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Assessment of diabetes risk in an adult population using Indian diabetes risk score in rural area of Chennai

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Abstract

Epidemiological transitions in India in the 21st century have led to non communicable diseases becoming a major public health problem of growing magnitude. Diabetes is an iceberg disease. Most of the cases remain asymptomatic. Screening for diabetes can identify patients at an early stage of the disease. A community-based, cross-sectional study was carried out in the rural field practise area of A.C.S. Medical College and hospital (Nazarathpet) in 2018 and analyzed by SPSS 16.0 version. Out of 305 subjects, 30.5% were in low risk category, 52.5% were in moderate risk and 17.0% were at high risk group as per Indian Diabetes Risk Score. Majority of the study subjects were at risk of having diabetes.

Keywords: Diabetes risk, adult population, iceberg disease

1. Introduction

Diabetes mellitus is one of the non-communicable diseases which has become a major global health problem with increasing prevalence worldwide and is expected to reach 4.4% by 2030. Epidemiological transitions in India in the 21st century have led to non-communicable diseases becoming a major public health problem of growing magnitude. One of the important disease is diabetes, which is considered a “disease of urbanization” [1-3].

Presently, more than three-quarters of the estimated 179 million people with diabetes are in the 40-59 years of age. Hence it is important to screen individuals early to increase the quality of life and delay complications. The prevalence of diabetes is higher in rural India. Unfortunately, more than 50% of people with T2DM still remained undiagnosed [4]. Early identification of the high risk individuals would help in taking appropriate intervention in the form of dietary changes and increasing physical activity, thus helping to prevent, or at least delay the onset of diabetes.

The Indian Diabetic Risk Score (IDRS) is a simple, low cost, feasible tool for mass screening programme at the community level. IDRS uses two modifiable risk factors (waist circumference and physical inactivity) and two non-modifiable risk factors (age and family history of diabetes), providing a clear message that if modifiable risk factors are altered, the risk score can be considerably reduced. Subjects with high IDRS regardless of their blood sugar status, are ideal candidates for life style modification as these are risk factors for not only diabetes but also for cardiovascular disease [5].

According to WHO the total number of people with diabetes is projected to rise to 366 million in 2030 [2] but International Diabetes Federation (IDF) estimated that the situation is much worsened as the burden would increase from 366 million (2011) to 552 million (2030) [6]. India has the dubious distinction of being the diabetes capital just next to China having 62.4 million diabetics which is expected to rise to 100 million by 2030 [6]. Every fifth diabetic in the world is an Indian. IDRS has been validated by various studies conducted in different parts of India. These studies have found IDRS as useful for identifying undiagnosed diabetic subjects, can make screening programmes more cost effective, can be reliably applied as effective tool for the mass screening of diabetes in the community [7-10].

The National Urban Diabetes Survey (NUDS), a population-based study was conducted in six metropolitan cities across India and recruited participant representatives of all socio-

socio-economic strata. This study also revealed that the prevalence in the southern part of India to be higher-13.5% in Chennai, 12.4%, in Bangalore, and 16.6% in Hyderabad; compared to eastern India (Kolkata), 11.7%; northern India (New Delhi), 11.6%; and western India (Mumbai), 9.3%.^[11] Several prospective studies have shown that measures of lifestyle modification help in preventing the onset of diabetes^[12]. Early identification of the high risk individuals would help in taking appropriate intervention thus helping to prevent, or at least delay, the onset of diabetes. With this background, the present study was conducted to find out the risk status of Diabetes mellitus using Indian Diabetic Risk score among adult population in rural area of Chennai.

2. Materials and Methods

A community-based, cross-sectional study was carried out in rural field practise area of ACS Medical College and Hospital in June 2018.

2.1 Inclusion Criteria

- a) All people who are aged 18 years and above.

2.2 Exclusion Criteria

- a) Those people who are critically ill and not willing to participate in the study.
- b) Known case of any type of DM.

2.3 Data Collection Methods

In the study area, individuals were interviewed using a structured questionnaire based on Indian Diabetic Risk Scoring system. Interviewer was trained in collecting the details present in IDRS questionnaire before the start of data collection. The individuals aged 18 years and above of both the genders were recruited in the study after obtaining the consent from the study participants. A study questionnaire was used to interview the study participants on socio demographic details, per capita income, history of blood pressure, Diabetes mellitus, physical activity and Diabetic score using IDRS and data was collected based on the questionnaire pattern. Anthropometric measurements such as height, weight, and waist circumference were measured.

Indian diabetes risk score^[7].

Table 1: Shows that particular score and age

| Particulars | Score |
|---|-------|
| Age | |
| • <35 | 0 |
| • 35-49 | 10 |
| • ≥ 50 | 20 |
| Abdominal obesity | |
| • Waist <80 cm [female], <90 [male] | 0 |
| • Waist ≥ 80 – 89 cm [female], ≥ 90– 99 cm [male] | 10 |
| • Waist ≥90 cm [female], ≥ 100 cm [male] | 20 |
| Physical activity | |
| • Vigorous regular exercise or strenuous manual labour at home | 0 |
| • Moderate regular exercise or Moderate physical activity at home or work | 10 |
| • Mild exercise regular or Moderate physical activity at home or work | 20 |
| • No exercise and sedentary work at home or work | 30 |
| Family history | |
| • No family history | 0 |
| • Either parent diabetic | 10 |
| • Both parents diabetic | 20 |
| Total score | |

2.4 Grade

<30: Risk of having Diabetes is probably low.
 If the score is 30-50, the risk of having diabetes is Moderate.
 If the score is >60, Very High risk of having diabetes.

- d = acceptable deviation- 11% of prevalence.

Based on the above formula, the calculated sample size was 305.

2.5 Sample Size

A study done in Pondicherry by sanjaygupta^[13] found that the prevalence of risk of diabetes mellitus using IDRS Score among adult population was 51%. Based on this prevalence and keeping 95% alpha error and 11% of relative precision, sample size will be calculated by the formula

$$n = \frac{Z^2pq}{d^2}$$

- n = sample size
- z = Value of two tailed alpha error is 1.96
- p = prevalence = 51%
- q = 100-p = 49%

2.6 Sampling Methods

Study Participants was recruited using Systematic random sampling.

Total no of Houses in the study area- 3640

Sample size- 305

Sampling Interval- Total no of Houses/Sample size
 =3640/305
 =12

Every 12th house was selected for the study and from each selected house one adult was included in the study, by simple random sampling (Lottery Method).

2.7 Data Analysis

The data obtained from the survey was entered, and analyzed by SPSS software version 16.0. Prevalence was expressed in percentage and the significance of association

between qualitative variables was checked using chisquare test. P value less than 0.05 was considered as statistically significant.

2.8 Ethical Considerations

Study was approved by Institutional Ethics Committee of ACS Medical College. An informed consent was taken from each participant before the data collection. Those who were illiterate, thumb impression were taken in front of a witness. All information collected was kept confidential. All the study subjects who had a diabetic risk score >30 (moderate and high risk) were referred to a secondary level /tertiary level hospital for getting their blood sugar levels checked and further workup.

3. Results

Out of 305 study participants, 52 (17.0%) study subjects were at low risk of having diabetes, 160(52.5%) were at moderate risk and 93 (30.5%) were at higher risk of having diabetes. Table 2 shows the distribution of study subjects according to Indian diabetes risk score (IDRS). Table 3 shows that there was a statistical significant association of diabetes risk with socio demographic details. Comparing risk of diabetes and age we found that as the age increases

the risk of having diabetes also increases. Association between risk of diabetes and age was found to be highly statistically significant (p=0.000). In gender, high risk of diabetes was relatively more among males [(31.5%)] compared to females and it was not statistically significant (p=0.589). There is no significant association with religion. Comparing risk of diabetes and Socio economic status, class 2 people, [10(47.6%)] were at higher risk of diabetes as compared to other socio economic status. However it was not statistically significant(p=0.408). With respect to occupation, unemployed people were at high risk of diabetes [39(36.4%)] and it was not statistically significant (p=3.075). Comparing risk of diabetes and hypertension we found that there is a statistically significant association with a known case of hypertensive and diabetes risk (p=0.000). Also there was a statistically significant association between body mass index and risk of diabetes (p=0.000)

Table 2: Shows the distribution of study subjects according to Indian diabetes risk score (IDRS)

| Variable | Frequency | Percent |
|---------------|-----------|---------|
| High Risk | 93 | 30.5 |
| Moderate Risk | 160 | 52.5 |
| Low Risk | 52 | 17.0 |

Table 3: shows that there was a statistical significant association of diabetes risk with socio demographic details

| Variables | High Risk | Moderate Risk | Low Risk | Total | Chi Square | P Value |
|-------------------------------|-----------|---------------|------------|------------|------------|---------|
| AGE: | | | | | 82.336 | 0.000 |
| 18-30 | 15(10.9) | 80(58.4) | 42(30.7) | 137(100.0) | | |
| 31-40 | 27(31.0) | 50(57.5) | 10(11.5) | 87(100.0) | | |
| 41-50 | 25(56.8) | 19(43.2) | 0(0) | 44(100.0) | | |
| >50 | 26(70.3) | 11(29.7) | 0(0) | 37(100.0) | | |
| Sex | | | | | 1.058 | 0.589 |
| Male | 47(31.5) | 74(49.7) | 28(18.8) | 149(100.0) | | |
| Female | 46(29.5) | 86(55.1) | 24(15.4) | 156(100.0) | | |
| Religion: | | | | | 10.464 | 0.106 |
| Hindu | 75(29.0) | 137(52.9) | 47(18.1) | 259(100.0) | | |
| Muslim | 9(32.1) | 14(50.0) | 5(17.9) | 28(100.0) | | |
| Christian | 9(50.0) | 9(50.0) | 0(0) | 18(100.0) | | |
| Occupation | | | | | 3.075 | 0.215 |
| Employed | 54(27.3) | 107(54.0) | 37(100.0) | 198(100.0) | | |
| Unemployed | 39(36.4) | 53(49.5) | 107(100.0) | 107(100.0) | | |
| Socio Economic Status: | | | | | 3.988 | 0.408 |
| Class 1 | 82(29.2) | 149(53.0) | 50(17.8) | 281(100.0) | | |
| Class 2 | 10(47.6) | 9(42.9) | 2(9.5) | 21(100.0) | | |
| Class 3 | 1(33.3) | 2(66.7) | 0(0) | 3(100.0) | | |
| Known Hypertensive | | | | | 24.488 | 0.000 |
| Yes | 19(73.1) | 6(23.1) | 1(3.8) | 26(100.0) | | |
| No | 74(26.5) | 154(55.2) | 51(18.3) | 279(100.0) | | |
| Body Mass Index | | | | | 32.982 | 0.000 |
| Underweight | 0(0) | 5(71.4) | 2(28.6) | 7(100.0) | | |
| Normal | 38(21.0) | 101(55.8) | 42(23.2) | 181(100.0) | | |
| Overweight | 45(45.0) | 47(47.0) | 8(8.0) | 100(100.0) | | |
| Obese | 10(58.8) | 7(41.2) | 0(0) | 17(100.0) | | |

4. Discussion

In this study we used a simplified Indian diabetes risk score for identifying newly diagnosed high risk subjects in the rural area of Chennai. This is of great significance as use of such scoring system can prove to be a cost effective tool for screening of diabetes.

In this study, screening for Diabetes was conducted for 305 subjects in the community. Out of these 30.5% were in low risk category, 52.5% were in moderate risk and 17.0% were at high risk group as per IDRS. Similar findings was

observed in a study conducted by Sanjay Kumar Gupta in rural area and found that 31.34% were at low risk, 50% of the individuals in moderate risk, and 18.66% were at high risk [13]. Another study by Sathiyaraj Narayanan S *et al.* in rural area of Kancheepuram found that out of 24.53% had low risk for diabetes, 49.49 had moderate risk, 25.98 had high risk for diabetes [14].

However a study done by Krutarth R Brahmhattin in Mangalore showed that, 9% were at low risk and 33.8% were at high risk [15]. This difference may be due to the

study area being urban where majority of the subjects fall under low risk category.

In our study a highly significant association was observed between risk of diabetes and age i.e, as the age increases the risk of having diabetes also increases ($p=0.000$). Similar results was found in a study conducted by Jayakiruthiga in chennai, found that association between Diabetes risk and age was also statistically significant ($p=0.001$)^[16].

In our study we found that 31.5% of males have high risk of Diabetes as compared to females (29.5%). However the association between risk of Diabetes and gender was not statistically significant.

In our study we found that 36.4% of Unemployed individuals are having high risk of Diabetes as compared to employed 27.3%. However the association between risk of Diabetes and occupation was not statistically significant.

In our study we found that 73.1% of known hypertensives are having high risk of Diabetes as compared to not having hypertension (26.5%). The association was statistically significant ($p=0.000$). Hypertension and Diabetes mellitus share the common risk factors so those who are known hypertensives will be at risk for DM also. Our study also proves the same.

In our study we found that 45% of overweight, and 58.8% of obese people are having high risk of Diabetes as compared to normal. The association also found to be highly statistically significant ($p=0.000$). Similar results was observed in a study conducted by Sanjay Kumar Gupta in rural area also found that risk for diabetes significantly increases with the increase in BMI from normal to obese stage ($P < 0.05$)^[13].

5. Conclusion

Indian diabetes risk score is a useful tool for predicting and screening for undiagnosed diabetes mellitus in the population. Our study has described that the majority of the adult population were at medium and high risk of developing type 2 diabetes, showing the need for lifestyle modifications to be initiated as soon as possible to delay the occurrence of type 2 diabetes and prevent its complications.

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