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## The metabolic syndrome: Its prevalence and risk factors among policemen of Patiala, Punjab

Ritika Masih

[ritzmasih770@gmail.com](mailto:ritzmasih770@gmail.com)

Eternal University, Sirmour,  
Himachal Pradesh

Suchpreet Kaur

[suchpreet@eternaluniversity.edu.in](mailto:suchpreet@eternaluniversity.edu.in)

Eternal University, Sirmour,  
Himachal Pradesh

Dr. N. L. Gupta

[drnlg.sml@gmail.com](mailto:drnlg.sml@gmail.com)

Eternal University, Sirmour,  
Himachal Pradesh

Dr. Neelam Kaur

[drnkaurdsingh@gmail.com](mailto:drnkaurdsingh@gmail.com)

Eternal University, Sirmour,  
Himachal Pradesh

Dr. Davinder Singh

[akal.contacts@gmail.com](mailto:akal.contacts@gmail.com)

Eternal University, Sirmour,  
Himachal Pradesh

### ABSTRACT

*Metabolic syndrome is characterized by a cluster of conditions, including hyperglycemia, abdominal obesity, dyslipidemia, and high blood pressure. The prevalence of this syndrome has varied markedly between different studies because of the lack of internationally agreed-upon criteria for its definition. Definitions of the syndrome have been proposed by the World Health Organization (WHO) in 1999, the U.S. IIIrd Report of National Cholesterol Education Program, Adult Treatment Panel (ATP III) in 2001, and the International Diabetes Federation in 2005 (IDF). To determine the prevalence of Metabolic Syndrome and risk factors in the policemen. To find out the association of sociodemographic variables with risk factors and Metabolic Syndrome. To find out the association between the risk factors and Metabolic Syndrome. A descriptive cross-sectional study was conducted amongst 155 policemen of Patiala; two types of data collection were done based on annual health reports (2017-18) and Structured Questionnaire. A Non-Probability Quota sampling was used to select respondents based on three criteria: Population group was Policemen, more than 40years of males having their Annual health reports (2017-18). The prevalence of Metabolic Syndrome was 71%, abdominal obesity (97%), high triglycerides (66.5%), low HDL cholesterol (33.5%), high BP (73%), Fasting glucose more than >110mg/dl (31.60%), alcohol consumption (84%), non-vegetarian (93.5%) and severe stress (73%) among the policemen. The binary logistic analysis showed the significant relationship between the risk factors and metabolic syndrome, risk factors including clinical parameters, individual medical history of low HDL cholesterol; diabetes; food preference, physical activity during working hours. The current study found that the majority of the policemen are vulnerable to metabolic syndrome and associated risk factors were responsible for developing it.*

**Keywords**— Metabolic Syndrome, Prevalence, Pattern, Policemen, Risk factors

### 1. INTRODUCTION

The Metabolic Syndrome that increases the risk of cardiovascular disease and diabetes, has been gaining importance in recent times as cardiovascular diseases are the number one cause of death globally. The rapid changes in society and increased consumption of unhealthy diet and lifestyle predispose the risk of developing metabolic syndrome among people. In 1940, Jean Vague was the first to highlight the Metabolic Syndrome and the link of metabolic abnormalities with abdominal obesity. After three decades, Gerald Phillips proposed that aging, obesity and sex hormone-associated clinical manifestations, now referred to as the metabolic syndrome, are associated with heart disease. Gerald Reaven (1988) suggested insulin resistance as the critical factor instead of obesity and named the constellation of abnormalities Syndrome-X.

The prevalence of metabolic syndrome has increased rapidly in recent years due to rapid socioeconomic transitions of increasing affluence, urbanization, auto-mobilization, mechanization and urban migration. The environmental, cultural, economic or ethnic differences contribute to varied prevalence across India. The impact of non-communicable diseases is serious on the lives of people when measured in terms of loss of life, disablement, family hardship; poverty and economic loss to the country. The metabolic syndrome is characterized by a clustering of risk factors, which predispose subjects to increased risk of diabetes and cardiovascular disease.

Men generally have a lower life expectancy and higher mortality than women in nearly all age groups. Police, whose main activity is the maintenance of public order and prevention of crimes, transgression of the laws, are mostly composed of men; viewing the nature of job of the policemen and their susceptibility towards developing metabolic syndrome and the paucity of researches in this context, it is reasonable to assess the prevalence and risk factors of the metabolic syndrome in the Policemen of Patiala (Punjab).

## 2. MATERIAL AND METHODS

An exploratory study on Metabolic Syndrome: Its Prevalence and the Risk factors among the policemen of Patiala, (PUNJAB). A quantitative approach was adopted for this study. Descriptive Cross-Sectional study was done. The study was conducted among the 155 policemen of Patiala city. A non-probability quota sampling technique was used, samples were selected on the basis of age and availability of the annual health report (2017-18). First of all, a list of policemen with recorded annual health report (2017-18) including their names and belt number was obtained from the Senior Medical Officer of Police Lines dispensary, Patiala. A list of policemen was taken from the control room of Police, Patiala and the selected policemen were tracked with the help of their belt number, phone number, and co-policemen. Consent was taken from the policemen for taking their primary and secondary data only for research purpose.

## 3. OPERATIONAL DEFINITIONS

- **Prevalence:** it refers to the total number of individuals in a population who have a disease or health condition at a specific period of time, usually expressed as a percentage of the population.
- **Risk Factor:** A risk factor is an attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease or injury.
- **Policeman:** A male member of the Police Force.
- **Metabolic syndrome:** - The metabolic syndrome is a cluster of the most dangerous heart attack risk factors: diabetes and raised fasting plasma glucose, abdominal obesity, high cholesterol, and high blood pressure. The cluster includes hypertension, hypertriglyceridemia, low HDL cholesterol, Obesity (central), Impaired glucose handling (Insulin Resistance) (WHO).
- **At the risk of Metabolic Syndrome:** the diagnosis is established when any of the three risk factors are present in the Individual.

**Table 1: Modified NCEP ATP III Criteria (2018) used for the diagnosis of Metabolic Syndrome.**

ATP III Criteria for clinical identification of Metabolic Syndrome	
Risk Factors	Defining Level
Abdominal obesity • Men • Women	Waist circumference >102cm(>40inches) >88cm(>35inches)
Triglycerides	>150/dl
HDL Cholesterol • Men • Women	<40mg/dl <50mg/dl
Blood Pressure	≥130/ ≥85mmhg
Fasting Glucose	≥110mg/dl

## 4. RESULTS AND DISCUSSION

The analysis was done with the reference to the objectives. The study was conducted from February to April 2019. A total of 155 policemen of Patiala were selected based on their annual health report (2017-18) available in the police lines dispensary, they were interviewed and data so collected was analyzed and presented in the tabulated form.

**Table 2: Distribution of Socio-Demographic Characteristics. (n=155)**

Socio Demographics	Category	Frequency(n)	Percentage (%)
Age	40-45years	42	27.1
	46-50years	65	41.9
	51-55years	39	25.2
	56-60years	9	5.8
<b>Mean Age=48.2 years; SD±4.241</b>			
Religion	Hindu	19	12.3
	Sikh	132	85.2
	Christian	4	2.6
Education	Illiterate	0	0
	primary	0	0
	secondary	3	1.9
	Higher secondary	103	66.5
Marital Status	Graduation and above	49	31.6
	married	155	100.0
	Single	0	0
	Widow	0	0
Family Structure	divorced	0	0
	Nuclear	145	93.5

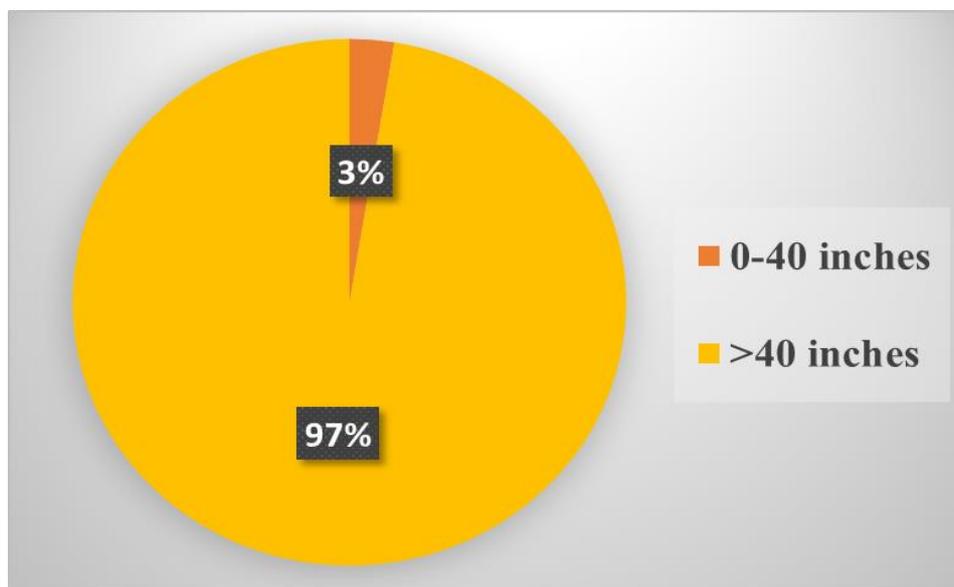
	Joint	10	6.5
	Expended	0	0
Income	>1,26,360	0	0
	63,182-1,26,356	8	5
	47,266-63,178	20	12.9
	31,591-47,262	80	51.6
	18,953-31,589	43	27.7
	6,327-18,949	4	2.6
	<6,323	0	0

The above table describes the socio-demographic characteristics of the respondents. The Majority of the policemen belonged to the age group of 46-50 years (41.9%) with the mean age of 48.2 ±4.241 years. Most of the participants belonged to Sikh religion 85.2% and all were married (100%) with the nuclear type of family structure (93.5%). The majority of qualification was higher secondary (66.5%) and most the participants belonged to the range

**4.1 Prevalence of the Risk Factors and the Metabolic Syndrome.**

**4.1.1 Prevalence of the Clinical parameters**

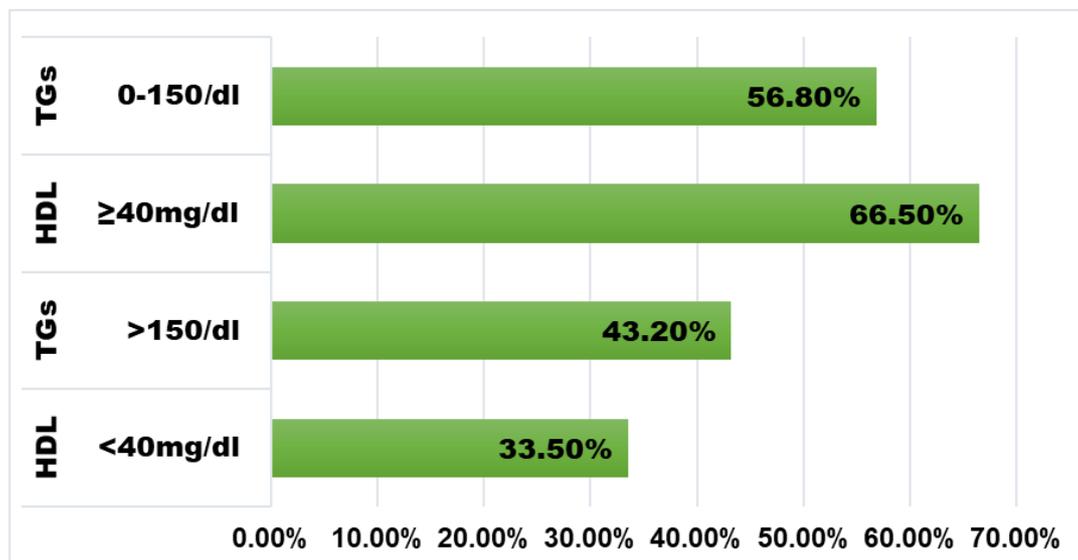
- Prevalence of the Anthropometric Parameters that is Abdominal Obesity.



**Fig. 1: Distribution of the Anthropometric Parameters i.e. Abdominal Obesity (n=155)**

There were (97%) responders who were having abdominal obesity of >40 inches and (3%) of them were having < 40 inches of abdominal obesity.

- Prevalence of the Biochemical Parameters



**Fig. 2: Prevalence of HDL Cholesterol and Triglycerides (n=155)**

Above figure shows that less than half of the policemen 43.20% were having triglycerides >150/dl and 33.50% of them were having HDL <40mg/dl. This indicates that HDL and TGs have inverse relationship thereby showing an increased probability of developing the Metabolic Syndrome.

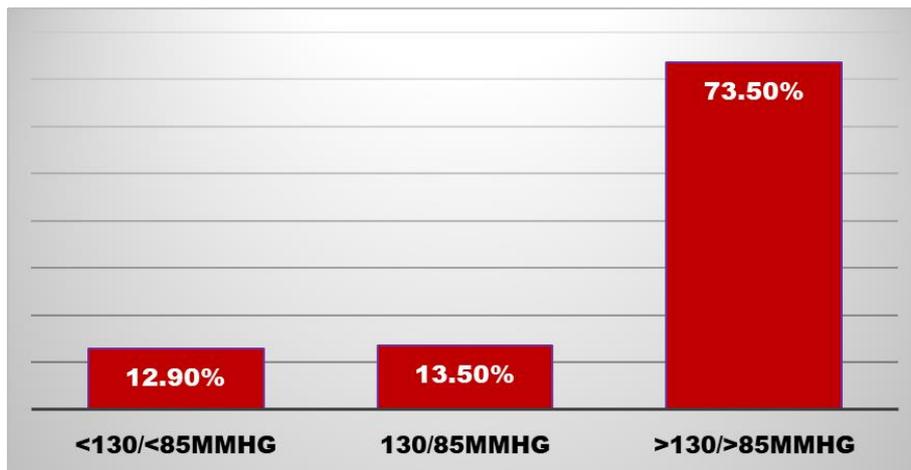


Fig. 3: Prevalence of the High Blood Pressure (n=155)

Above figure depicts that the majority of the policemen (73.50%) were having high blood pressure levels which increased the susceptibility of Hypertension thereby resulting as a predisposing risk factor for Metabolic Syndrome.

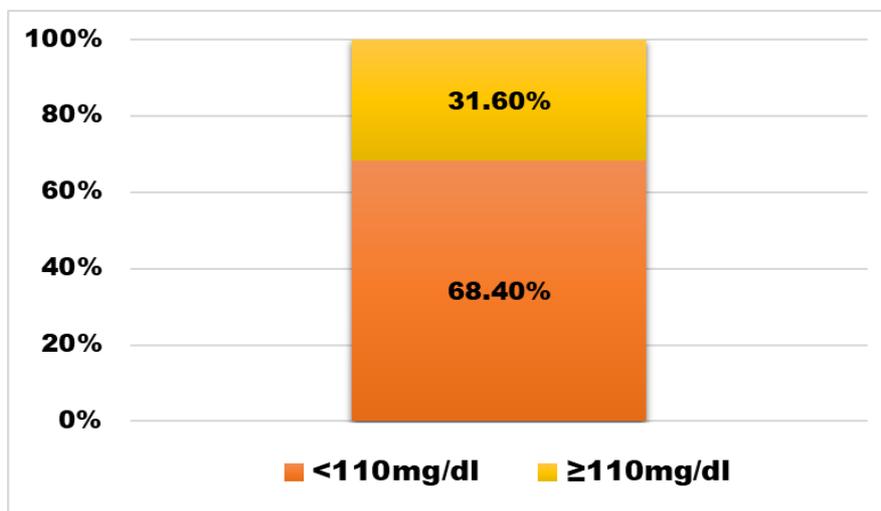


Fig. 4: Prevalence of Fasting Glucose (n=155)

This figure depicts that the majority of the policemen (68.4%) were having fasting glucose level less than 110mg/dl whereas 31.6% suffering from the high fasting glucose levels were more liable to have Metabolic Syndrome.

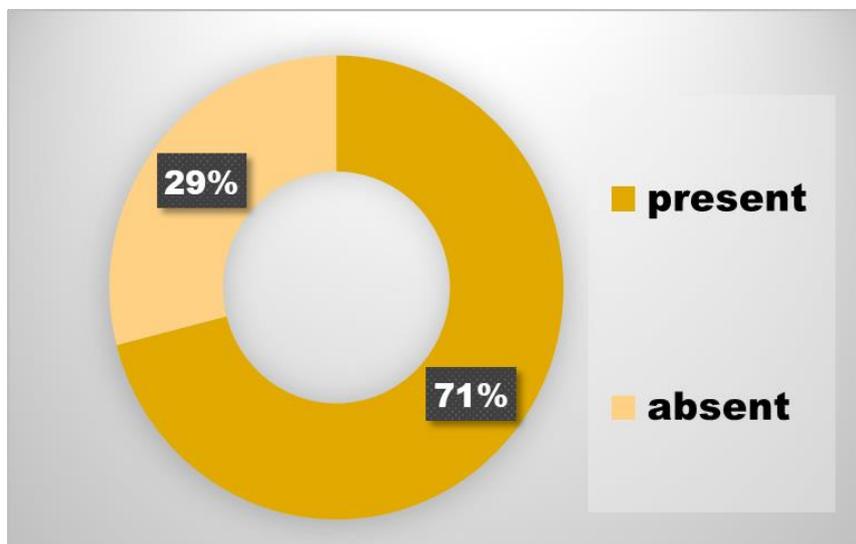


Fig. 5: Prevalence of the Metabolic Syndrome

The above figure shows that more than half of the policemen (71%) were at the risk of developing Metabolic Syndrome.

• Prevalence of the Other Risk Factors

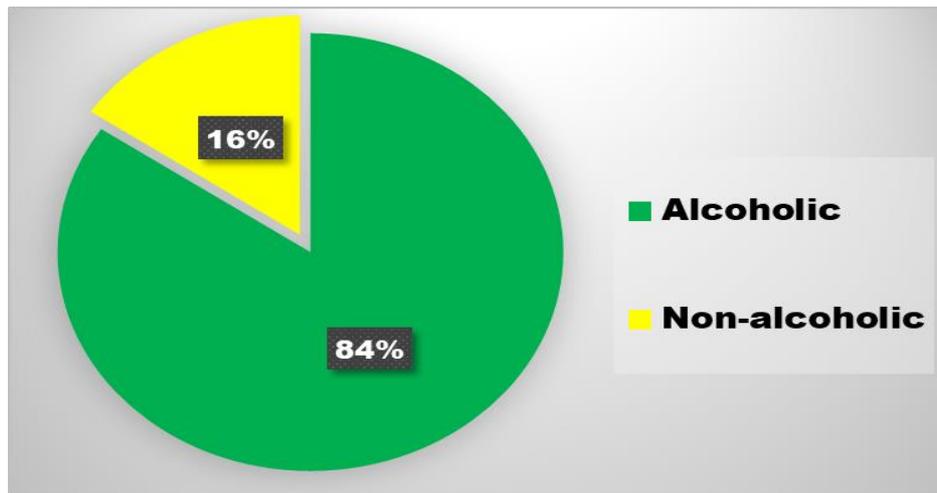


Fig. 6: Distribution of Alcohol Consumption

The above figure depicts that the majority of the policemen were alcoholic (84%), Alcohol consumption has an influence on the lipids, waist circumference, fasting glucose thereby increasing the vulnerability of having Metabolic Syndrome.

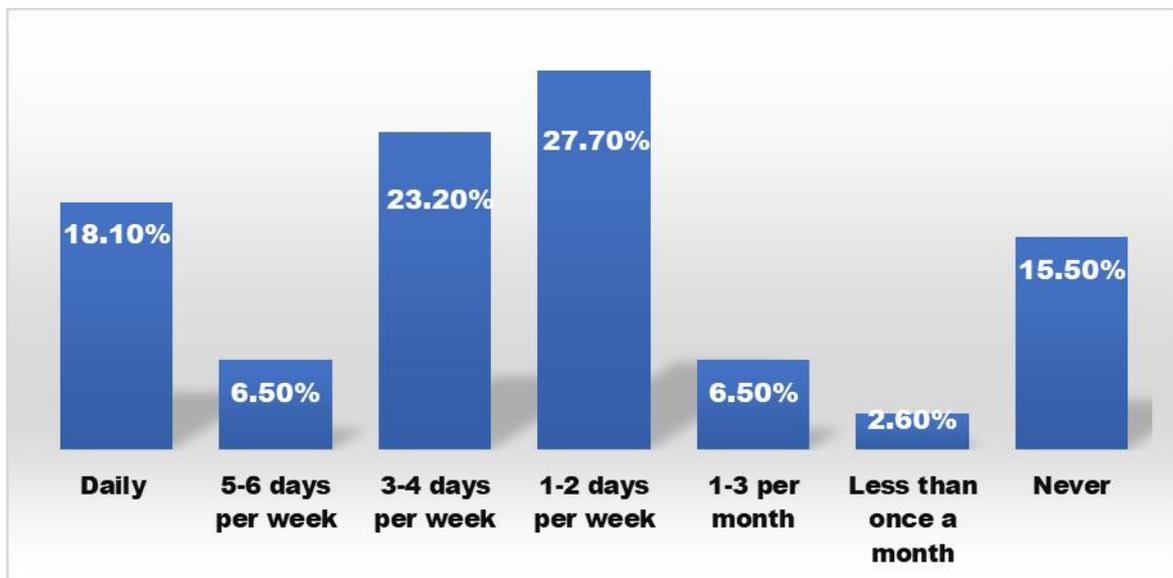


Fig. 7: Distribution for Pattern of alcohol consumption

The above figure shows a variation in the pattern of alcohol consumption (27.7%) of the policemen take a standard alcohol drink for 1-2 days per week whereas (23.2%) take 3-4 days per week, (18.1%) consume daily, 6.5% take 5-6days per week.

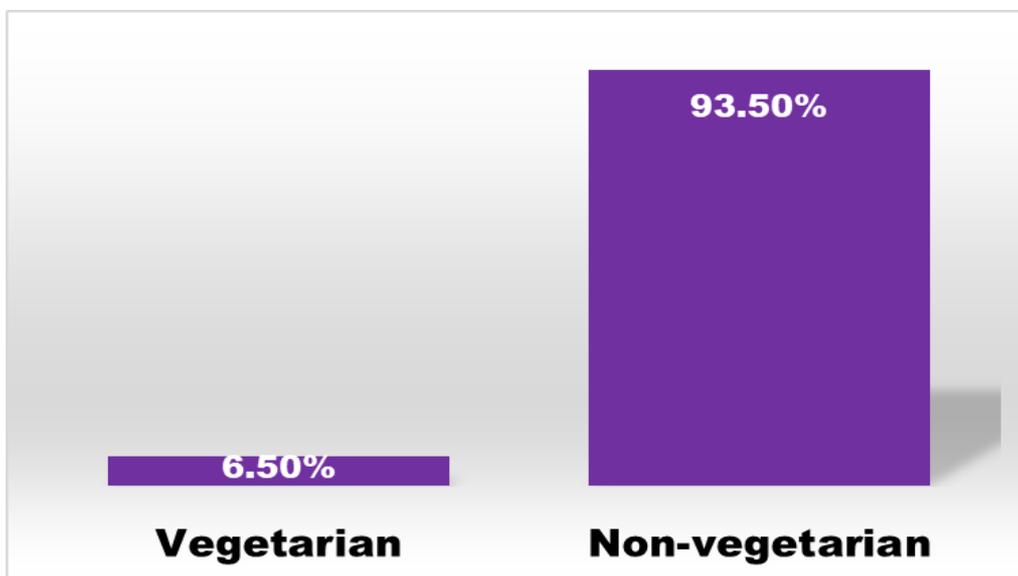


Fig. 8: Distribution of Food Preference

The above figure shows that 93.5% i.e. the majority of the policemen were preferring to have a non-vegetarian diet. The dietary pattern has a favourable influence on the risk of Metabolic Syndrome so the non-vegetarian diet heightened the risk of developing metabolic syndrome among policemen.

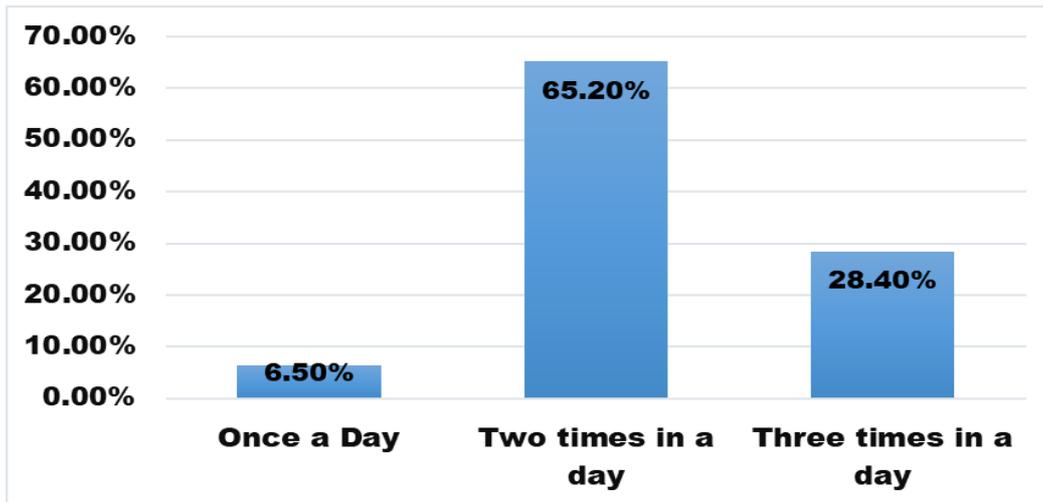


Fig. 9: Distribution for the pattern of eating homemade food in a day

This figure shows the pattern of eating homemade food out of which more than half of the policemen 65.2% eat homemade food two times in day which shows the possibility of eating outside at least once in a day whereas the 6.5% of them eating homemade food only once a day were more liable to have risk of Metabolic Syndrome.

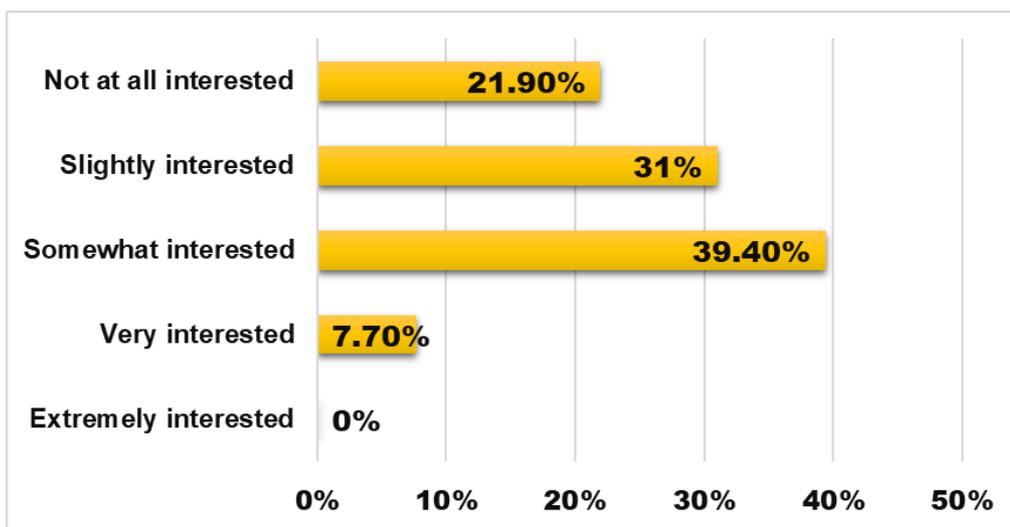


Fig. 10: Distribution of interest of the Police department towards a healthy diet of Policemen

This figure shows that majority of the policemen 39.4% had reported that the police department shows concerned behaviour towards their healthy diet at their workplace.

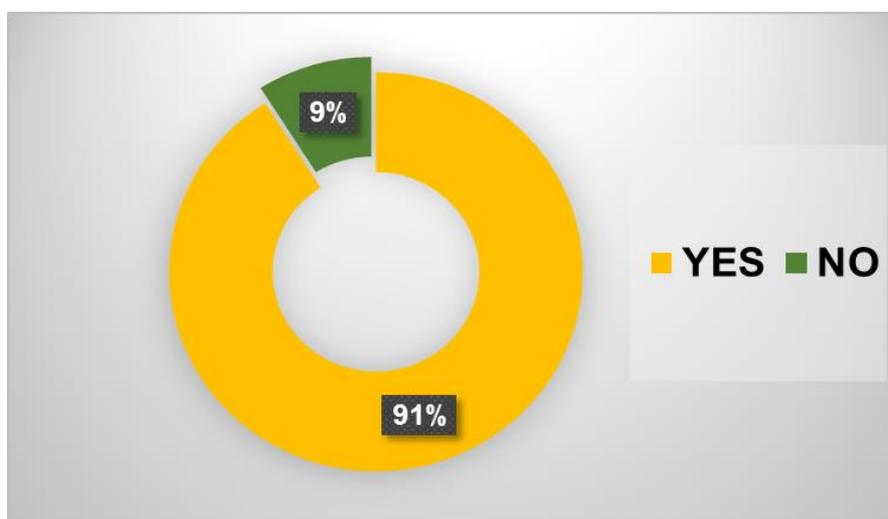


Fig. 11: Distribution for Physical activity habit during working hours i.e. Use of lifts instead of Stairs

Above figure depicts that the majority of the policemen 91% uses the lifts instead of stairs which leads to physical inactivity further influence the risk of developing metabolic syndrome.

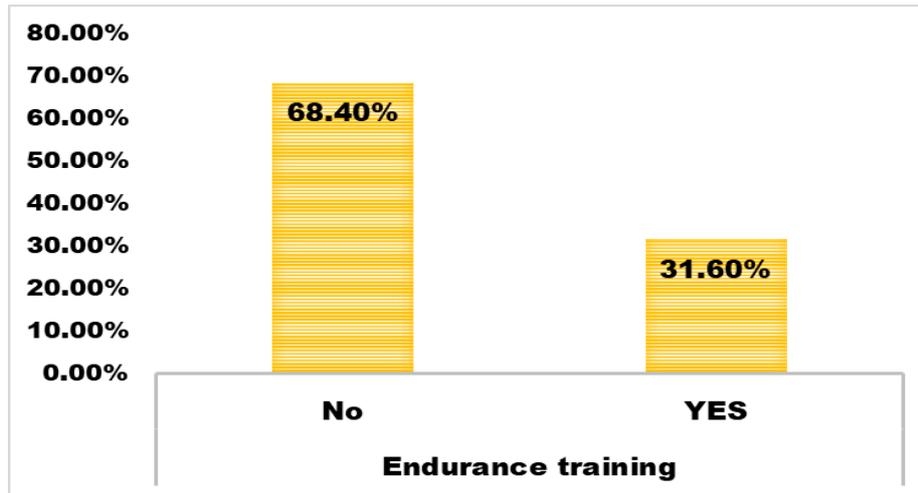


Fig. 12: Distribution of Recreational Activity

The figure depicts that more than half of the policemen 68.4% were not performing any endurance training like morning walk, jogging, running, etc. thereby having a favourable influence on the progression of Metabolic Syndrome.

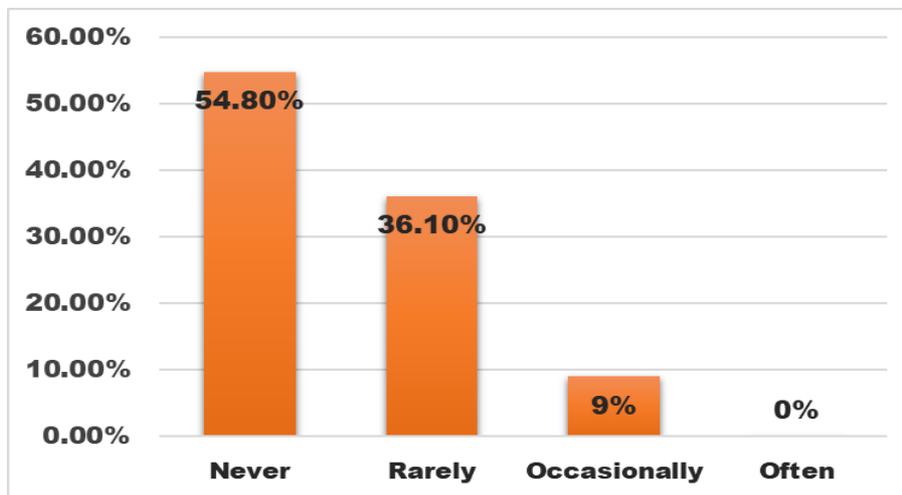


Fig. 13: Distribution of Time to take Rest and Relax

The figure depicts that more than half of the policemen 54.8% did not have time to take rest and relax which influenced the health status thus made headway to metabolic syndrome.

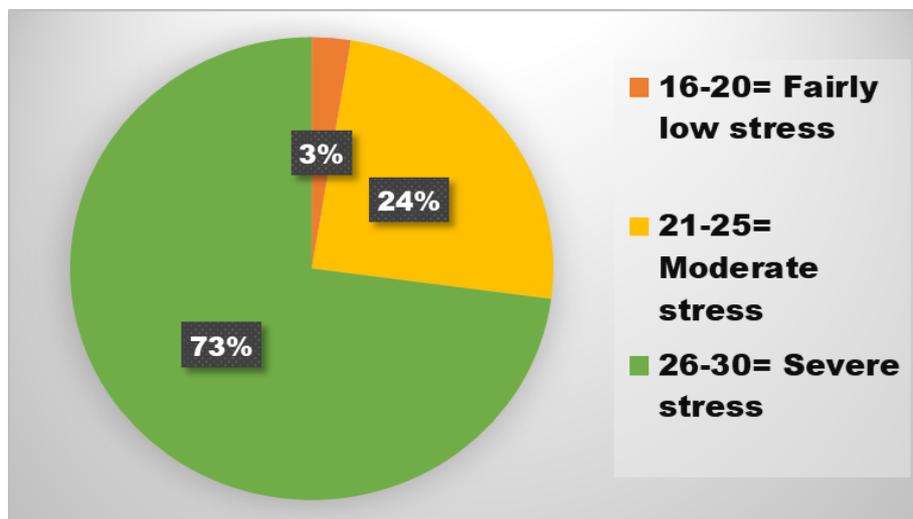


Fig. 14: Distribution of Workplace Stress Scale.

The above figure shows that the majority of the policemen 73% were having Severe stress levels with score ranges from 26 to 30 resulted as a signal for poor metabolic health

**Table 2: Association of sociodemographic variable (age) with Family medical history (Hypertension and Diabetes) and physical activity during working hours, (n=155)**

Sociodemographic Variable	N	Family medical history				p-value	
		High blood pressure					
		YES		NO			
		n	%	n	%		
<b>AGE</b>							
40-45 Years	42	19	45.2%	23	54.8%	<b>0.001*</b>	
46-50 years	65	19	29.2%	46	70.8%		
51-55 years	39	4	10.3%	35	89.7%		
56-60 years	9	0	42.0%	9	100%		
Sociodemographic Variable	N	Family Medical History					
		High Blood Pressure					
		YES		NO			
		N	%	n	%		
40-45 Years	42	21	50%	21	50%		
46-50 years	65	18	27.7%	47	72.3%		
51-55 years	39	9	23.1%	30	76.9%		
56-60 years	9	1	11.1%	8	88.9%		
Sociodemographic variable	N	Physical activity during working hours					
		Seating Position		Standing position			Both
		n	%	N	%		
		n	%	n	%		
40-45 Years	42	4	9.5%	10	23.8%	28	
46-50 years	65	12	18.5%	6	9.2%	47	
51-55 years	39	16	41%	0	0.0%	23	
56-60 years	9	0	0.0%	4	44.4%	5	

\*statistically significant at p-value (<0.005)

\*\*Highly significant statistically at p-value (<0.001)

The above-mentioned table 2 depicts the significant association between the sociodemographic characteristics and the other risk factors like family medical history of High BP (p=0.001\*) and Diabetes (p=0.018). A significant association was found between the sociodemographic characteristics and the physical activity during working hours (p<0.001).

- Association between Metabolic syndrome and other risk factors.
- Association and correlation between metabolic syndrome and other risk factors.

**Table 3: Association between the Metabolic syndrome and other risk factors with Odd's Ratio (n=155).**

Risk Factors		N	Metabolic Syndrome		X <sup>2</sup> p-value	Odd's ratio
			Absent	Present		
			n%	n%		
<b>Individual medical history</b>						
High BP	YES	106	22(20.8)	84(79.2)	0.001*	3.37
	NO	49	23(46.9)	26(53.1)		
High cholesterol	YES	64	9(14.1)	55(85.9)	0.001*	4.0
	NO	91	36(39.6)	55(60.4)		
Diabetes	YES	63	10(15.9)	53(84.1)	0.002*	3.25
	NO	92	35(38)	57(62)		
<b>Family history</b>						
Cancer	YES	21	2(9.5)	19(90.5)	0.025*	4.48
	NO	134	43(32.1)	91(67.9)		
<b>Smoking and alcohol status</b>						
Any smoking habit in the past	YES	19	2(10.5)	17(89.5)	0.045*	3.93
	NO	136	43(31.6)	93(68.4)		
Alcohol consumption	Alcoholic	131	28(21.4)	103(78.6)	<0.001*	-
	Non-alcoholic	24	17(70.8)	7(29.2)		

\*\*Highly significant statistically at p-value (<0.001)

\*statistically significant at p-value (<0.005)

Dietary Pattern					
Food Preference					
VEG.	10	8(80)	2(20)	<b>0.001*</b>	<b>11.67</b>
NON-VEG.	145	37(25.5)	108(74.5)		
Add salt to your food					
Always	0	-	-	0.022*	-
Often	0	-	-	Often	
Sometimes	39	18(46.2)	21(53.8)	Sometimes	
Rarely	82	18(22)	64(78)	Rarely	
Interest of the department on healthy diet of the policemen					
Extremely interested	0	-	-	<b>0.002*</b>	-
Very interested	12	3(25)	9(75)	Very interested	
<b>Somewhat interested</b>	<b>61</b>	<b>28(45.9)</b>	<b>33(54.1)</b>	<b>Somewhat interested</b>	
Slightly interested	48	7(14.6)	41(85.4)	Slightly interested	
Not at all interested	34	7(20.6)	27(79.4)	Not at all interested	
Physical exercise pattern					
Physical activity habits during working hours					
Use of lifts over stairs	YES	141	33(23.4)	108(76.6)	<b>&lt;0.001*</b>
	NO	14	12(85.7)	2(14.3)	
Walking to work place	YES	85	31(36.5)	54(63.5)	<b>0.018*</b>
	NO	70	14(20.0)	56(80.0)	
Time to take rest and relax	<b>Never</b>	<b>85</b>	25(29.4)	60(70.6)	<b>0.031*</b>
	Rarely	56	12(21.4)	44(78.6)	
	Occasionally	14	8(57.1)	6(42.9)	
	Often	0	-	-	

\*statistically significant at p-value (<0.005)

\*\*Highly significant statistically at p-value (<0.001)

The above table shows the association between the risk of metabolic syndrome and the individual history of high BP (p=0.001, OR=3.37), high cholesterol (p=0.001, OR=4.0) and diabetes (p=0.002, OR=3.25) were statistically found to be highly significant. The association between the Risk of MS were found significant with smoking (p=0.045, OR=3.93) and alcohol (p<0.001), Food Preference (p=0.001, OR=11.6), and salt addition (p=0.002) were found to have significant association with the risk of MS along with the concern of the department on the healthy diet of the policemen(p=0.002). The association between the risk of MS found to be significant with physical activities during working hours i.e. use of lifts over stairs (p <0.001, OR=19.6), walking to the workplace (p=0.018) and time to take rest and relax (p=0.031).

## 5. DISCUSSION

The current study found the high, 71% prevalence of the metabolic syndrome with abdominal obesity (97%), high blood pressure( 73%) and diabetes (31.6%) and alcohol use (84%) among the study population which is in contrast with the 16.8% prevalence of the MS with high body mass index (65.6%), hypertension(37.7%) , diabetes (7%) and alcohol use (48%) among the police officers of a district in India(Thayyil et al,2012). An another study found to have results in contrast prevalence of the metabolic syndrome(36.2%) , abdominal obesity(34.5%), high BP(51.3%), diabetes(17.7%) and the low HDL cholesterol (74.8%) and high triglycerides (24.3%) whereas in the current study the low HDL cholesterol (33.5%) and high triglycerides (66.5%) were also find in contrast. The prevalence of abdominal obesity, high BP, hypertriglyceridemia, low HDL cholesterol and high fasting glucose found to be higher than the contrast study (79.5%) abdominal obesity, (31.2%) high BP, (17.9%) hypertriglyceridemia, (15.8%) low HDL cholesterol and (4.3%) high fasting glucose. (Garbarino S et al, 2015), Contrast study prevalence of metabolic syndrome (31%) (Lu J et al, 2017), 17.38% (Kaur J, 2014), 29.34% (Villegas R et al, 2009)

## 6. CONCLUSION

The prevalence of metabolic syndrome was found out to be more than the finding of most of the studies. There were more than half of the policemen who were at the risk of developing metabolic syndrome. The clinical parameters like abdominal obesity, high triglycerides, low HDL, High BP, fasting glucose were helpful in determining the risk of MS. More than half of the policemen were having a high percentage of abdominal obesity, triglycerides, low HDL but fasting glucose found to be less prevalent. Majority of the policemen were alcoholic and preferred non-vegetarian diet which affects the abdominal obesity, lipids, and insulin. Absence of active physical activity like the use of lifts instead of stairs influenced the risk of developing MS. High-stress levels were found among the majority of policemen, work-related stress induces the risk of MS as its effects on the blood lipids.

The metabolic syndrome found to be associated with the individual medical history of high BP. High cholesterol and diabetes; smoking; alcohol; food preference; salt addition; physical activity -use of lifts instead of stairs, walking to the workplace, time to rest and relax, workplace stress scale.

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