ORIGINAL ARTICLE

Association between socioeconomic status and diabetes in rural settings of India

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Abstract

Background: The pattern of diabetes incidence is related to the geographical distribution of diabetes, rough estimates show that the prevalence of diabetes in rural population is one-quarter that of urban population for India and Indian subcontinent countries. Socioeconomic status (SES) determinants of health status refer to an individual's position within a hierarchical social structure. **Objective:** The 6 months prospective observational cross-sectional study in a sample of 100 diabetic's performed in a secondary referral health-care setting of India aimed at assessing the association of SES of an individual based on three variables of Kuppuswamy scale. **Materials and Methods:** Study included participants diagnosed with diabetes mellitus (DM) of age above 18 years who showed willingness to participate in the study, whereas pregnant women, children below 18 years of age and participants diagnosed with diabetes but showed no willingness was excluded from the study. **Results:** The prevalence of DM was found to be 0.0713 with period prevalence of 0.0571. In our study, 29% of the study population was under age group of 51-60 years, illiteracy was 71%, and marital status was 92%. Based on Kuppuswamy scale the score of SES in our study, 42% of individuals were documented under Class IV, which shows a study relationship of household income, occupation, and education with diabetes between age group of 30 and 70 years. **Conclusion:** These findings concluded an inequality of health according to SES in the younger population.

Key words: Diabetes mellitus, observational study, prevalence, prospective, socioeconomic status

INTRODUCTION

Diabetes mellitus (DM) is a group of metabolic disorders characterized by hyperglycemia. It is associated with abnormalities in carbohydrate, fat, and protein metabolism and results in chronic complications including microvascular, macrovascular, and neuropathic disorders.[1]

Diabetes Epidemiology: Prevalence in Southeast Asia Region

It is estimated that 8.5% of adult population or 78.3 million people living with diabetes, over half of these are undiagnosed. Mauritius has one of the highest adult diabetes prevalence rates in the world. The Maldives has the second highest prevalence rate in the region. India is home to the second largest number of adults living with diabetes worldwide, after China.[2]

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In India, the pattern of diabetes incidence is related to the geographical distribution of diabetes. Rough estimates show that the prevalence of diabetes in rural population is one-quarter that of urban population for India and Indian subcontinent countries.[3]

Preliminary results from a large community study conducted by the Indian Council of Medical Research revealed that a lower proportion of the population is affected in states of Northern India Chandigarh (0.12 million), and Jharkhand (0.96 million) as compared to Maharashtra (9.2 million), and Tamil Nadu (4.8 million).[4]

Similarly, the National Urban Survey conducted across the metropolitan cities of India reported that a lower population is affected, 11.7% in Kolkata (Eastern India), 6.1% in Kashmir Valley (Northern India),[5] 11.6% in New Delhi (Northern India), and 9.3% in West India (Mumbai) compared with 13.5% in Chennai (South India), 16.6% in Hyderabad (south India), and 12.4% Bangalore (South India).[6]

A suggested explanation for this difference is that the north Indians are migrant Asian populations and south Indians are the host populations, however this possible cause and effect has to be strengthen with new evidence or through further research.[7]

India currently faces an uncertain future in relation to the potential burden that diabetes may impose on the country. Many influences affect the prevalence of disease throughout a country, and identification of those factors is necessary to facilitate change when facing health challenges. Hence, what are the factors currently affecting diabetes in India that is making this problem so extreme.[3]

Socioeconomic Status (SES)

SES refers to an individual's position within a hierarchical social structure, which is one of the important determinants of health status.[8] The health status of a country depends on the SES and the per capita income of the citizens of that country. The SES also decides the affordability and utilization of the health facilities.[8]

Several methods or scales have been proposed for classifying different populations by SES: Rahudkar scale 1960,[9] Parikh and Trivedi scale 1964,[10] Alota *et al*. scale 1970,[11] Kulshrestha and Day scale 1972,[12] Kuppuswamy scale 1981,[13] Srivastava scale 1978,[14] and Bhardwaj scale 2001.[15]

Kuppuswamy scale 2081[13] is a consumer price index based scale, which measures the SES of an individual based on three variables education; occupation of the head of household and income of the family of this three variables, education, and occupation of head of the household do not change frequently with time. However, the steady inflation and the resultant devaluation of rupee necessitate periodic revisions of the income variable.[16]

Theoretical Background

India currently faces an uncertain future in relation to the potential burden that diabetes may impose on the country. Many influences affect the prevalence of disease throughout a country, and identification of those factors is necessary to facilitate change when facing health challenges.[3]

General Analysis

The SES is an important determinant of health and nutritional status as well as of mortality and morbidity. SES also influences actual utilization of various available health facilities.[17] Literatures suggested that both individual and neighborhood SES play a role in the development of diabetes.[18] Lower individual levels of education and income and lower levels of neighborhood SES were independently associated with an increased risk of Type 2 diabetes. These associations appeared to be primarily mediated by BMI. The association of neighborhood SES with diabetes risk was most evident among women with the most education and the highest income.[18]

Hence, this research work entitled "DM in association with SES in rural background of India" was undertaken after a series of discussion with the relevant fraternities who are having good experience in the field of diseases related to the endocrine disorders.

MATERIALS AND METHODS

Study Design

Prospective observational cross-sectional study.

Study Site

Secondary referral health-care setting (Rural Development Trust [RDT] Hospital, Bathalapalli) of Andhra Pradesh in resource-limited background of South India.

Study Period

The study was performed for a period of 6 months from June to November 2016.

Study Population

100 diabetic patients.

Ethical Approval

The ethical approval was obtained from the Institutional Review Board (IRB) before the commencement of the study (Raghavendra Institute of Pharmaceutical Education and Research [RIPER]/IRB/2016/016).

Study Criteria

The study included participants diagnosed with DM of age above 18 years who showed willingness to participate in the study, whereas pregnant women, children below 18 years of age and participants diagnosed with diabetes but showed no willingness was excluded from the study.

Study Procedure

The prospective observational cross-sectional study of 6 months duration was designed to assess the prevalence of DM, identification of time prevalence and point prevalence in association with SES as primary objectives in the study population. A structured process was followed for obtaining permission from hospital authorities by submitting a pro forma of study, the initial acceptance from hospitals was registered with the IRB. A documentation form was designed to collect the patient's information which was kept confidential, the information from patients was collected only after explaining the merits and demerits of the study and obtaining their consent for which an informed consent form was designed separately. The information's pertaining to patient's demography, approximate date of diagnosis (in old cases) and definite date of diagnosis (in new cases), family and social histories, food habits, educational qualification, occupation, income, and lifestyle were obtained and documented. Kuppuswamy scale 2014[16] was used to categorize the participants into different socioeconomic class based on the score. Descriptive statistics was used to explain the data and documented.

RESULTS

This study included 100 patients diagnosed with DM, out of which 58% were male and 42% were female. The distribution of patients diagnosed with diabetes was categorized based on age, gender, body weight, education qualification, marital status, social histories (smoking and alcohol consumption), data's thus obtained are analyzed and reported in Table 1: Demographic particulars of the study population. In our study, the prevalence of diabetes was found to be 0.0713 (men 0.0413 vs. women 0.0299) and the period prevalence of 6 months duration was found to be 0.0571 (men 0.0308 vs. 0.0199) which are reported in Table 2: Prevalence of DM according to Kuppuswamy scale 2014[16] the SES was categorized into Class I, II, III, IV, and V based on the corresponding score in which 42% of our study population belongs to the upper lower class (Class IV) reported in Table 3: Kuppuswamy classification of SES.

Table 1: Demographic particulars of study population

Variable	Male	Female	Total
Age (years)			
≤20	2	1	3
21-30	9	3	12
31-40	9	5	14
41-50	10	14	24
51-60	20	9	29
61-70	6	8	14
71-80	2	2	4
Gender	58	42	100
Body weight (kg)			
20-40	3	2	5
41-60	35	29	64
61-80	15	10	25
81-100	5	1	6
Education			
Illiterate	41	30	71
SSC/10th class	10	10	20
Intermediate	2	2	4
Graduation	5	0	5
Marital status			
Married	52	40	92
Unmarried	6	2	8
Smoking			
Yes	45	0	45
No	13	42	55
Alcohol			
Yes	49	0	49
No	9	42	51

Table 2: Prevalence of DM

DM	Male	Female	Total
Prevalence	0.0413	0.0299	0.0713
Point prevalence	0.0413	0.0299	0.0713
Period prevalence	0.0308	0.0199	0.0571
Time prevalence	0.0413	0.0299	0.0713

DM: Diabetes mellitus

DISCUSSION

The association of many vascular diseases and their risk factors with SES has been well described.[19-22] Certain risk

Table 3: Kuppuswamy classification of SES

Socioeconomic class	Score	Number
Upper (Class I)	26-29	7
Upper middle (Class II)	16-25	24
Lower middle (Class III)	11-15	21
Upper lower (Class IV)	5-10	42
Lower (Class V)	<5	6

SES: Socioeconomic status

factors such as obesity, physical inactivity, smoking, and alcoholism are implicated in the development of diabetes are also known to be associated with SES. In Western societies these factors are associated with low SES.[23] Thus, a direct relation would be expected between the prevalence of Type 2 diabetes and SES. This study had shown a significant association between occupation and DM, education and DM, income of head of the family and DM.

SES has different influences on age and sex, and studies examining the relationship between SES and DM have reported that the relationship varied depending on sex, race, and degree of development of societies and countries.[24-26]

The study findings demonstrate that participants with low income have a higher prevalence of diabetes than wealthy participants. This SES in diabetes prevalence has been shown previously across the studies and across cultures.[27-29] To reach consistent therapeutic targets in DM usually requires the support of a multidisciplinary team (diabetes educators, dieticians, and medical specialist) and use of several medications.[30-32]

Diabetes education centers allow patients to access the relevant health-care professionals and education services within a single center. This study shows that people in the lowest socioeconomic level were more likely to be referred for structured diabetes education care center. Our study shows that low income, unemployed/unskilled workers, and illiterate patients 42% more likely to be referred to this diabetes education and care center.

Lower individual levels of education and income and lower levels of neighborhood SES were independently associated with an increased risk of diabetes. When differentiating by age neither household income nor education level was associated with DM in elderly people, which contrasts with the results observed in the young age group.

The possible reasons for this could be highly age dependent development of DM, people aged 65 years and older may greatly influenced by their physical status rather than by their health habits or other external factors. It is also believed that difficulty in conducting an accurate measurement to income level due to the changing in working status and income level might influence the results in old age people.

CONCLUSION

In conclusion, the study observed a close relationship of household income, occupation, and education with DM in study population using representative sample data in adults between 30 and 70 years of age. These findings conclude the inequality of health according to SES in the younger population. With the increasing prevalence of DM the fact that SES is one of the most important factors determining one's lifestyle, therefore, further study is needed to examine the effects of SES on DM. Furthermore, preventive care is needed for a population with low SES, particularly in the young or middle-aged populations.

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