Diabetes Mellitus among City Policemen in Nagpur: A Cross Sectional Study

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Abstract: _Introduction: India is slowly and steadily acquiring the status of the global chronic disease capital. By 2025, India will have the dubious distinction of having 70 million diabetics, 213 million hypertensives. Material and Methods: This cross-sectional study was conducted among police personnel. - The data collection was done between August 2016 and August 2017. Permission was obtained from institutional ethical committee and from the Commissioner of police. The study included 3 police stations in the city as per convenience. All eligible policemen selected randomly and examined till sample size met. Results: Prevalence of diabetes mellitus was 03.00%. Prevalence of diabetes mellitus among males was 03.29%. Prevalence of diabetes mellitus among females was 02.09%. Few police persons had impaired glucose tolerance i.e. 15(07.50%) and few had impaired fasting glucose i.e. 05(02.50%). Conclusion: High prevalence of overweight, obesity and also central obesity was found which is alarming. Prevalence of diabetes mellitus was 3% but prevalence of IGT was high (7.5%) with IFG prevalence of 2.5%._

Keywords: diabetes mellitus, policemen, Nagpur

1. Introduction

Indian police personnel can be broadly categorized into constables, inspectors, and officers. The constables belongs to the lowest strata; they obey commands of inspectors/sub-inspectors and impart assigned duties as part of police work. The inspectors are placed at the intermediate level; they are expected to investigate cases and registered first information report.[1]

They are also responsible for the law and order situation in their area of jurisdiction and the supervision of work at the police station. The officers (e.g., Circle Officers [Cos], Superintendent of Police [SP], Assistant Superintendent of Police [ASP], and Senior Superintendent of Police [SSP]) entertain administrative control over crime and law-and-order situation of the town. They also take care of public complaints and grievances and supervise the work of policemen subordinate to them.[1]

India is slowly and steadily acquiring the status of the global chronic disease capital. By 2025, India will have the dubious distinction of having 70 million diabetics, 213 million hypertensives.[2]

Diabetes mellitus (DM) is emerging as a major healthcare challenge for India. According to the World Health Organization (WHO) estimates, India had 32 million diabetic subjects in the year 2000 and this number would increase to 80 million by the year 2030.[3]

Prevalence of diabetes across various occupational groups and its relationship with occupational factors is a topic of recent interest. Police work is considered as inherently stressful on account of several factors such as long and unpredictable hours of work, constant exposure to traumatic situations, dealing with anti-social elements, strong disciplinary mechanism, etc.[3]

2. Aim & Objective

a) To study diabetes mellitus among city policemen.
b) To study obesity among city policemen according to BMI and waist hip ratio.

3. Material and Methods

This cross-sectional study was conducted among police personnel.

Inclusion Criteria: Policepersons completed one year of job & willing to participate.

Exclusion Criteria: Policepersons who cannot be contacted for three successive visits.

Sample size
It was calculated by assuming the prevalence of diabetes mellitus as 11.5% from study of Kumar S, et al. Prevalence of diabetes and impaired fasting glucose in a selected population with special reference to influence of family history and anthropometric measurements-the Kolkata policeman study. J Assoc Physicians India 2008;56: 841–4.[4] Absolute precision (2 sided α) was 5%, with confidence level: 95%, Sample size: 156.

Data collection
The data collection was done between August 2016 and August 2017. Permission was obtained from institutional ethical committee and from the Commissioner of police. The study included 3 police stations in the city as per

convenience. All eligible policemen selected randomly and examined till sample size met.

Policeperson who could not be contacted for three successive visits were excluded. Informed consent was taken before they participate in the study. Routine roll-call was selected as the most appropriate time to undertake the study to ensure most of participants were present. The aim of the study was explained to each respondent.

Participants were contacted during routine roll call and some police personnel were contacted in evening. Proforma was filled during interview. After feeling of proforma, they were examined and investigated for DM and obesity according to BMI and waist hip ratio. Weight was measured by Omran digital weighing machine. Reading was recorded to the nearest 0.1kg. Height was measured in upright position standing against the straight, flat wall with the body weight evenly distributed and both feet flat on the flat surface with the heels together and toes apart. Reading was recorded to the nearest 0.1cm. BMI was calculated by using formula. BMI= Weight in Kg/ (Height in meter) ². WHR was measured by measuring tape. Waist -the measurement was made at the approximate midpoint between the lower margin of the last palpable rib and the top of the iliac crest. Hip circumference measurement was taken around the widest portion of the buttocks.

Blood glucose was measured by Accucheck glucometer. Random blood glucose level was measured.

If random blood glucose level value comes more than 200 mg% then method was repeated on next day with fasting and postprandial values. Those individuals already diagnosed as diabetic and on treatment were labelled as known cases of diabetic.

Pilot study was carried out before main study to assess the feasibility and test the Proforma and necessary changes were made accordingly. Study subjects diagnosed with DM, IGT and IFG were prescribed appropriate counselling and treatment.

Statistical Analysis
Data was analyzed and tabulated using frequency distribution tables and proportions. The significance of difference between various factors analyzed using the Chi-square test.

4. Results

Distribution of study subjects according to diabetic status showed that majority of study subjects are non-diabetic had normal blood glucose level. All 6 diabetic study subjects were known cases of diabetes mellitus and no new cases were detected. Prevalence of diabetes mellitus was 03.00%. Prevalence of diabetes mellitus among males was 03.29%. Prevalence of diabetes mellitus among females was 02.09%. Few police persons had impaired glucose tolerance i.e. 15(07.50%) and few had impaired fasting glucose i.e. 05(02.50%). (Table 1)

Distribution of study subjects according to BMI showed that majority of police persons were overweight followed by normal BMI and then obese i.e.127 (63.50%), 43(21.50%) and 30(15.00%) respectively. Majority of male police persons were overweight 118(77.63%) followed by obese 24(15.78%). Very few 10(06.57) had normal BMI. Majority of female police persons had normal BMI 33(68.75%) followed by overweight 09(18.75%). 06(12.50%) study subjects were obese. Mean BMI was 25.01 ± 2.60 kg/m² (19.57 – 36.50). Mean BMI for male was 25.63 ± 2.22 kg/m² (20.57 – 36.50). Mean BMI for female was 23.03 ± 2.76 kg/m² (19.57 – 30.69). Overweight and obesity were more in male than female which is statistically significant. Chi-square value- 79.9025, degree of freedom- 1, p value <0.001. (Table 2)

Distribution of study subjects according to Waist Hip Ratio (WHR) showed that majority of police person 130(65.00%) had central obesity followed by 56(28.00%) overweight. Only 14(07.00%) had normal waist-hip ratio. Majority of male police person 97(63.81%) had central obesity followed by 45(29.60%) overweight. Only 10(06.57%) male had normal waist-hip ratio. Majority of female police person 33(68.75%) had central obesity followed by 11(22.91%) had overweight. Only 04(08.33%) female had normal waist-hip ratio. Mean waist-hip ratio was 0.9730 ±0.07 (0.78-1.1). Mean waist-hip ratio of males was 0.9965 ±0.05 (0.8437-1.1). Mean waist-hip ratio of females was 0.8986 ±0.06 (0.78-1.0204). There was no any statistical significant difference between male and female for waist-hip ratio. Fisher exact test was applied, p value-0.7462. (Table 3)

Distribution of study subjects according to obesity and impaired blood sugar status showed that statistical significant difference in impaired blood sugar status compared to normal blood sugar status for risk factor obesity i.e. BMI > 27.5 kg/m2, chi square value- 64.132 and p value- <0.001. (Table 4)

Distribution of study subjects according to central obesity and impaired blood sugar status showed that statistical significant difference in impaired blood sugar status compared to normal blood sugar status for risk factor central obesity, chi square value- 8.4647 and p value- <0.0036. (Table 5)

Table 1: Distribution of study subjects according to diabetic status

Diabetic status	Study Subjects		
	Male (%)	Female (%)	Total (%)
Non-diabetic	132(86.84)	42(87.50)	174(87.00)
Impaired fasting glucose	03(01.97)	02(04.16)	05(02.50)
Impaired glucose tolerance	12(07.89)	03(06.25)	15(07.50)
Diabetic	05(03.29)	01(02.09)	06(03.00)
Total	152(76.00)	48(24.00)	200(100)

Table 2: Distribution of study subjects according to BMI

BMI*	Study subjects		
	Male (%)	Female (%)	Total (%)
Normal (18.5-23.0 kg/m²)	10(06.57)	33(68.75)	43(21.50)

Overweight (>23.0-27.5 kg/m^2)	118(77.63)	09(18.75)	127(63.50)
Obese (>27.5 kg/m^2)	24(15.78)	06(12.5)	30(15.00)
Total	152(76.00)	48(24.00)	200(100)

*BMI south-east Asian classification

Table 3: Distribution of study subjects according to Waist Hip Ratio (WHR)

Waist-Hip Ratio*	Study subjects		
	Male (%)	Female (%)	Total (%)
Normal	10(06.57)	04(08.33)	14(07.00)
Overweight	45(29.60)	11(22.91)	56(28.00)
Central Obesity	97(63.81)	33(68.75)	130(65.00)
Total	152(76.00)	48(24.00)	200(100)

*Waist-Hip ratio cut off- DGSP criteria

Table 4: Distribution of study subjects according to obesity and impaired blood sugar status

Obesity	Impaired blood glucose		
	Present (%)	Absent (%)	Total (%)
Present (BMI >27.5 kg/m2)	18(60.00)	12(40.00)	30(100)
Absent (BMI ≤27.5 kg/m2)	08(04.70)	162(95.30)	170(100)
Total	26(13.00)	174(87.00)	200(100)

Table 5: Distribution of study subjects according to central obesity and impaired blood sugar status

Central Obesity	Impaired blood glucose		
	Present (%)	Absent (%)	Total (%)
Present	24	106	130
Absent	02	68	70
Total	26(13.00)	174(87.00)	200(100)

5. Discussion

High Prevalence was reported in Selokar D et al (2011) study where Prevalence of diabetes was (5.9%).[5] and in Tambe N et al (2012) study where Known diabetics were 8.3% & IGT in 2.7 %.[2], in Satapathy DM et al (2009) study, prevalence of Diabetes was 6.25%.[6] Hasan Abu-Aisha et al (2008) study showed more prevalence of diabetes; (8.7%).[7]

Higher Prevalence of diabetes was reported Kumar S et al (2008) study as 11.5% (10.4% known and 1.1% newly diagnosed).[4], Almale B et al (2014) study as (12.7%).[8], in John F et al (2012) study as 12.5%.[9] and Thayyil J et al (2012) study as 13.7%.[10]

Ramkrishnan J et al (2013) study revealed Prevalence of Diabetes mellitus as 33.6%; Impaired glucose tolerance 7%.[11], Jahnvi G et al (2012) study reported Prevalence of diabetes as (37%).[12]

In Almale B et al (2014) study, there were less overweight (48.2%) whereas more obesity (20.3%).[8]
Sen A et al (2015) study also showed less overweight as compared to present study (27.6%) but obesity was more (31.4%). [13]

Overall obesity, assessed by BMI, was significantly prevalent among the policemen (P < 0.05). A higher percentage of policemen were found to be overweight (BMI > 23 kg/m2) and obese (BMI > 25 kg/m2) than the normal individuals (27.6% overweight and 34.1% obese in policemen, whereas 25.5% overweight and 27.6% obese in civilians. [13]

In this study, central obesity was seen in majority of police person (65%); 63.81% male police person and 68.75% female police person had central obesity. There was no any statistical significant difference between male and female for waist hip ratio (p value by Fisher Exact test-0.7462).

Similar finding seen in Sen A et al (2015) study where the percentage of population with abdominal obesity and truncal obesity were significantly higher among the policemen when compared with the civilians (66.3% vs. 47.9%, P <0.0001 for WC and 94.7% vs. 88.0%, P <0.01 for WHR).[13]

Lower prevalence of overweight was seen in Tambe N et al (2012) study 49.43%.[2], Agrawal S et al (2015) study showed that out of 48 officers 41 were found non-obese and remaining seven were overweight. Out of 1279 non-officers, 913 were non-obese and 366 were found overweight (BMI ≥25). The percentage of overweight was more in non-officers as compared to that in officers, This difference is found to be statistically significant (x2 = 4.508 , d.f.= 1, p= 0.03 significant).[14]

6. Conclusion

High prevalence of overweight, obesity and also central obesity was found which is alarming. Prevalence of diabetes mellitus was 3% but prevalence of IGT was high (7.5%) with IFG prevalence of 2.5%. Police person with impaired blood glucose status were present more in obese and central obese group with statistical significant difference.

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