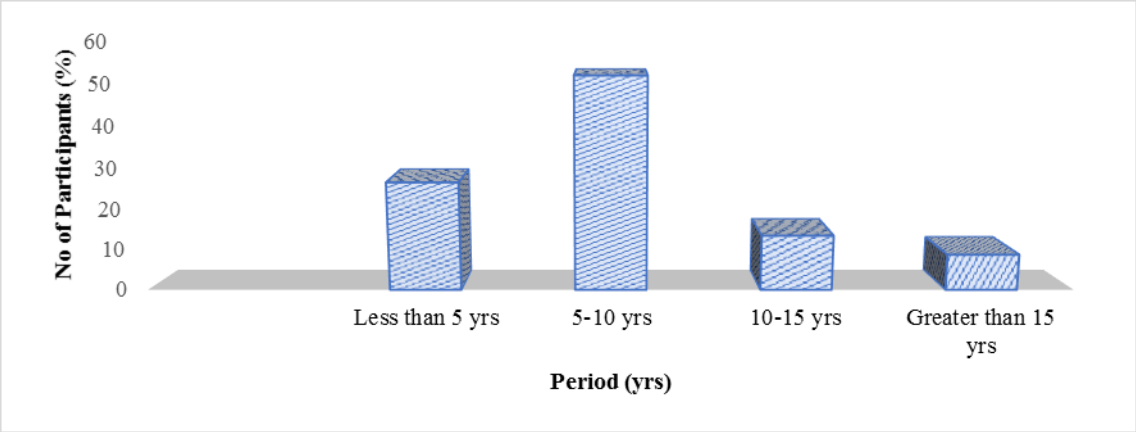

Figure No. 3: Duration of diabetes mellitus

Figure 3 represent duration of diabetes mellitus. It was found that about 220 (51.65%) of the respondents were diagnosed with diabetes in a period of between 5 to 10 yrs followed by 112 (26.3%) of study population who were diagnosed with diabetes in less than 5 yrs. This result was similar to the study conducted by **Akari S et al**, to access the healthcare cost of diabetes in south India. It was found that 65% of study participants had been suffering from diabetes mellitus for less than 5 yrs, while remaining were suffering for more than 5 yrs, which was similar to the findings in the study.

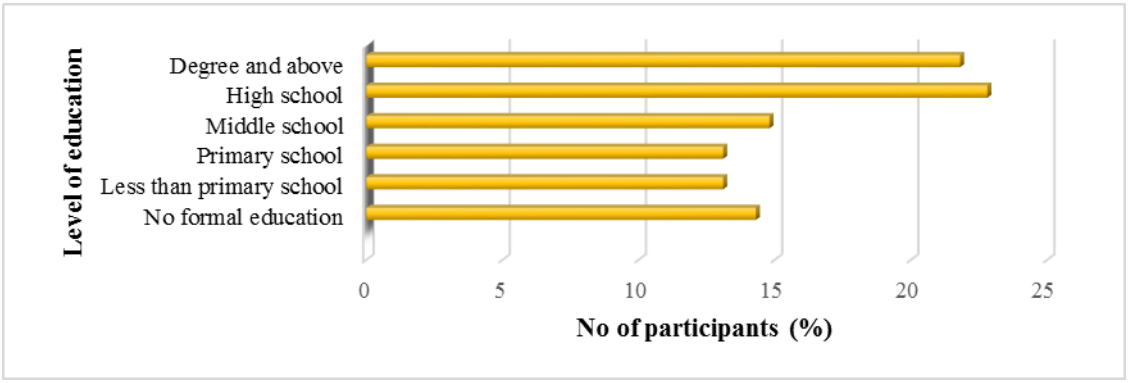

Figure No. 4: Distribution according to educational status

Among the total 426 samples collected, about 97 (22.8%) have studied till high school, 93 (21.8%) have completed their degree, 56 (13.1%) of the study participants have studied till primary school and 61 (14.3%) of the study participants have no formal education. Perhaps desire to study varies from individual to individual and their financial background. This is depicted in **Figure 4.** This result was similar to the study conducted by **Natalie Botelho Borges et al,** reported that 41.1% of patients had attended but not finished primary school, while 16.7% had finished high school, 12.4% when it comes to university and 4.3% of patients had no schooling at all.

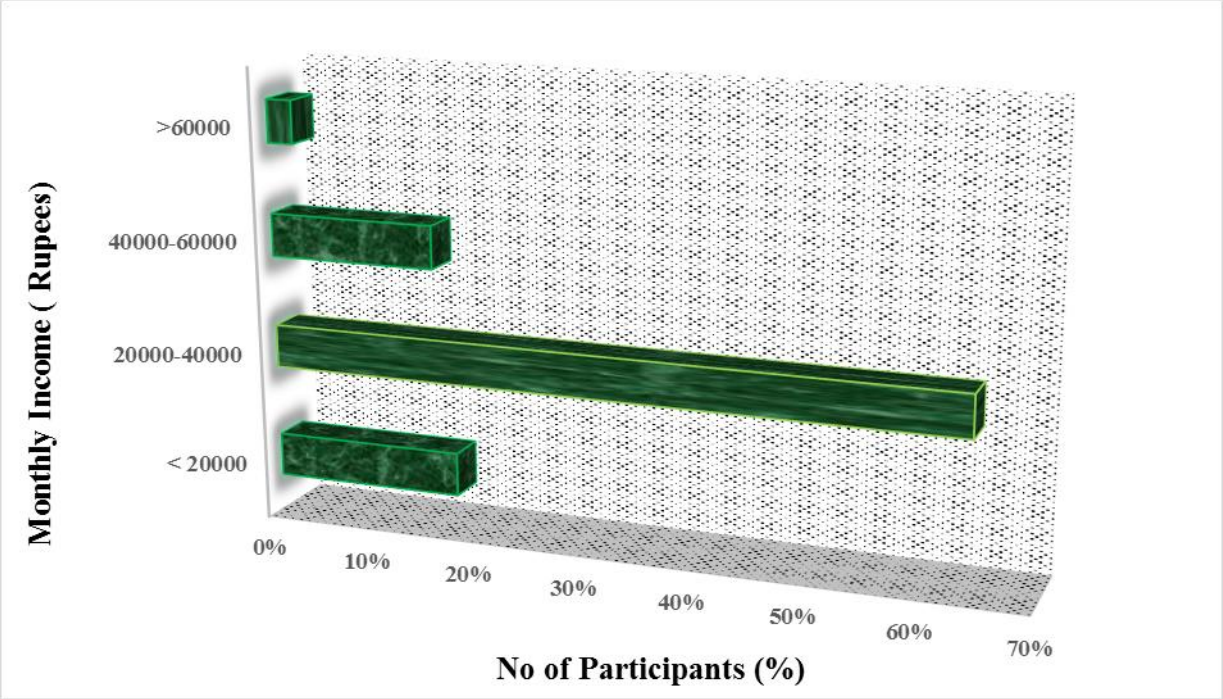

Figure No. 5: Monthly household income of study subjects

Figure 5 analyzes the monthly income of the study participants. The monthly household income represents the spending capability of the households. The monthly consumption expenditure represents the amount of spending a household does on food items and non-food items. Therefore, both these variables are important to understand the economic status of the household. In this study majority of patients were hesitant to disclose their monthly income, most of the patients gave some random numbers, so reliability of this result is doubtful. As per the study results, it showed that majority of the study participants 221 (64.2%) are earning between 20000 to 40000 rupees and the average monthly income of the patients was found to be 32,643 rupees.

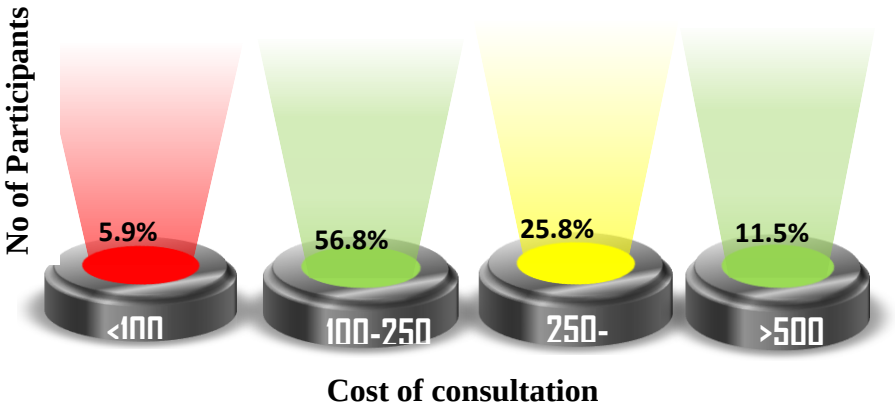

Figure No. 6: Cost of consultation

Figure 6 represent the cost of consultation for diabetes treatment. Among 426 participants majority of the patients 242 (56.8%) had to pay an amount between 100 to 250 rupees followed by 110 (25.8%) participants who had to pay an amount between 250 to 500 rupees. The average cost of consultation per month was found to be 333 rupees. A survey conducted by **Geethu Mathew et al** reported that mean cost of consultation was 300 rupees which is similar to our findings.

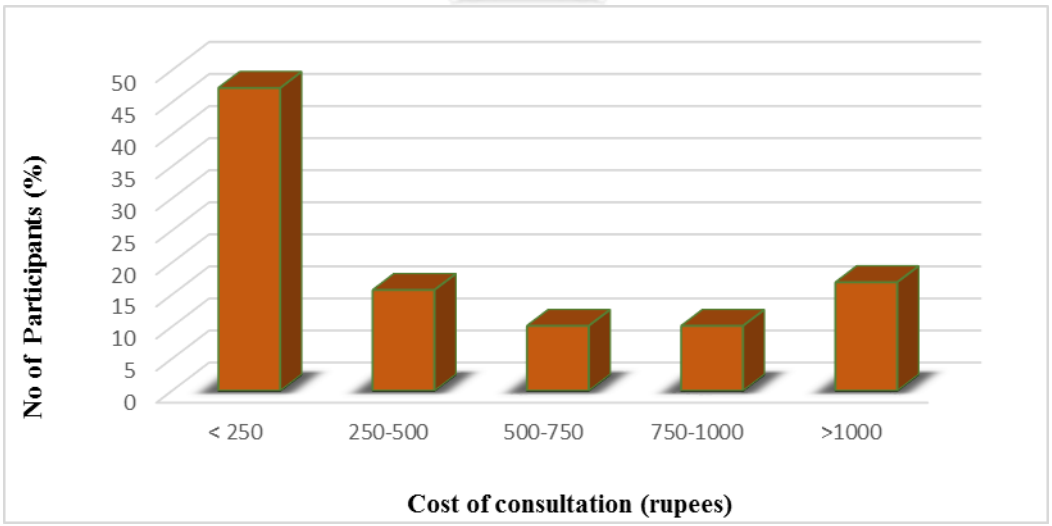

Figure No. 7: Cost of lab investigations

Figure 7 depicts the cost of lab investigation for diabetes mellitus. The data suggests that majority of the patients 201 (47.2%) had to pay an amount less than 250 rupees for the lab test. 72 (16.9%) of the study population have spent an amount greater than 1000 rupees for lab investigations. This shows that an average of 280 rupees was spent for lab investigation by the patients suffering from diabetes mellitus. This result was similar to the study

conducted by **Geethu Mathew et al** which reported that mean cost of lab investigation was 330 rupees.

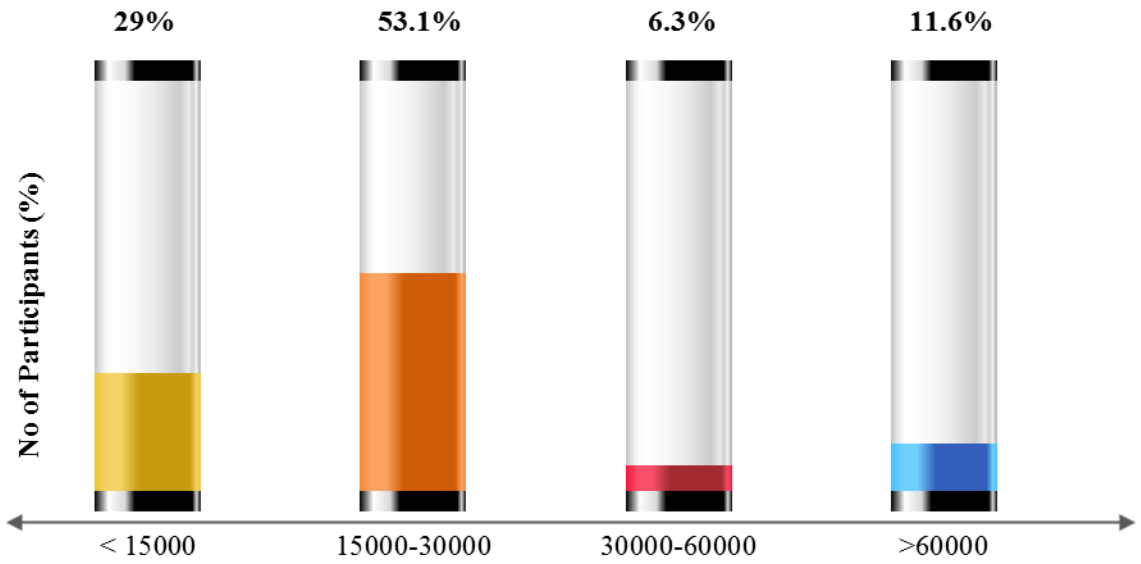

Figure No. 8: Total expenditure incurred during hospitalization

Our study found that hospitalization is a major cost driver in case of diabetes treatment. Among 186 patients who have been hospitalized in the past, majority of the study participants had an expense of amount between 15000 to 30000 rupees. An average of 16,978 rupees were spent for the hospitalization, which has contributed 30.8% of the total cost. This result is depicted in **Figure 8.** These results were congruent with the study of **Morsanutto et al.,** where he found similar results in that hospitalization contributed 28% of the total cost. **Jonsson B** reported that as much as 65% of the total cost was due to hospitalizations. There is no doubt that hospitalization is one of the major cost drivers for health care, but the variation may be attributed to different methods used to estimate the cost of the hospital event as well as different factors to consider when estimating the hospital cost. This further emphasized the financial impact of hospital care on the cost of treating the complications of diabetes mellitus. For a low-income person, the average annual direct cost without hospitalization was 9,828 rupees and with hospitalization was 21,555 rupees. The average annual indirect cost was 3,536 rupees.

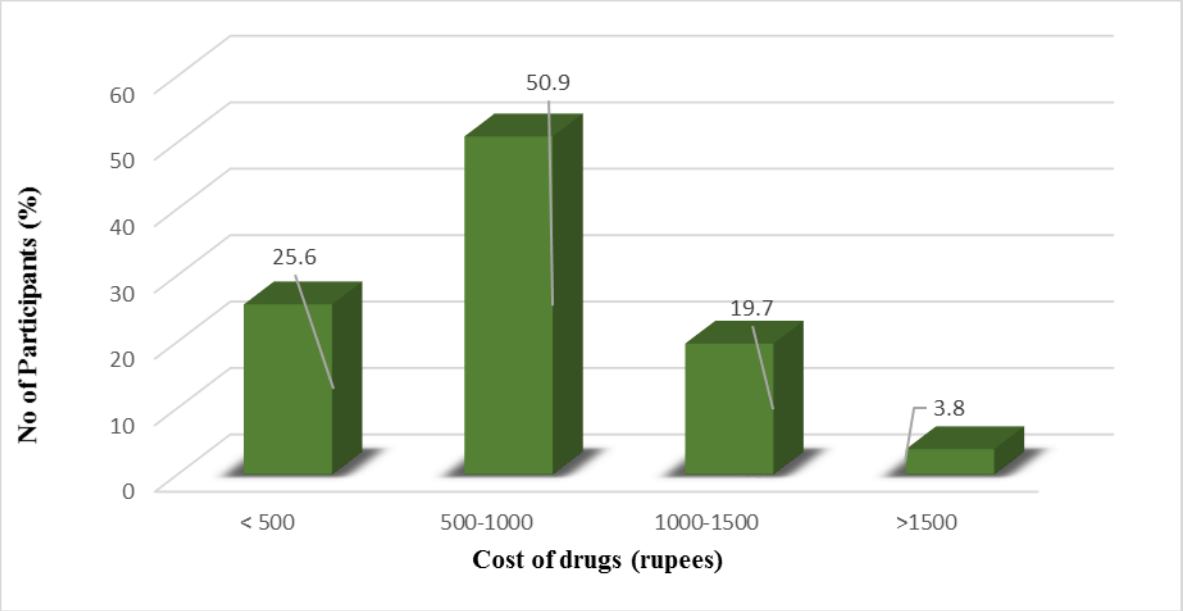

Figure No. 9: Cost of drugs for study subjects

Figure 9 depicts cost of drugs in diabetes treatment. Among 426 study participants majority of the patients 217 (50.9%) have spent an amount between 500 to 1,000 rupees for purchasing drugs for the treatment of diabetes. The average cost of drugs per month for diabetes treatment was found to be 771 rupees. These results were like the study conducted by **Morsanutto et al.** In his study medicine cost was 52% of the total cost and this could be a contributing factor.

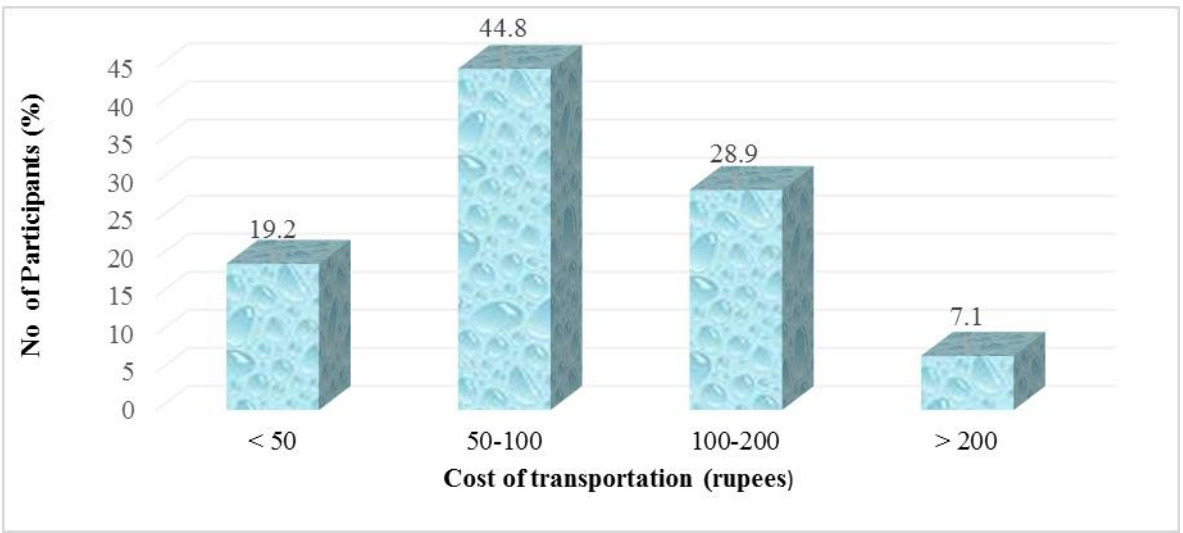

Figure No. 10: Cost of transportation for study subjects

Out of 426 samples collected most of the patients had to pay an amount between 50-100 rupees for transportation. An average of 111 rupees is spent for transportation by a diabetic patient. This is shown in **Figure 10.**

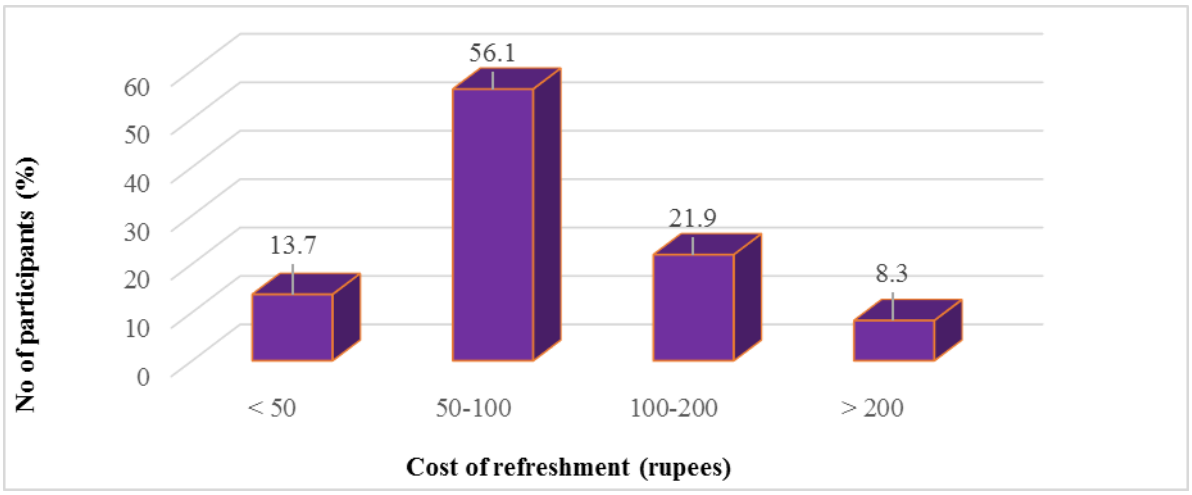

Figure No. 11: Cost of refreshment for study subjects

Figure 11 portrays cost of refreshments which comes under direct non-medical cost. Out of 426 sample collected most of the patients had to pay an amount between 50-100 rupees for refreshments. An average of 124 rupees was spent for refreshments by a diabetic patient.

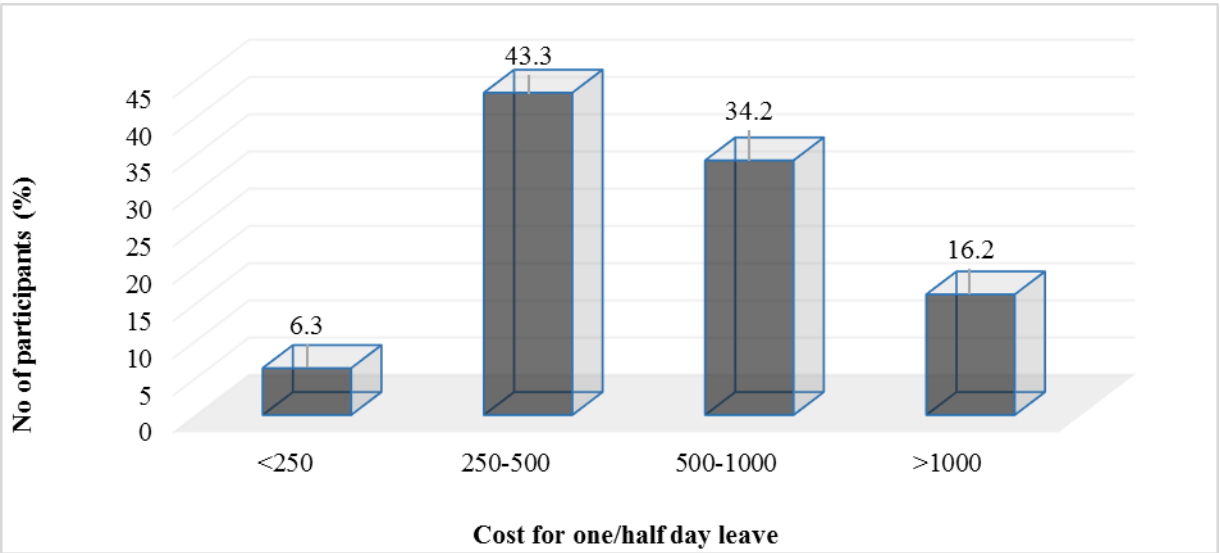

Figure No. 12: Cost of one/ half day leave

In **Figure 12** the study results have shown that most of the study participants have taken full day leave to consult the physician. The results showed that an average of 801 rupees was lost per month due to time taken off from work for consultation.

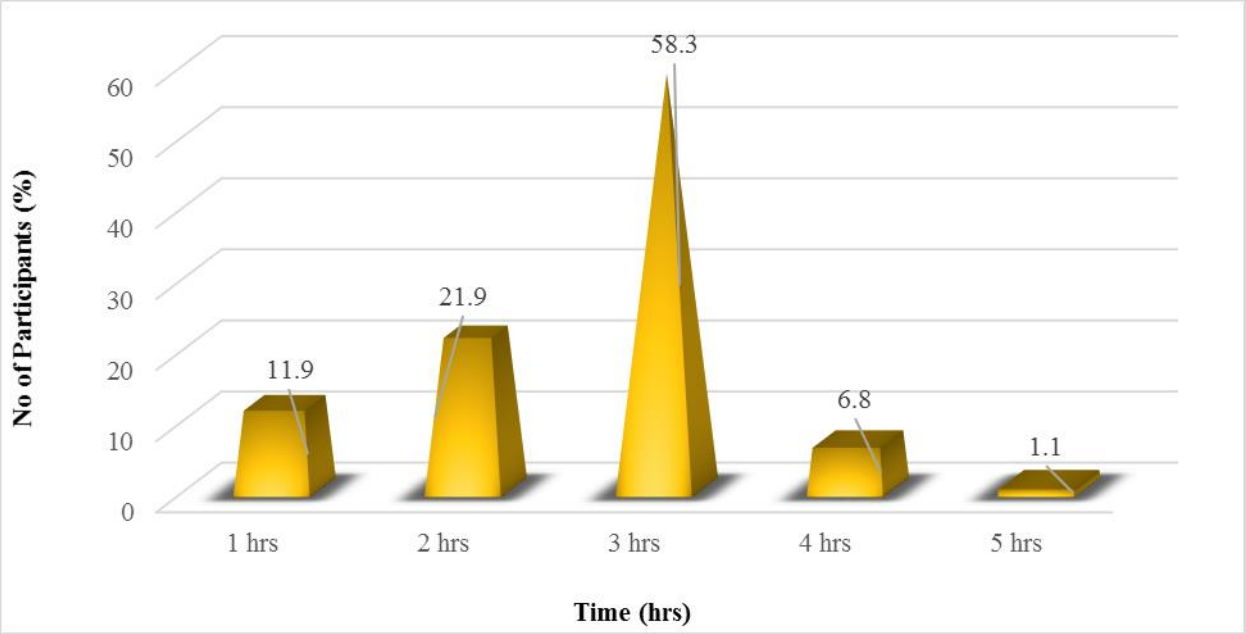

Figure No. 13: Time lost for consultation

Among 426 study population most of the patients 248 (58.3%) have lost 3 hrs for consulting the physician. An average of 2.4 hr is lost on each visit including travelling time, waiting period and consultation. This result was similar to the study conducted by **Sandhya Rani Javalkar** in which she reported that an average of 2.6 hrs was lost on each visit for consultation.

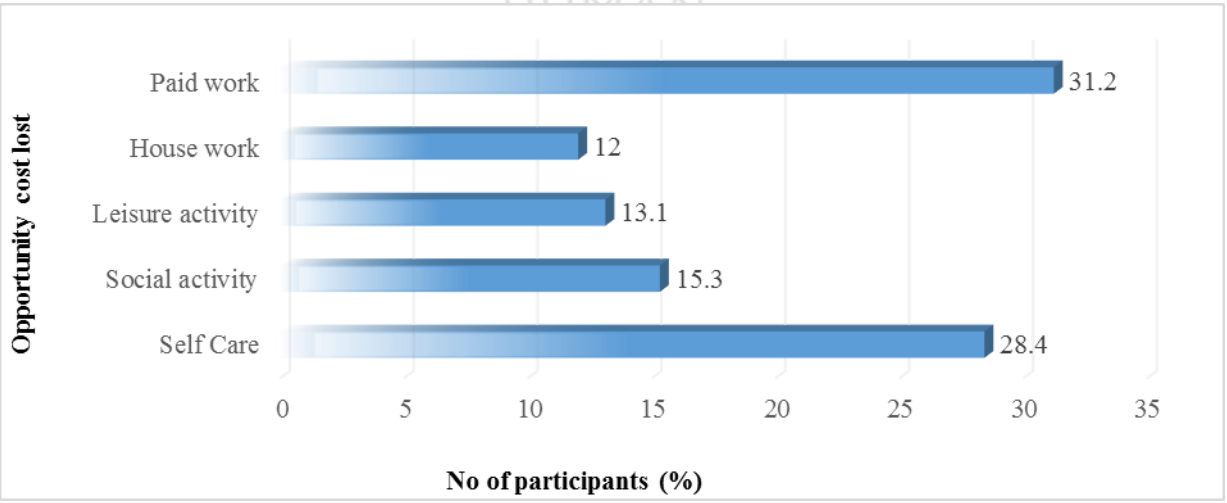

Figure No. 14: Type of opportunity cost lost

Figure 14 represents types of opportunity cost lost due to diabetes mellitus. Out of 426 study participants majority of the participants 133 (31.2%) have lost paid work at least for a day for the treatment of diabetes mellitus. 121 (28.4%) of study participants have lost their opportunity to do self-care activities because of diabetes disease. Diabetic foot ulcers are the most common complication of diabetes mellitus which is not well controlled. It is usually the

result of poor glycaemic control, underlying neuropathy, peripheral vascular disease or poor foot care. Efforts should be made for the prevention of foot ulcers, which occur by offloading the pressure from the site by using walkers or therapeutic shoes.

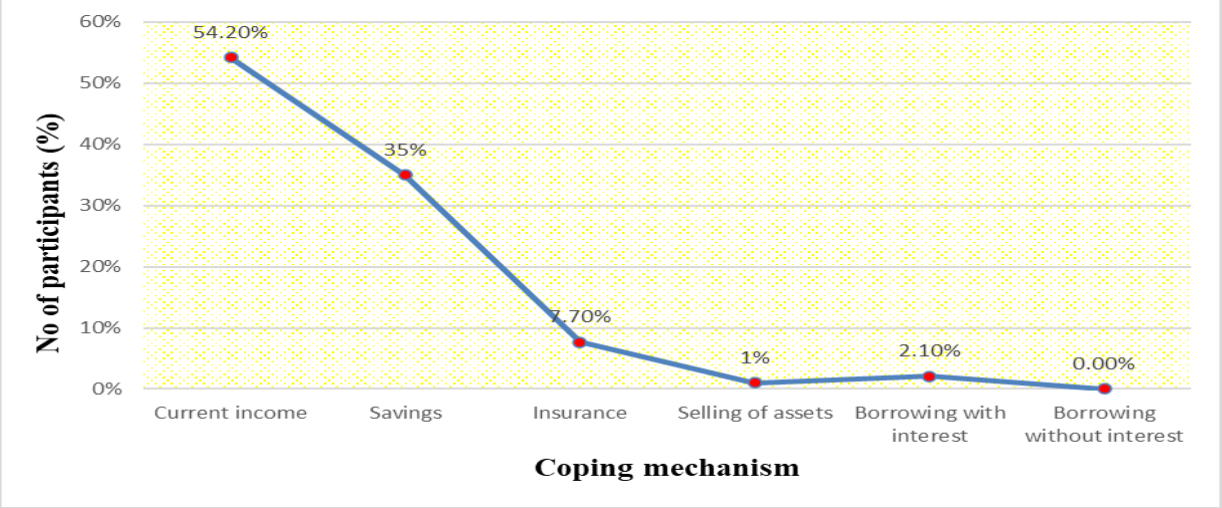

Figure No. 15: Coping mechanism

Figure 15 analyze how patient is managing the expenditure incurred due to diabetes mellitus. The study results show that among 426 study participants 231 (54.2%) have managed the expenditure through current income, 149 (35%) have managed the expenditure through savings and 33 (7.7%) patients have managed to overcome the expenditure incurred due to diabetes through insurance.

To tackle rising prevalence of diabetes in India, the government started a National Diabetes Control Programme in 1987 on a pilot basis in some districts of South India. However, due to paucity of funds this program could not be expanded further in the following years. The National NCD Monitoring Survey lead by ICMR-NCDIR with support from the Ministry of Health and Family Welfare, Government of India sought to examine empirical evidence to address the deficiencies in the diabetic care cascade, identify disadvantaged population groups with diabetes and monitor the initiatives taken to halt growing burden of diabetes by 2025. [17, 18]

The study showed that an individual with diabetes will have an average burden of direct cost of INR 36,870 rupees per annum. Similarly indirect cost for a diabetic patient is INR 6,408 rupees per annum. When evaluating the cost per patient for the various cost components, then hospitalization costs were the main cost driver.

In our study, direct cost account for 85 % and indirect cost account for 15 % of the total costs. This showed that nearly 11% of the patient income was spent for diabetic care. For low income patient around 49.14% their income was spent for diabetic care. The average annual cost of illness (COI) calculated for diabetic subjects was found to be INR 43,278. In socioeconomic status majority of the subject's falls under 50 to 60 age group and majority of them were males. About 14.3% of patients have no formal education and only 21.8% of patients have completed their degree. The prominent occupation is of self-employment.

This study shows that about half of the study participants are suffering from complications. The cost of treating complications of diabetes mellitus is almost same for treating diabetes mellitus in a year.

The impoverishment effect as per the study is not related to the disease burden but relates to the household income. 54.2% of diabetic population in the study relies on current income as their only source for managing the health expenditure incurred. 35% are managing via savings and 7.7% subjects rely on insurance. This current scenario shows that there is an urgent need to tackle the situation by providing insurance schemes, increasing awareness about insurance schemes, reducing cost of medicines and diagnostic test, developing market shaping mechanisms to increase access of medicines, eliminating poor procurement procedures and week supply chain systems that contribute for high price and variable availability of drugs, accurate costing system should be established at fundamental level which helps to reduce economic burden and improving quality of life of the diabetic patients.

CONCLUSION

Proper treatment of diabetes is not costly, but not treating diabetes properly is very costly. Accurate information on diabetes costs is vital to inform and guide resource allocation decisions and to provide baseline information for future comparisons and evaluations of the effect of public health policies and intervention. The study has addressed the economic magnitude of diabetes mellitus in Raichur and has emphasized the grave problems of diabetes care. The economic burden of diabetes will rise as the epidemiological burden grows, and the economically disadvantaged will be most affected. In the future, initiatives to combat diabetes should be based on evidence-based and integrated strategies that address prevention and disease management at all levels. The health policy agenda should be based on an analysis of the cost of illness in order to prioritize strategies for mitigating its effects.

ACKNOWLEDGEMENT

Authors take it as a privilege to acknowledge Medical superintendent, physicians, nursing staffs and other healthcare professionals for their support during the study.

CONFLICT OF INTEREST

The author declare no conflict of interest.

REFERENCES

1) The British Medical Association: Complete family health encyclopedia [Internet]. London: Dorling Kindersley; 1992 [cited 2022 Feb 06]. http://archive.org/details/ britishmedicalas0000unse_o1x9/mode/2up
2) WHO diabetes programme 2008 Geneva. Available at [http://www.who.int/ diabetes/facts/world figures/en/indfex2.html]. [cited 2022 Feb 06].
3) World Health Organization. Global report on diabetes. World Health Organization ; 2016. [cited 2022 Feb 06].
4) International Diabetes Federation: The economic impact of diabetes. In Diabetes Atlas. 2nd ed. Brussels, International Diabetes Federation 2003; 6(3): 175–192.
5) Ramachandran A, Ramachandran S, Snehalatha C, Augustine C, Murugesan N, Viswanathan V, et al. Increasing expenditure on health care incurred by diabetic subjects in a developing country: a study from India. Diabetes Care [Internet]. 20 07 Feb [cited 2022 Feb 10];30(2):252-6.
6) Segel JE. Cost of illness Studies-A Primer. RTI UNC Center of Excellence in Health Promotion Economics; 2006.
7) Mohan V, Mathur P, Deepa R, Deepa M, Shukla DK, Menon GR, et al. Urban rura l differences in prevalence of self-reported diabetes in India--the WHO-ICMR Indi an NCD risk factor surveillance. Diabetes Res Clin Pract [Internet]. 2008 Apr [cite d 2022 Feb 10]; 80(1):159-68. Available from: https://pubmed.ncbi.nlm.nih.gov /18237817/ doi: 10.1016/j.diabres.2007.11.018. Epub 2008 Jan 30. PMID: 182378 17.
8) Gupta R, Misra A. Review: Type 2 diabetes in India: regional disparities. Br J Diabetes Vasc Dis [Internet]. 2007[cited 2022 Feb 10]; 7(1):12-16. Available from: https://journals.sagepub.com/doi/10.1177/14746514070070010301 doi: 10.1 177/14746514070070010301
9) Selvaraj S, Dinesh A, Gopakumar KM. Access to medicine in India. New Delhi: Acadameic Foundation; 2014.
10) Ping Z, Xinzhi Z, Jonathan B, Dorte V, Richard AS, Shaw J, et al. Economic impact of diabetes. IDF Diabetes Atlas fourth edition. 2009:1-28.
11) Oberoi S, and Kansra P. Economic menace of diabetes in India: A systematic review. Int J Diabetes Dev Ctries June 2020; 40(4): 464-475
12) Singla R et al. Drug prescription patterns and cost analysis of diabetes therapy in India: Audit of an endo-crine practice. Indian J Endocr Metab 2019; 23(1): 40–45.
13) Basu S et al. The determinants of out-ofpocket health care expenses for diabetes mellitus patients in India: An examination of a tertiary care government hospital in Delhi. Perspect Clin Res 2020; 11(2): 86–91.
14) Sandhya RJ. 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.
15) Sophia DF and Sunny DAF. Economic burden of diabetes mellitus and its socio-economic impact on household expenditure in an urban slum area. Int J Res Med Sci. 2017; 5(5): 1808-1813.
16) Bhansali A et al. Cost of ambulatory care of diabetes mellitus: a study from north India. Postgrad Med J 2005; 81(956): 391–395.

17) Kumar A, Goel MK, Jain RB, Khanna P, Chaudhary V. India towards diabetes control: Key issues. Australas Med J [Internet]. 2013 Oct [cited 2022 May 28]; 6(10):524-31. Available from: https://pubmed.ncbi.nlm.nih.gov/24223071/ doi: 10.4066/AMJ.2013.1791.
18) Mathur P, Leburu S, Kulothungan V. Prevalence, Awareness, Treatment and Control of Diabetes in India From the Countrywide National NCD Monitoring Survey. Front Public Health. 2022 Mar 14;10:748157. doi: 10.3389/fpubh.2022.748157. PMID: 35359772; PMCID: PMC8964146.