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Original Research Article

A cross-sectional study of magnitude of diabetes among individuals attending health camp in an urban area of Solapur

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ABSTRACT

Background: Diabetes is a significant contributor to non-communicable diseases related morbidity and mortality worldwide. A significant proportion of diabetes cases still remain undiagnosed in India. Glycosylated haemoglobin HbA1c ≥6.5% is a convenient and reliable alternative to plasma glucose tests to diagnose diabetes.
Methods: An observational cross-sectional descriptive study was conducted among all individuals attending Health Camp at Solapur after taking institutional ethical committee (IEC) approval. Out of 299 individuals who attended the health camp only 126 individuals gave written informed consent to collect venous blood samples to measure their HbA1c levels. HbA1c cut-offs for diabetes and prediabetes was determined based on the recommended values of American Diabetes Association.
Results: Magnitude of diabetes was (27.8%) and Prediabetes was (15.9%) among the study participants according to their HbA1c levels. Statistically significant association was seen between prediabetes diabetes and age, gender and hypertensive while no significant association was seen with residence and socioeconomic status.
Conclusions: The study reported magnitude of diabetes among study participants was 35 (27.8%) of which 29 (23.01%) study participants were newly detected. Screening for NCD's like diabetes is very important for early diagnosis and prompt treatment especially among advancing age, female and hypertensive individuals for halting the transition of prediabetes to diabetes.

Keywords: Diabetes, Prediabetes, HbA1c Level, Health camp, Urban area

INTRODUCTION

Globally in 2024, an estimated 589 million adults aged 20-79 were living with diabetes, a figure predicted to rise to 853 million by 2050 while for South East Asia region, an estimated 106.9 million adults aged 20-79 were living with diabetes, a figure predicted to rise to 184.5 million by 2050.[1] ICMR-INDIAB study showed National projections of 101.3 million with diabetes and 136.0 million with prediabetes.[2] The prevalence and incidence of diabetes is rapidly increasing in India. Glycated Haemoglobin (HbA1c) gives an estimate of long-term index of glucose control (i.e. about previous 2-3 months). It is used to assess glycaemic control in diabetics to attain treatment goals and prevent complications.[3] HbA1c offers some advantages over plasma glucose test, it is more convenient to perform can be done at any time of day and no need for overnight fasting and glucose challenge and hence better compliance with testing, has lowest variability (unaffected by stress, acute illness and changes in diet and physical activity just before testing) and the values would not be affected by delayed analysis of blood samples after collection, unlike plasma glucose test.[4] The 2011 WHO Consultation on HbA1c underscores the necessity for research to establish specific HbA1c cut points for diagnosing prediabetes and diabetes across

diverse ethnic populations.[5] Objectives of this study were as mentioned. To estimate the magnitude of diabetes and prediabetes by glycosylated haemoglobin (HbA1c) in individuals attending health camp at urban area of Solapur. To determine the association between sociodemographic factor and diabetes among individuals attending health camp. There are few studies available regarding the use of HbA1c to access magnitude of diabetes and prediabetes in general population, this study aim was to estimate burden of diabetes and prediabetes among individuals attending health camp.

METHODS

This cross-sectional observational descriptive study was carried out among all individuals attending health camp at Solapur after taking approval from Institutional Ethical Committee (IEC) of Dr. Vaishampayan Memorial Government Medical College, Solapur, Maharashtra. Period of study was from 18 September 2025 to 12 October 2025. Sample size included all individuals who fulfilled inclusion criteria. Inclusion criteria were all individuals age ≥18 years and all willing participant who gave written informed consent while exclusion criteria was pregnant female were excluded from study.

The socio demographic factor includes variables like age, gender and place of residence, blood pressure and socioeconomic status. Venous blood sample was collected to estimate their HbA1c levels by high-performance liquid chromatography, as recommended by the National glycosylated haemoglobin standardization program and aligned to diabetes control and complications trial assay and HbA1c values were expressed as percentages.[6]

Operational definitions

Hypertension is defined as systolic blood pressure measuring more than or equal to 140 mm of mercury and diastolic blood pressure measuring more than or equal to 90 mm of mercury recorded in an individual according to JNC 7.[7] Modified B.G. Prasad classification for the year 2025 was used for socioeconomic status classification according to per capita income.[8] According to American diabetes association, HbA1c value ≥6.5% was considered as diabetic and values between 5.7% to <6.5% as pre-diabetic.[9] Informed written consent was obtained from the individuals before taking their information and blood sample. Result was calculated in Microsoft Excel software and Chi-square test was applied, p value <0.05 was considered as statistically significant.

RESULTS

Out of 299 individuals who attended the camp only 126 individuals gave venous blood samples to estimate their HbA1c levels. Out of 126 study participants majority (46.8%) were from age group 31-45 years with a mean age of 41 years (SD 11.6). The range of HbA1c was from 4.5% to 13.8% with a mean level of 5.85% (SD 1.64). Male: female ratio was 4:6 as male were 54 (42.9%) and female were 72 (57.1%). Majority (89.7%) of study participants were residing in an urban area while (10.3%) of study participants were residing in rural area. Hypertensives were 32 (25.4%) and non-hypertensives were 94 (74.6%). Maximum 71 study participants (56.3%) belonged to Class IV Socio-economic status as per modified BG Prasad Classification (Table 1).

Table 1: Socio-demographic factors of study participants attending the health camp.

Variable	Group	n=126 (%)
Age (in years)	18-30	28 (22.2)
	31-45	59 (46.8)
	46-60	31 (24.6)
	More than 60	8 (6.4)
Gender	Male	54 (42.9)
	Female	72 (57.1)
Residence	Urban	113 (89.7)
	Rural	13 (10.3)
Blood pressure	Hypertensive	32 (25.4)
	Non-hypertensive	94 (74.6)
Socio-economic status (according to modified B.G. Prasad)	Class I (≥9130)	1 (0.8)
	Class II (4565 to 9129)	7 (5.6)
	Class III (2739 to 4564)	35 (27.81)
	Class IV (1369 to 2738)	71 (56.3)
	Class V (<1369)	12 (9.5)

Table 2: Association between socio demographic factors and their blood glucose control.

Variable	Group	n=126 (%)	Normo-glycemia n=71	Pre-diabetes n=20	Diabetes n=35	Result
Age (in years)	18-30	28 (22.2%)	26 (92.9%)	1 (3.6%)	1 (3.6%)	$\chi2$=26.1827, DF=6, *p=0.0002
	31-45	59 (46.8%)	30 (50.8%)	11 (18.6%)	18 (30.5%)	
	46-60	31 (24.6%)	11 (35.5%)	5 (16.1%)	15 (48.4 %)	
	> 60	8 (6.4%)	4 (50%)	3 (37.5%)	1 (12.5%)	
Gender	Male	54 (42.9%)	40 (74.1%)	5 (9.3%)	9 (16.7%)	$\chi2$=12.0729, DF=2, *p=0.0024
	Female	72 (57.1%)	31 (43.1%)	15 (20.8%)	26 (36.1%)	
Residence	Urban	113 (89.7%)	63 (55.8%)	19 (16.8%)	31 (27.4%)	$\chi2$=0.7271, DF 2, p=0.6952
	Rural	13 (10.3%)	8 (61.5%)	1 (7.7%)	4 (30.8%)	
Blood pressure	Hypertensive	32 (25.4%)	12 (37.5%)	8 (25%)	12 (37.5%)	$\chi2$=6.4152, DF=2, *p=0.0405
	Non hypertensive	94 (74.6%)	59 (62.8%)	12 (12.8%)	23 (24.4%)	
Socio-economic status	Class I	1 (0.8%)	1 (100%)	0 (0%)	0 (0%)	$\chi2$=5.2556, DF=2, p=0.7299
	Class II	7 (5.6%)	4 (57.1%)	2 (28.6%)	1 (14.3%)	
	Class III	35 (27.81%)	22 (62.9%)	6 (17.1%)	7 (20%)	
	Class IV	71 (56.3%)	39 (54.9%)	9 (12.7%)	23 (32.4%)	
	Class V	12 (9.5%)	5 (41.7%)	3 (25%)	4 (33.3%)	

*p value of <0.05 was statistically significant

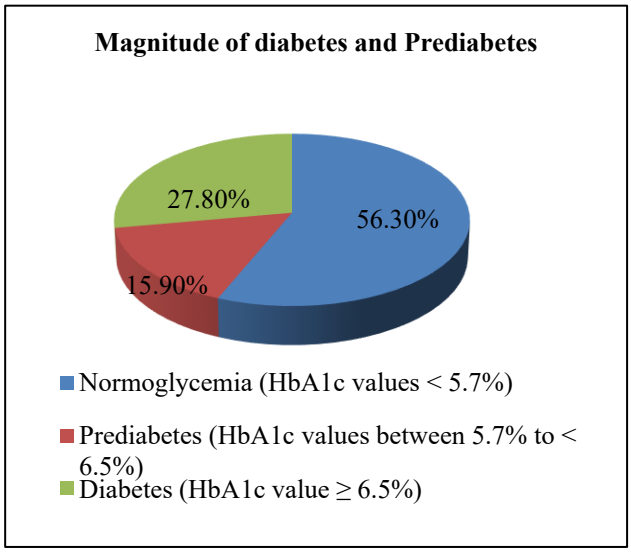

Figure 1: Magnitude of pre-diabetes and diabetes among study participants (n=126).

From 126 study participants maximum 71 (56.3%) were normo-glycemic i.e. HbA1c values were <5.7% followed by 35 (27.8%) participants were diabetic i.e. HbA1c value ≥ 6.5% and 20 (15.9%) were pre-diabetic i.e. HbA1c values between 5.7% to < 6.5% (Figure 1).

Association between socio demographic factors and their blood glucose control in which the magnitude of diabetes was found to be maximum (48.4%) in 46-60 years age group, (36.1%) in female more than male and 12 (37.5%) in Hypertensive study participants the association was found to be statistically significant while study variable residence and socioeconomic status was not statistically significant (Table 2). There were 6 known cases of diabetes in the study participant of which 1 (16.7%) had HbA1c values was <5.7%, 2 (33.3%) had HbA1c values between 5.7% to <6.5% and 3 (50%) had HbA1c values ≥6.5% (Figure 2).

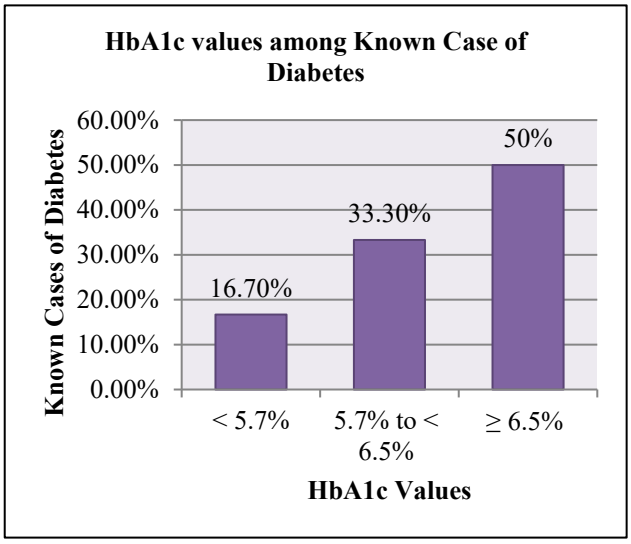

Figure 2: HbA1c values among known case of diabetes (n=6).

DISCUSSION

In the study the magnitude of diabetes was (27.8%) and prediabetes was (15.9%) which was comparable to study of Radhakrishna et al in which diabetes was (28.9%) but prediabetes (33.7%) was more.10 In study by Kumar et al

the prevalence of diabetes was (12.67%) and prediabetes was (11.69%).11 In study by Dasappa H et al prevalence of diabetes was (12.33%) and of pre-diabetes was (11.57%).[12] In study by Tripathy et al prevalence of diabetes mellitus and prediabetes among the study participants was 8.3 and 6.3% respectively.[13] In the ICMR-INDIAB study by Anjana et al prevalence of diabetes was 11.4% & prediabetes was (15.3%).[2] In the study the finding was early onset of diabetes specifically most affected were in age group of 46–60 years (48.4 %), followed by those in age group of 31–45 years (30.5%). In study by Sekher et al diabetes prevalence among adults aged 45 years and older in India was (19.8%).[14] In study by Sharma et al most study participants were affected due to diabetes in age group of 40–60 years.[15] In study by Tripathy et al prevalence of diabetes mellitus and prediabetes was more in age group (45–69 years).[13]

In study by Dasappa et al prevalence of diabetes was increasing with age.[12] In the study prevalence of diabetes (36.1%) and prediabetes (20.8%) being pre-dominant among women was similar to finding in study by Mathur et al.[16] In study by Dasappa et al prevalence was more among the females compared to males.[12] In the study by Sekher et al prevalence of diabetes among men was (19.6%) and women was (20.1%).[14]

In the study diabetes in rural areas (30.8%) was similar to that in urban (27.4%) consistent to finding of reduction of the conventional rural-urban differences in the prevalence of diabetes in studies by Gupta et al and Goswami et al.[17,18] In study by Sekher et al diabetes prevalence in urban was (30%) and in rural was (15%).[14]

In the study prevalence of diabetes in hypertensive was (37.5%) while in study by Kumar et al prevalence of diabetes in hypertensive was (53.1%).[19] In study by Tripathy et al prevalence of diabetes mellitus and prediabetes was more among hypertensives.[13] In the study out of 35 diabetics, maximum 4 (33.3%) were in Class V followed by 23 (32.4%) were in Class IV did not show any significant difference between socio-economic status and Diabetes similar to study the by Baur et al.[20] Different results of our study than other studies could be due to different settings at which studies had carried out and variation of prevalence of diabetes in diverse population.

Limitations

As this study was conducted in adults attending health camp in an urban area hence results cannot be generalizable to the general population. Modifiable risk factors were not included in this study and factors like iron deficiency anaemia, haemolytic anaemia, chronic malaria, major blood loss, glucose-6-phosphate dehydrogenase deficiency, sickle cell anaemia or blood transfusions was not ruled out which could alter HbA1c values.

CONCLUSION

Over all magnitude of diabetes among study participants was 35 (27.8%) of which 29 (23.01%) study participants were newly detected. 50% among k/c/o diabetes had HbA1c levels ≥6.5%. Statistically significant association was seen between prediabetes-diabetes and age, gender and hypertensive while no significant association was seen with residence and socioeconomic status. Hence opportunistic & routine screening for NCD's like diabetes is very important for early diagnosis & prompt treatment especially among advancing age, female and hypertensive individuals. Potential of using HbA1c for individuals at risk should be explored for halting the transition of prediabetes to diabetes

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