Research Article

Diabetes

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Prevalence of type 2 diabetes mellitus among people attending medical camps in South Chennai, India

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Background: As per the International Diabetes Federation (2013), nearly 65.1 million people were living in India with diabetes. **Aim and Objectives:** To estimate the prevalence of Type 2 diabetes and to compare the prevalence in relation to gender, age and area. **Methodology:** A cross- sectional record based study done on 1056 people attending medical camps conducted by Sree Balaji Medical College and Hospital, in various locations of South Chennai. The data regarding Random Blood Sugar (RBS), age, gender and camp site were collected from the camp register (October 2014 to June 2015). **Results:** Among study population, 453 (42.9%) were males and 603 (57.1%) females. The overall prevalence of diabetes was 11.8%. Tambaram area showed highest prevalence of 27.3%. Prevalence in males (12.4%) versus females (11.4%) [p- 0.647], above 45 years (12.6%) versus below 45 years (10.4%) [p- 0.303], and urban (13.2%) versus rural (11%) [p- 0.291]. **Conclusions:** Prevalence of diabetes was 11.8% which is higher than the existing documented prevalence of 10.4%. Hence more awareness creation and preventive measures needs to be targeted in this population to reduce the disease burden.

Keywords: Type 2 Diabetes Mellitus, Prevalence, South Chennai, RBS, Age

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Introduction

According to the World Health Organization (WHO) the global prevalence of diabetes was estimated to be 9 % among adult population as of 2014[1]. As per the International Diabetes Federation (2013), nearly 65.1 million people were living in India with diabetes [2]. More than 80% of diabetes deaths occur in low- and middle-income countries [3]. WHO projects that diabetes will be the 7th leading cause of death in 2030 [4]. The Prevalence of diabetes in Tamilnadu as per the ICMR Study done in 2011 was 10.4% [5]. The Prevalence of diabetes in chennai is always on the rise [6]. Hence we can understand that diabetes is a major public health problem and also a challenge to tackle.

Aims and Objectives

To estimate the prevalence of Type 2 diabetes (using screening test) as per Random Blood Sugar (RBS) values > 200mg/dl using glucometer in various parts of South Chennai among medical camp attendees. To compare the prevalence in relation to gender, age, and locations.

Materials and Methods

Type of study: Cross sectional record based study.

Period of study: October 2014 to June 2015.

Study settings: Urban and Rural areas of South Chennai patients attending medical camps conducted by Sree Balaji Medical College and Hospital(SBMCH) .**Inclusion Criteria:** Patient who have attended medical camps in South chennai region and have undergone a RBS check. **Data Collected:** RBS values, age, gender and camp site were collected from the camp register (October 2014 to June 2015). An operational definition of RBS glucometer values of > 200 mg/dl was defined as having diabetic. Descriptive analysis and Chi square test done to see the statistical significance between various parameters. Correlation regression analysis was also done to see the relationship between CBG (Capillary Blood Glucose) values and age .

Justification for using RBS values > 200 mg/dl for diagnosing diabetes: We followed the Mayo Clinics, diagnostic criteria for diabetes as using RBS values > 200mg/dl with any one of the clinical symptoms of diabetes like thirst and excessive urination [7].

Even WHO have mentioned RBS values greater than 200 mg/dl can be used as a screening tool for diagnosing diabetes in resource poor settings and practical consideration of the existing situations[8]. Hence this will be apt for our medical camp attendees to use RBS values as a diagnostic screening tool for diabetes detection.

Ethical Clearance: The ethical clearance was obtained from the Institutional Ethical Committee and Institutional Review board of Sree Balaji Medical College and Hospital, Chennai, India.

Sample size Calculation: By assuming a prevalence of around 12% from a previous study [9] a sample size of 1010 was estimated by using the formula, n = Zα2 pq / L2 including a 10% non responders. But we finally arrived at a sample size of 1056. Sampling techniques used was convenient sampling. We took the details of the patients data from the camp register. Only camp data regarding camps conducted in Southern Chennai were included in the study.

Results

The mean age of the study population was 52 years (Range 15 to 97). Most number of study participants were females (57.1%), > 45 years old (67.1%) and belong to rural area (62.7 %). The mean Random Blood sugar values were 135.09 mg/dl. The overall prevalence of diabetes was 11.8%. The baseline characteristics are shown in table 1.

Table 1: Baseline Characteristics N=1056

Variables		N	%
Gender	Male	453	42.9
	Female	603	57.1
Diabetics RBS> 200 mg/dl	Diabetics	125	11.8
	Non Diabetics	931	88.2
Age Categories	Greater than 45 Years	709	67.1
	Less than 45 Years	347	32.9
Place of Residence	Urban	394	37.3
	Rural	662	62.7

N= Numbers, % = Percentage

Comparison of Diabetic Prevalence with other variables: We compared the variables like gender, age and locality with prevalence of diabetes. The prevalence was high among males (12.4%), age > 45 years (12.6%) and among urban population (13.2%), but these findings were not statistically significant. The findings are shown in table 2.

Table 2: Comparison of Diabetic Prevalence with gender, age and locality

Variables	Diabetes Prevalence	Chi Square	OR	95% CI	P-Value
Gender	Male 12.4 %	0.2	1.1	0.7- 1.6	0.647
	Female 11.4 %				
Age	>45 years 12.6%	1.05	1.2	0.8- 1.8	0.303
	<45 years 10.4%				
Locality	Urban 13.2%	1.2	1.2	0.8-1.8	0.291
	Rural 11%				

OR= Odds Ratio , 95%CI = 95 Percent Confidence Interval

Prevalence of Diabetes in Various locations of South Chennai: The figure 1 shows the prevalence of diabetes in various locations of South Chennai. As you can see from the figure 1, the prevalence was very high in Tambaram (27.2%) followed by Pammal (21.7%), Nelvoyal (14%), Sanatorium (12.7%), chromepet (12.6%), Manimangalam (10.2%), Nanmangalam (8.3%), Pallavaram (7.4%), Mudichur (6.5%) and Nanganallor (5.5%) .

**Fig-1: Prevalence of Diabetes in various locations of South Chennai**
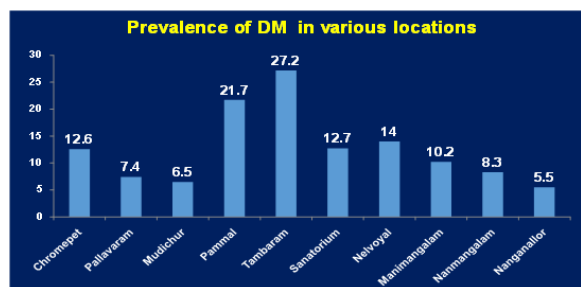
Correlation between Age and CBG Values: When we did correlation and regression analysis to see the relationship between the CBG and age , we found that there was a positive correlation between age and CBG values, showing that as the age increseases the CBG values also increases(r- 0.07) [p-value < 0.05] Shown in Figure 2.

Fig-2: Correlation between age and CBG values
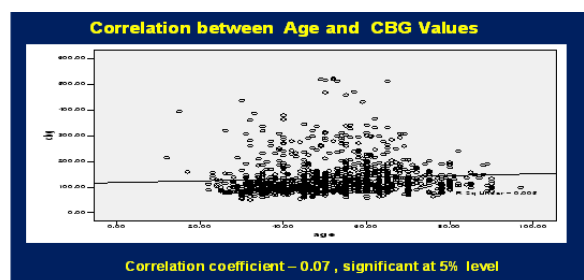
Comparison of Mean RBS with age : Our study showed that the mean RBS values in age > 45 years were high (141.21 mg/dl) when compared with < 45 years (122.57) [p-value = 0.0001] as shown in Figure 3.

Fig-3: Comparison of Mean RBS values with age.
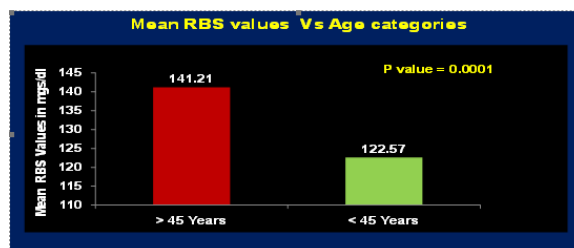
Discussion

Our study showed that the overall prevalence of diabetes in South Chennai was 11.8%. This prevalence was slightly higher than the last documented prevalence of 10.4%, a study done in Tamilnadu by Anjana et al [5] .We compared the prevalence of diabetes in Chennai with various other studies [5, 10 -15] done in Chennai and in Tamilnadu . It is clear from the table 3 there is a steady increase in the prevalence of diabetes in Chennai from 1996 to 2008 [5, 10-15]. The highest reported prevalence in chennai city was 18.6% a study done by Ramachandran et al [15] .Even our study showed there were some pocket areas showing very high prevalence, like tambaram (27.2%) and Pammal (21.7%). The overall prevalence was 11.8 %, which was comparable with the study done by Anjana et al [5] in Tamilnadu, showing a prevalence of 10.4%. The major concern in our study is that the criterion used for diagnosing diabetic was based on RBS values. Hence these cases needs to be confirmed with a fasting and post prandial blood glucose values. Hence the results should be interpreted with certain reservations. Nearly 88.2% of our study population was non diabetic as per RBS values, but still we could find a positive correlation between CBG values and increasing age. Even the mean RBS values in age group > 45 years were higher than the mean RBS values in age group < 45 years (Figure.3). A study done by Gary TC Ko et al [17] in non diabetic Hong Kong Chinese population showed a significant increase in plasma glucose levels with age. Their finding of positive correlation was related to fasting, 2-hour post-prandial, and also for random plasma glucose levels.

Table 3: Comparison of Prevalence of Diabetes in Chennai with our study [5, 10,- 15, 16]

Year of Publication	Author	Prevalence
1992	Ramachandran et al [10]	8.2 %
1997	Ramachandran et al [11]	11.6%
1999	Bai et al [12]	7.6%
2001	Mohan et al [13]	12%
2006	Mohan et al [14]	15.5%
2008	Ramachandran et al [15]	18.6%
2011	Anjana et al [5]	10.4% (Tamilnadu Prevalence)
Present study (2015)	Ganesh Anusuya et al	11.8%

Our study has also shown a similar positive correlation between age and RBS values. The reason for positive correlation between CBG values and age may be due to the decreasing insulin sensitivity with increasing age [18-21]. We did not find any statistically significant difference in prevalence between gender, age categories (< 45 years vs > 45 years) and between rural and urban population (Table 2). Our study showed the prevalence were more among males (12.4%) than females (11.4%), similar findings were observed in other studies [22, 23]. In our study the prevalence of diabetes were more in urban population (13.2%) vs rural population (11%). Similar findings were observed in other studies done in India [10, 24].

Limitations

The results of our study should be interpreted with caution as the diagnostic criteria used for diagnosis of diabetes was purely based on RBS values > 200mg/dl.

Conclusions and Recommendations

Our study showed the prevalence of diabetes in Southern parts of Chennai was 11.8%. As the diagnostic criterion used was purely based on RBS values, all these patients should be followed up for confirmation of diabetic status. Prevalence of 11.8% was higher than the existing documented prevalence of 10.4% [5]. Hence more awareness creation, screening and preventive measures needs to be targeted in this population to reduce the disease burden.

Also our study showed pockets of areas of very high prevalence, hence more awareness to be created and also the cause of high prevalence in those areas needs to be studied further. The positive correlation between age and RBS values shows that more life style modifications like proper diet and exercise counselling to be adviced to the population greater than 45 years old and also creating more awareness from young age can prevent them from becoming diabetic at a later age.

Authors Contributions

Acknowledgements

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