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Prevalence of Diabetes Mellitus in Cardiovascular Risk Factors among South Indian Adults Population.

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ABSTRACT

Epidemiological evidence also suggests that the association between blood glucose and cardiovascular disease begins before diabetes manifestation. A total of 734 subjects aged 30 years and above of both sexes were selected for the study. The diagnosis of diabetes is should be based on the elevated fasting and postprandial blood sugar levels over several instances and not one reading. The prevalence of diabetes was found to be significantly higher in those with previous history of cardiovascular or cerebrovascular events 47.6%, family history of diabetes 41.8%, central obesity 34.4%, current smoking 31.5%, stress 29.8%, joint family 28.4%, 50 years and above years age 25.3%, other castes & backward castes 22.6% and Hindus 21.4%. Higher prevalence levels of diabetes were found in those with all categories of Holmes stress category compared to those without any stress and the difference is also found to be statistically significant. The cardiovascular risk has been found to be significantly higher in males than females. The present study suggests that regular screening programmes should be conducted for early detection of diabetes and prompt treatment which helps in management of modifiable risk factors of cardiovascular diseases.

Keywords: cardiovascular diseases, Diabetes, risk factors.

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INTRODUCTION

The cardiovascular disease (CVD) burden of India is expected to double in the next two decades, making it the single largest cause of death and the second largest cause of disability by the year 2020[1].Cardiovascular disease accounts for about 60% of all mortality in people with diabetes. The risk of cardiovascular events is 2–3 times higher in people with type 1 or type 2 diabetes and the risk is disproportionately higher in women [2,3].Patients with diabetes also have a poorer prognosis after cardiovascular events compared with non-diabetics [2,4]. Abnormal glucose regulation tends to occur together with other known cardiovascular risk factors, such as central obesity, elevated blood pressure, low HDL-cholesterol and high tri- glyceride level [5,6].Cardiovascular disease accounts for an overwhelming 65-75 per cent of deaths in people with diabetes [7,8].The present study was undertaken to provide the data on prevalence of Diabetes mellitus in cardiovascular disease risk factors among adults aged 30 years and above in adults of South Indian population.

MATERIALS AND METHODS

This study was conducted in rural area of Tirupati under the jurisdiction of PHC Mangalam. Most of the people are daily labourers, vegetable and fruit vendors, dhobis and a majority of the women are homemakers. A total of 734 subjects in the age group of 30 years and above age group were selected from the study areas to estimate the prevalence. Subjects were included in the cross-sectional study by using 20 cluster sampling technique. Thus all the sectors, all the sub centers within the sectors and all the villages/habitations within the sub centres are listed in alphabetical order and cumulative population. The study subjects were explained the purpose of the study and informed consent was taken from the subjects.

Within each village/habitation the investigator went to the centre of village and all houses to the right side are included until the required number covered. One subject from each house aged 30 years and above is interviewed who is selected randomly from those available at home at the time of study. On an average four families were examined during each day of visit. Reassurance was given regarding the confidentiality of their responses. Ethical clearance for this study was accorded by Institutional ethical committee, Sri Venkateswara Medical College, Tirupati. Weight was measured with calibrated weighting machine. Body mass Index was calculated. Our study has a major limitation in the diagnosis of diabetes; based on known cases as well as random blood sugar elevation (>200 mg %). The diagnosis of diabetes is should be based on the elevated fasting and postprandial blood sugar levels over several instances and not one reading.

Cardiovascular risk categorization assessment was done based on the prevalence of diabetes by giving points scale as per American Heart Association. The total points are added and total risk is estimated separately for men and women.

RESULTS

It was found that the prevalence of diabetes was significantly higher in 50 years & above 25.3% compared to those aged less than 50 years 18.5%. Similarly, the prevalence was found to be insignificantly higher in males 22.3% compared to that in females 19.1%. Similarly it was found that the prevalence is higher in those with secondary & above educational level 23.2% compared to those educated up to primary level 18.4%, the difference is found to be not statistically significant (P=0.10; NS). Those subjects with other than unskilled occupation had higher prevalence of diabetes 23.9% compared to unskilled occupation 18.8% but the difference was not statistically significant (P=0.17; NS) [Table-1]. Significantly higher prevalence of diabetes was found in those belonging to Hindu religion than other religions 21.4% compared to 9.1%, joint/extended families than nuclear families 28.4% compared to 16.4%, other castes & backward castes than scheduled caste & tribe 22.6% compared to 14.2%. Although higher prevalence is found in unmarried/widowed/divorced than married group 23.2% compared to 20.3% and in upper & middle socio-economic status than lower status 21.5% compared to 19.8%, the differences were not statistically significant [Table-2].Significantly high proportion of diabetes was found in those with a positive family history 41.8% compared to those without family history 16.0% [Table-3].Those who were current smokers had higher prevalence of diabetes 31.5% compared to those who were not current smokers 18.5% and the difference is also found to be statistically significant (P<0.001; S). Although a slightly higher prevalence of diabetes was found among those who were currently alcoholics 25.3% compared to non-alcoholics 19.6%, the difference is however found to be not

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statistically significant (P=0.12; NS) [Table-4].Contrastingly higher prevalence of diabetes was found in those not taking extra salt (21.3%) than those who were taking extra salt 14.0% but the difference is however not statistically significant (P=0.19; NS).Similarly a contrastingly higher prevalence was found in those taking oils rich in PUFA (27.0%) than those who were taking other oils (18.2%) and the difference is also found to be statistically significant [Table-5].Higher prevalence levels of diabetes were found in those with all categories of Holmes stress category compared to those without any stress and the difference is also found to be statistically significant (P=0.046; S) [Table-6].It was found that those with sedentary type of work had higher prevalence of diabetes 22.8% than those with moderate and severe type of work 17.3% but however the difference is not statistically significant (P=0.07;NS).Contrastingly a significantly higher prevalence of diabetes was found in those with regular physical exercise 34.3% than those without regular exercise 17.7% [Table-7].

The prevalence of medium risk was found to be higher in males 15.5% than in females 3.9%. Similarly, the prevalence of high risk is also found to be higher in males 26.3% compared to that in females 1.7% and the differences are also found to be statistically significant (P<0.001; S)[Table-8].

Table 1: Relationship between Diabetes & various socio-demographic factors (N=734)

S.No	Risk factor		Prevalence of Diabetes (%)	Odds ratio and 95% CI	Statistical significance
1	**Age group**				
	(a)	50 & above years	60 / 237 (25.3)	1.49 (1.03 – 2.16)	χ^2=4.32; P=0.03;S
	(b)	Less than 50 years	92 / 497 (18.5)		
2	**Sex**				
	(a)	Male	83 / 373 (22.3)	1.21 (0.84 – 1.73)	χ^2=1.10; P=0.29;NS
	(b)	Female	69 / 361 (19.1)		
3	**Level of education**				
	(a)	Secondary & above	83 / 358 (23.2)	1.34 (0.93 – 1.92)	χ^2=2.60; P=0.10; NS
	(b)	Up to Primary	69 / 376 (18.4)		
4	**Occupation**				
	(a)	Not unskilled	65 / 272 (23.9)	1.29 (0.88-1.89)	χ^2=1.81; P=0.17; NS
	(b)	Unskilled	87 / 462 (18.8)		

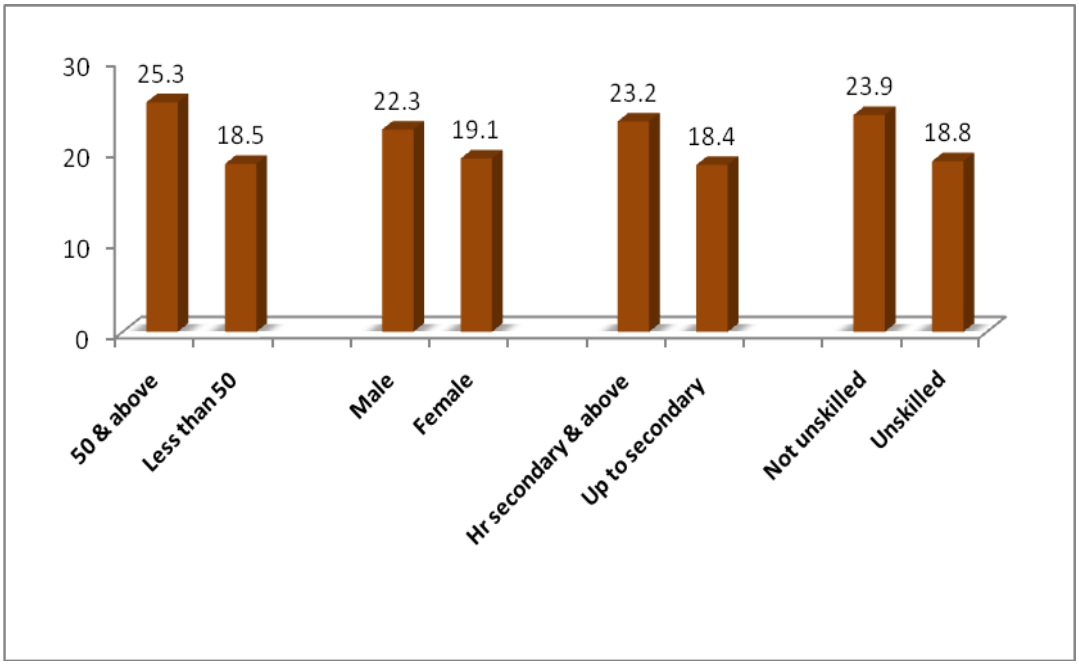

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Table 2: Relationship between Diabetes & various socio-demographic factors (N=734)

S.No	Risk factor		Prevalence of Diabetes (%)	Odds ratio and 95% CI	Statistical significance
1	**Marital status**				
	(a)	Unmarried/Divorced/ Separated	22 / 95 (23.2)	1.18 (0.68 – 2.03)	χ2=0.39; P=0.53; NS
	(b)	Married	130 / 639 (20.3)		
2	**Religion**				
	(a)	Hindu	148 / 690 (21.4)	2.73 (0.92 – 9.14)	χ2=3.85; P=0.049; S
	(b)	Others	4 / 44 (9.1)		
3	**Type of family**				
	(a)	Joint/Extended	75 / 264 (28.4)	2.02 (1.40 – 2.90)	χ2=14.9; P<0.001; S
	(b)	Nuclear	77 / 470 (16.4)		
4	**Social status**				
	(a)	Other castes & Backward castes	129 / 572 (22.6)	1.76 (1.06 – 2.94)	χ2=5.36; P=0.02; S
	(b)	Scheduled Caste & tribe	23 / 162 (14.2)		
5	**Social Economic status**				
	(a)	Upper & Middle	84 / 391 (21.5)	1.10 (0.77 – 1.58)	χ2=0.30; P=0.58;NS
	(b)	Lower	68 / 343 (19.8)		

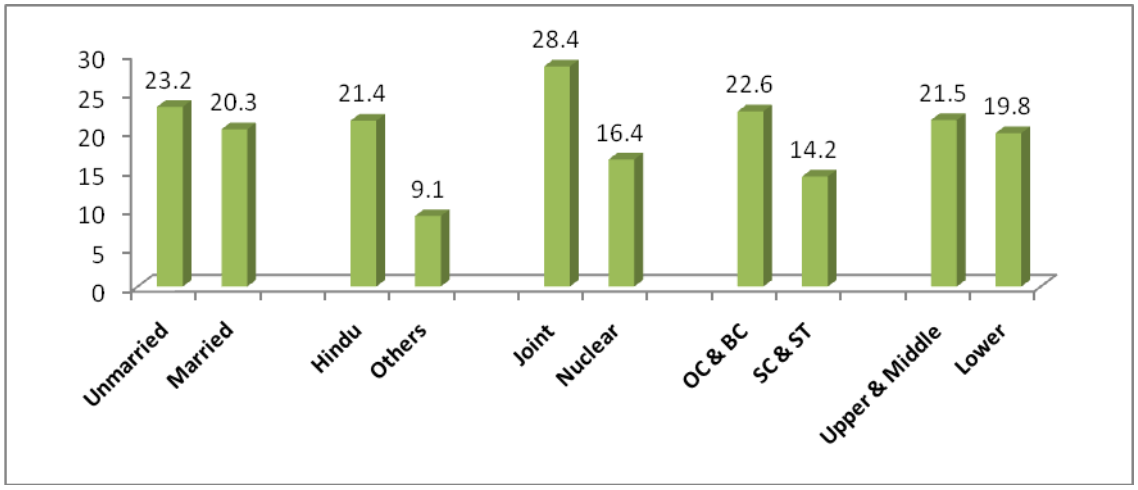

Table 3: Relationship between Diabetes & Family history of diabetes

S.No	Risk factor		Prevalence of Diabetes (%)	Odds ratio and 95% CI	Statistical significance
1	**Family history of Diabetes**				
	(a)	Yes	56 /134 (41.8)	3.77 (2.46 – 5.78)	χ2=44.4; P<0.001; S
	(b)	No	96 / 600 (16.0)		
	(b)	No	142 / 713 (19.9)		

Table 4: Relationship between Diabetes & current smoking, alcohol and tobacco intake

S.No	Risk factor		Prevalence of Diabetes (%)	Odds ratio and 95% CI	Statistical significance
1	**Current smoking**				
	(a)	Yes	39 / 124 (31.5)	2.02 (1.28 – 3.17)	χ2=10.5; P=0.001;S
	(b)	No	113 / 610 (18.5)		
2	**Current alcohol**				
	(a)	Yes	37 / 146 (25.3)	1.40 (0.89 – 2.18)	χ2=2.38; P=0.12; NS
	(b)	No	115 / 588 (19.6)		
3	**Current tobacco chew**				
	(a)	Yes	11/ 70 (15.7)	0.69 (0.33 – 1.40)	χ2=1.17; P=0.27; NS
	(b)	No	141/ 664 (21.2)		

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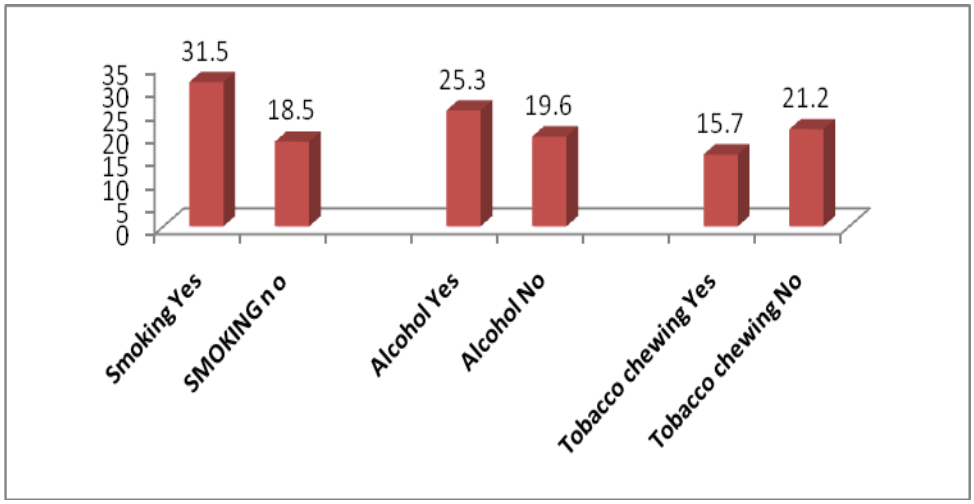

Table 5: Relationship between Diabetes & extra salt intake and type of cooking oil (N=734)

S.No	Risk factor		Prevalence of Diabetes (%)	Odds ratio and 95% CI	Statistical significance
1	**Extra salt intake**				
	(a)	Yes	8 / 57 (14.0)	0.60 (0.26 – 1.36)	χ2=1.61; P=0.19;NS
	(b)	No	144 / 677 (21.3)		
2	**Type of cooking oil**				
	(a)	Others	98 / 539 (18.2)	1.72 (1.15 – 2.57)	χ2=7.89; P=0.005;S
	(b)	Oil rich in PUFA	54/ 195 (27.0)		

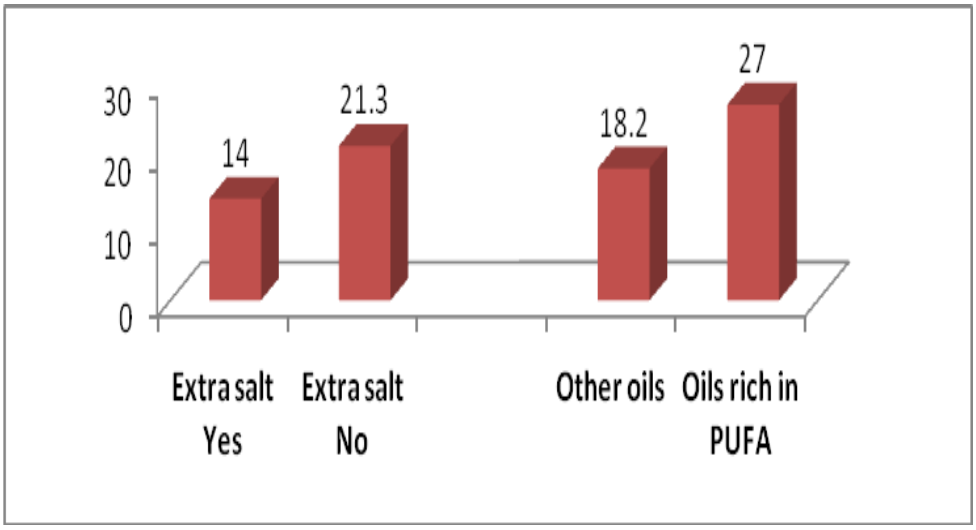

Table 6: Relationship between Diabetes & Holmes stress categories (N=734)

Holmes Stress category	Prevalence of Diabetes (%)	Statistical significance
Nil	121 / 630 (19.2)	χ2=6.12;df=2 P=0.046; S
Mild	27 / 90 (30.0)	
Moderate	3 / 12 (25.0)	
Severe	1 / 2 (50.0)	

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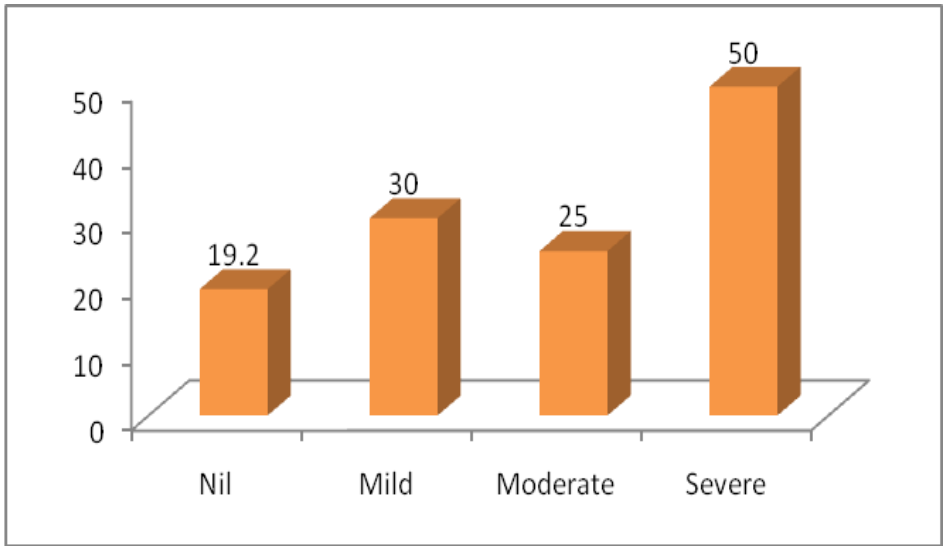

Table 7: Relationship between Diabetes & nature of work and physical exercise (N=734)

S.No	Risk factor		Prevalence of Diabetes (%)	Odds ratio and 95% CI	Statistical significance
1	**Nature of work**				
	(a)	Sedentary	103 / 451 (22.8)	3.32 (2.23 – 4.95)	$\chi 2$=3.23; P=0.07;NS
	(b)	Moderate & Severe	49 / 283 (17.3)		
2	**Physical exercise**				
	(a)	No	106 / 600 (17.7)	1.72 (1.15 – 2.57)	$\chi 2$=18.5; P<0.001; S
	(b)	Yes	46 / 134 (34.3)		

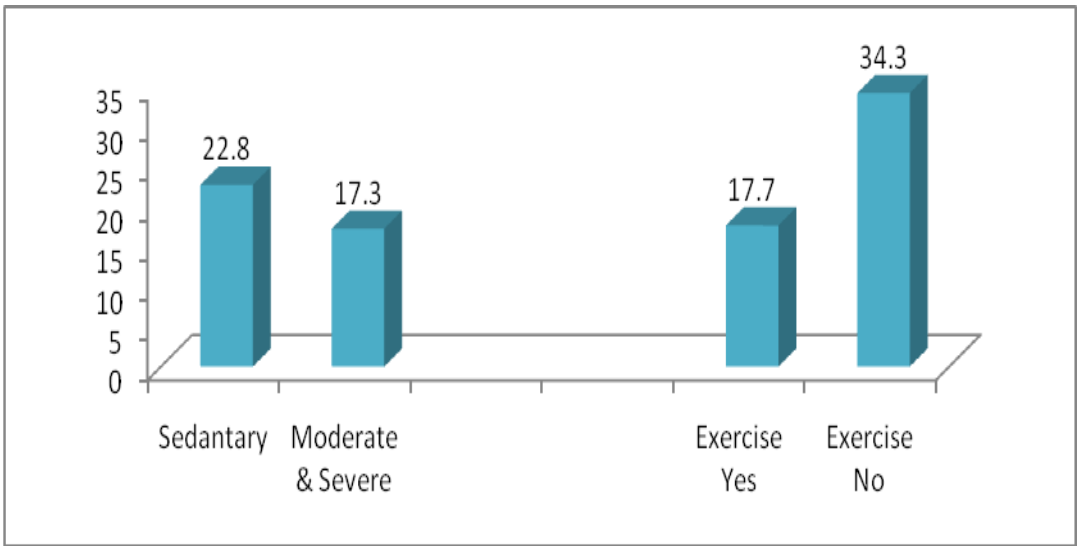

Table 8: Cardiovascular risk categorization compared between male and female subjects

Cardiovascular risk category	Males (%)	Females (%)	Total (%)
Low (less than 10 %)	217 (58.5)	341 (94.4)	558 (76.0)
Medium (10 – 20%)	58 (15.5)	14 (3.9)	72 (9.8)
High (Above 20%)	98 (26.3)	6 (1.7)	104 (14.2)
Total	**373 (100.0)**	**361 (100.0)**	**734 (100.0)**

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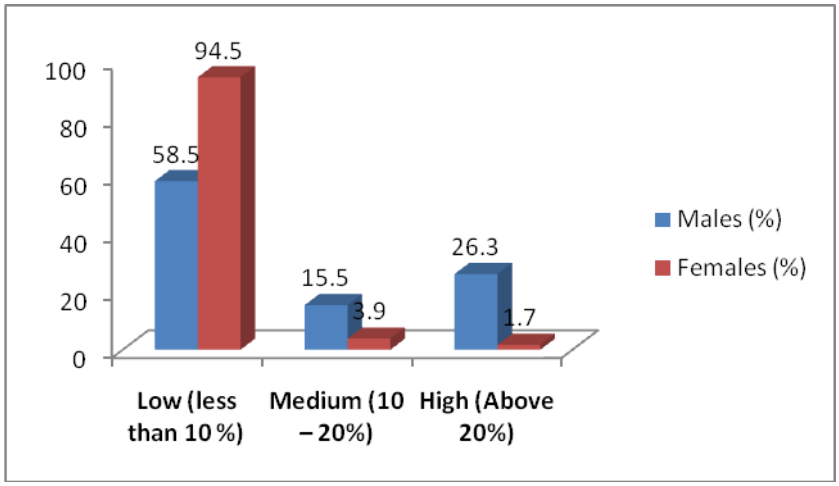

DISCUSSION

Diabetes prevalence including known diabetics and newly diagnosed diabetics based on random blood sugar level above 200 mg% is found to be 20.7%. A comparable prevalence 20.9% was reported in rural Lucknow study [9]. A slightly higher prevalence was reported in a study in Kancheepuram 25.2% [10]. It was found in the present study that out of 152 diabetics, 71.7% are aware of their diabetes. Out of those aware, 99.1% are currently taking treatment. Out of those treated 70.4% are adequately treated with blood sugar under control. Thus only 50.0% of diabetics are diagnosed and adequately treated. A lower prevalence of 15 % was reported in Delhi industry study while 12.3% prevalence was reported in a study at Jaipur [11,12].

Similarly, a study in industrial population in Chennai found a prevalence of 11.9% [13]. A very low prevalence of 3.7% was reported in a study in Andhra Pradesh [14]. The differences in the prevalence may be linked to factors already mentioned under hypertension. The prevalence of diabetes was found to be significantly higher in those with previous history of cardiovascular or cerebrovascular events 47.6%, family history of diabetes 41.8%, central obesity 34.4%, current smoking 31.5%, stress 29.8%, joint family 28.4%, 50 years and above years age 25.3%, other castes & backward castes 22.6% and Hindus 21.4%. The prevalence was also found to be higher in current alcoholics 25.3%, unskilled occupation 23.9%, higher secondary & above education 23.2%, sedentary life style 23.2%, overweight and obesity 23.2% and male sex 23.2% but here the differences are not statistically significant. The high incidence results of our study are in agreement with previous literatures and suggest the diabetes prevalence role in cardiovascular risk factors in adult population.

CONCLUSION

In the present study, the undiagnosed diabetes was found to be 38.3% and inadequately treated diabetes as 29.6% with overall level of 50.0% only being adequately diagnosed and treated. Hence it is recommended that regular screening programmes should be conducted for early detection of diabetes and prompt treatment.The cardiovascular risk has been found to be significantly higher in males than females.

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