Original Research Paper

Volume - 11 | Issue - 05 | May - 2021 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Medicine

PREVALANCE OF CARDIOVASCULAR RISK FACTORS, THEIR AWARENESS AND GENDER DIFFERENCES IN ADOLESCENTS.

Vishwa Thakkar	Student Indira Gandhi Government Medical College, Nagpur.
Sayali Bhangare*	ExSenior resident Indira Gandhi Govt Medical college Nagpur. *Corresponding Author
Rakhee Joshi	Assistant professor Indira Gandhi Government Medical college Nagpur.
Vivek Ghotkar	Junior Resident Indira Gandhi Government Medical college Nagpur.
Pankaj Chavan	Junior Resident Indira Gandhi Government Medical college Nagpur.
Ganesh Thomare	ExAssistant professor Indira Gandhi Government Medical college Nagpur.
Prashant Joshi	Professor and Head of Department ,department of medicine AIIMS Nagpur.

ABSTRACT **Background :** Changing and sedentary life style, eating habits and lucrative job profiles have made the Indian adolescents and young subjects more prone to develop cardiovascular risk factors. Study of cardiovascular risk factors in adolescents and school- going children has been studied in the western population. In India we lack such relevant data. The present study aims to study such cardiovascular risk factors in adolescents in an institute in central India

Methods: We included 100 seemingly healthy adolescents of age group 12-18 years visiting either OPD or wards of IGGMCH,Nagpur. we assesed cardiovascular risk factors and its awareness among adolescents and gender differences prevailing in cardiovascular risk factors .

Result: The study showed that there is an increased risk of cardiovascular disease in adolescents. Prediabetes is the major risk factor affecting about 1/3rd adolescents (females-n=16, males- n=14).High waist circumference (females-n=24, males-n=9) was also very prevalent. Of the total, prehypertension was prevalent in 22% cases (females-n=12, males-n=10) .17% cases were found to be overweight(females-n=15, males-n=2).Low HDL was found in 7% cases(males-n=6,females-n=1).Borderline high LDL was found in 11% cases (females-n=7,males-n=4).Borderline high triglycerides in 17 % cases (females-n=10, males-n=7).Metabolic syndrome was prevalent in 7% adolescents predominantly in females.

Conclusion: That there is an increases burden of cardiovascular risk factors on adolescents and females are at a higher risk of developing cardiovascular diseases. Moreover, awareness of these risk factors is also lacking.

KEYWORDS : Adolescents,hypertension,diabetes mellitus, dyslipidaemia,waist circumference,Metabolic syndrome, awareness.

INTRODUCTION:

Adolescents are considered to be at the peak of their health,yet adolescence coincides with onset of many health disorders. Burden of cardiovascular risk factors andovert cardiovascular disease has increased manifold worldwide. Initially, a disease of the developed world it is now a disease more prevalent in the developing world and more prominently in south Asians. Obesity is the other end of spectrum of malnutrition and is epidemic in the urban settings. This is accompanied with metabolic derangements like diabetes dyslipidemia hypertension and polycystic ovary disease. Essential hypertension is rising among Indian youth. There is a close relationship between obesity, hypertension and type 2 diabetes mellitus. Sedentary lifestyle, increased consumption of calorie dense food and decreased outdoor activity contribute to these disorders.

What is even more alarming is that cardiovascular disease in South Asians and Indians occurs at least a decade earlier and are characterized by a greater morbidity and mortality. Changing and sedentary life style, eating habits and lucrative job profiles have made the Indian adolescents and young subjects more prone to develop cardiovascular risk factors. The erstwhile disease naive population is becoming the major cluster of these cardiovascular risk factors. Study of cardiovascular risk factors in adolescents and school- going children has been studied in the western population. In India we lack such relevant data. The present study aims to study such cardiovascular risk factors in adolescents in an institute in central India

AIMS AND OBJECTIVES:

A. To assess the cardiovascular risk factors in adolescents.
B. To assess knowledge and awareness of cardiovascular risk factors in these adolescents.
C. To study gender differences prevailing in cardiovascular risk factors.

MATERIALS AND METHODS

A.To assess the cardiovascular risk factors in adolescents.

Type of study: Hospital based observational study.

Study duration: May-June 2015

Sample size:100

INCLUSION CRITERIA:

All seemingly healthy adolescents of age group 12-18 years visiting either OPD or wards of IGGMCH,Nagpur.

EXCLUSION CRITERIA:

1. Not willing to give consent
2. Already diagnosed with

- Type 1- diabetes mellitus
- Hypertension
- Coronary heart disease
- Cardiomyopathy
- Rheumatic heart disease
- Endocrine disorders like Cushing syndrome,hypothyroidism, Acromegaly,pheochromocytoma

Consecutive adolescents fulfilling the eligibility criteria were enrolled.

DEFINED VARIABLES:

PREHYPERTENSIVE: defined as those with systolic pressure 120-139 mm hg or diastolic pressure 80-89 mm hg

HYPERTENSIVE: defined as systole >140 mm hg or diastole > 90 mm hg.

HIGH LDL: defined as having levels >130mg/dl

LOW HDL: Defined with levels <40 mg/dl.

PREDIABETIC: having fasting plasma glucose >100-125mg/dl to <126 mg/dl

DIABETIC: Those with fasting plasma glucose >126 mg/dl

OBESE:BMI>30kg/m2 are described obese.

BORDERLINE HIGH TRIGLYCERIDE: Having triglyceride levels 150-199 mg/dl

MEASUREMENTS:

1. BMI10: Weight and height were measured to the nearest 0.1 kg and 0.1 cm, respectively, with the children wearing only underwear and no shoes. Height and weight measurements were used to calculate BMI (kg/m 2).3

$$\text{BMI} = \frac{\text{mass(kg)}}{(\text{height(m)})^2} = \frac{\text{mass(lb)}}{(\text{height(in)})^2} \times 703$$

Table 1 : Classification of obesity according to BMI

obesity class	BMI(kg/m2)	Risk of disease
underweight	<18.5	
healthy weight	18.5-24.9	
overweight	25-29.9	increased
obesity	30-34.9	high
obesity	35-39.9	very high
extreme obesity	>/=40	extremely high

2. WAIST CIRCUMFERENCE (WC):
Waist Circumference can be useful for those people categorized as normal or overweight in terms of BMI. Waist circumference (WC) was measured to the nearest 0.1 cm with a flexible tape at a point midway between the lower border of the ribcage and the iliac crest at the end of normal expiration.3

For South Asian, Chinese, and Ethnic South & Central Americans9
MEN = >/= 90 cm
WOMEN = > /= 80 cm

3. BLOOD SUGAR LEVEL:
Venous blood samples were collected from all study participants after 12 h of overnight fasting and delivered to the laboratory on the day of blood collection. The blood samples were centrifuged for 10 min at 3,000 rpm within 30 min of venipuncture and were immediately transported to the laboratory3. Fasting blood sugar was evaluated using GOD-POD method.

Level14	Normal glucose	prediabetes	diabetes
tolerance		mellitus	
FPG	100 mg/dl	100-125mg/dl	126mg/dl
2h FPG	140mg/dl	140-199 mg/dl	200 mg/dl

4. BLOOD PRESSURE (BP):
Auscultatory method for measuring B.P. was used.
The blood pressure was measured in a calm situation using mercury sphygmomanometers afterat least 5 min of rest in the sitting position. The subjects were seated with the heart, cuff, and zero indicators on the manometer at the observer's eye level. All readings were taken in duplicate in the right arm. Appropriate size cuffs were used with a cuff width 40% of the mid-arm circumference as well as cuff bladders covering 80–100% of the arm circumference and approximately two-thirds of the length of the upper arm without overlapping. The procedure was explained to the subjects and the cuff inflated and deflated once; the first BP measured was not used in the analysis of this study.The readings at the first and the fifth Korotkoff phase were taken as the systolic blood pressure (SBP)and diastolic blood pressure (DBP), respectively. The average of the two time measurements was recorded and included in the analysis.3

B.P.13:	systolic(mmhg)	diastole(mmhg)
Normal	<120	<80
Prehypertension	120-139	80-89
Stage 1 hypertension	140-159	90-99
Stage 2 hypertension	>/=160	>/=100
Isolated systolic hypertension	>/=140	<90

5. DYSLIPIDEMIA12: Triglycerides, LDL cholesterol and HDL cholesterol were measured through biochemical methods.

TRIGLYCERIDES15:
Normal: <150 mg/dl
Borderline high: 150-199 mg/dl
High risk: >/= 200-499 mg/dl
Very high risk: >500 mg/dl

LDL CHOLESTROL:

<70 mg/dl	Therapeutic option for very high risk
<100 mg/dl	optimal
100-129 mg/dl	near optimal
130-159mg/dl	borderline high
160-189mg/dl	high
>190mg/dl	very high

HDL CHOLESTROL:

<40mg/dl	low
>60mg/dl	high

6. METABOLIC SYNDROME: 9
According to NCEP: ATP 111 2001 guidelines, metabolic syndrome is said to consist three or more of the following:

Central obesity:
Waist circumference for South Asian, Chinese, and Ethnic South &Central Americans

MEN = >/= 90 cm
WOMEN = > /= 80 cm

Hypertriglyceridemia: Triglycerides >/= 150 mg/dl or specific medication

Low HDL cholesterol : <40 mg/dl and <50 mg/dl respectively for males and females respectively, or specific medication

Hypertension:
Blood pressure >/= 130 mm systolic pressure or >/= diastolic or specific medication

Fasting plasma glucose >/= 100 mg/dl or specific medication or previously diagnosed type 2 diabetes.

As these risk factors are already assessed, metabolic syndrome in the cases could be determined.

6. SMOKING:
It was assessed by asking. Smokers can be divided into:

1. SMOKER: Adults who have smoked 10 cigarettes during their lifetime and currently smoke every day or some days.
2. NON- SMOKER: They are defined as never smokers or ex-smokers.
3. EX-SMOKER: They are defined as the patients with a history of less than 10 years of smoking or quitted smoking at least 20 years before.

7 .PHYSICAL ACTIVITY
Itwas measured in a self - reported manner through a questionnaire.1

8. FAMILY HISTORY:
Family history of cardiovascular risk factors was taken.

B.To assess knowledge and awareness of cardiovascular risk factors in these adolescents Awareness of cardiovascular risk factors was assessed by giving a questionnaire1.People not in a condition to solve it, were asked verbally in Hindi/Marathi.

C. Gender differences of cardiovascular risk factors were assessed.

STATISCAL ANALYSIS:
Statistical analysis was done using statistical software OpenEpi info version 2.3. Anova was used

ETHICAL ISSUES:
Written Informed consent was obtained from all subjects and confidentiality of data wasassured. The study has been approved by the institutional ethics committee.

OBSERVATIONS AND RESULTS:
In this study conducted in 2015, following observations and results were obtained.

The age group of adolescents studied was 12-18 years
The mean age of adolescents is found to be 15.6 ± 2.695. The percentage of males was 42% and females were 58%.

Table-1: Bmi In Cases, N =100

BMI CATEGORY	n (%)	MALES(%)	FEMALES(%)	
UNDERWEIGHT	11	5 (5)	6 (6)	
HEALTHY	72	35(35)	37 (37)	
OVERWEIGHT	17	2 (2)	15 (15)	pvalue<0.05
OBESE	0	0	0	

The above table shows that 17% adolescents were overweight, females outnumbering males (male:female ratio 7.5:1) and this difference was found to be statisticallysignificant.(p- value<0.05) . None of the study cases were found obese.

Table 2: Waist Circumference In Cases, N=100 (according To Idf Criteria For Central Adiposity)

WAIST CIRCUMFERENCE	n (%)
>90cm(Males)	9 (9)
>80cm(females)	24 (24)

This study showed that 24 females had waist circumference >80 cm and 9 males had waist circumference >90 cm. The difference was statistically significant. (p value<0.05)

Table-3: Fasting Blood Sugar In Cases: N =100

FASTING SUGAR LEVEL(mg/dl)	n (%)	MALES(%)	FEMALES(%)	
Normal(<100)	70	28(28)	42(42)	
Prediabetes (100-125)	30	14(14)	16(16)	pValue >0.05
Diabetes (>126)	0	0	0	

The above table shows that 1/3rd adolescents had impaired fasting blood glucose.More females with impaired fasting glucose were found than males (females:male ratio 8:7). However the difference was not statistically significant (p value>0.05). Overt diabetes was not found in the cases.

Table-4: Blood Pressure In The Cases, N=100

BLOOD PRESSURE CATEGORY	n(%)	MALES (%)	FEMALES (%)	
Normal(<120)	77(77)	32(32)	45(45)	
Prehypertension (120-139)	22(22)	10(10)	12(12)	pvalue >0.05
Stage-1 hypertension (140-159)	1(1)	0	1(1)	
Stage-2 hypertension (>/=160)	0	0	0	

It is seen that 22% adolescents were prehypertensives. No. of prehypertensive females predominated over males (female:male ratio 6:5).However the difference was not statistically significant. (p value> 0.05). Only one female was found to be overtly suffering from hypertension (stage-1.)

Table 5: Hdl In Cases: N=100

HDL LEVEL(mg/dl)	n (%)	MALES (%)	FEMALES (%)	
Low(<40)	7(7)	1 (1)	6 (6)	pvalue>0.05
Normal(40-60)	91(91)	40 (40)	51(51)	
High(>60)	2(2)	1 (1)	1 (1)	

It was found that 7% adolescents had low HDL. Only 1 male had low HDL whereas in females there were 7 cases.But the difference was not statistically significant. (p-value>0.05).

Table 6: Ldl In Cases, N=100

LDL LEVEL(mg/dl)	n (%)	MALES (%)	FEMALES (%)	
Optimal(<100)	69 (69)	29(29)	40 (40)	
Near optimal(100-129)	20 (20)	9 (9)	11 (11)	
Borderline high (130-159)	11 (11)	4(4)	7(7)	pvalue >0.05

1It was found that 11% of the adolescents had borderline high value for LDL.Females outnumbered males (females-n=7,males-n=4).However the difference was not statistically significant. (p value>0.05)

Table- 7: Triglycerides In Cases, N=100

LEVEL (mg/dl)	n (%)	MALES (%)	FEMALES (%)	P-VALUE
normal (<150)	83(83)	35(35)	48 (48)	
borderline high (150-199)	17(17)	7 (7)	10(10)	>0.05
high (200-449)	-	-	-	

In this study, 17% cases had borderline high triglycerides. Females outnumbered males (females-n=10, males- n=7), however this difference was not statistically significant.(p-value>0.05)

Table 8: Prevalance Of Metabolic Syndrome, N=100

MALES (%)	FEMALES (%)
2(2)	5(5)

p-Value>0.05

The above table shows that 7 % study population had Metabolic syndrome with predominance of females(females-n=5, males n=2).however the difference was not statistically significant (p-value >0.05)

Table- 9: No. Of Components Of Metabolic Syndrome In The Cases, N=100

NO. OF COMPONENTS OF METABOLIC SYNDROME	n (%)	MALES (%)	FEMALES (%)	p-VALUE
3	6(6)	2(2)	4(4)	>0.05
>3	1(1)	0(0)	1(1)	-

The study shows that 6% study population had 3 components of MetS (females-n=4 and males n=2). But the difference was not statistically significant (p-value>0.05) .Only 1 case in the study population had more than 3 components

Table 10: Physical Activity In Cases, N=100

NO. OF DAYS IN LAST WEEK CHILD WAS PHYSICALLY ACTIVE FOR ATLEAST AN HR PER DAY	n (%)	MALES (%)	FEMALES (%)	
0	19(19)	4(4)	15(15)	p-value<0.05
1-3	23(23)	5(5)	18 (18)	p - value<0.05
4-6	50(50)	28 (28)	22 (22)	
7	8(8)	5 (5)	3(3)	

This study shows that 19% adolescents were physically inactive for all days of the week.No. of females physically inactive on all the days outnumbered males (females- n=15, males-n=4) and this difference was statistically significant. (p-value <0.05)

Table 11:time Spent By The Adolescents In Sedentary Activities In A Usual Day, N=100

TIME SPENT IN SEDENTARY ACTIVITIES IN A USUAL DAY	n (%)	MALES (%)	FEMALES (%)	
<1	19(19)	15 (15)	4(4)	
1-2	13(13)	5(5)	8 (8)	
3-4	10(10)	3 (3)	7 (7)	
5-6	25(25)	11(11)	14(14)	
7-8	25(25)	5(5)	20 (20)	pvalue<0.05
>8	8(8)	3 (3)	5(5)	pvalue>0.05

It was found that 25% adolescents spent 7-8 hrs. in sedentary activities in a usual day and 8% of them spent more than 8 hrs. per day in sedentary activities. Females were found to indulge in sedentary activities more than males. (females- n=20, males- n=5(7-8 hrs.)) and this difference was found to be statistically significant.(p-value<0.05)

Table 12: Awareness Regarding Risk Factors And Preventive Strategies Of Heart Disease In Cases, N=100

AWARENESS	GRADE	n (%)
<50%	Inadequate	26(26)
50-75%	moderately adequate	48(48)
>50%	Adequate	26(26)

Considering the total knowledge scores, 26% adolescents had adequate knowledge scores while 48%of the adolescents had moderately adequate scores and 26% of them had inadequate scores

Table- 13: Family History Of Cardiovascular Risk Factors, N=100

FAMILY HISTORY	n(%)
CHD	7(7)
OBESITY	2(2)
DIABETES MELLITUS	8(8)
HYPERTENSION	9(9)

It is found that 7% adolescents had the family history of CHD.Only 2% of them had that of obesity.8% and 9% had that of diabetes mellitus and hypertension respectively.

DISCUSSION:

It is found that that there is a high prevalence of risk factors for heart disease in adolescents worldwide. In today's world most deaths are attributable to non- communicable diseases and just over half of these are a result of CVD.It is estimated that there were approximately 46.9 million patients with cardiovascular disease in India during the year 2010.An estimated 2.33 million people died of CVD during 2008.Compared with all the countries India suffers highest loss in in potentially productive years of life due to deaths from CVD in people aged 35-64 years8.Hence it is very important to track the risk factors since adolescence so that preventive measures can be taken to combat it.Overweight, high blood pressure, high waist circumference, prediabetes, insufficient physical activity are among the risk factors concentrated in this study. Out of the 100 cases, 30% are prediabetic .Hence; prediabetes is the most prevalent risk factor. Prehypertension was prevalent among 22% adolescents. Only one case of stage -1 hypertension was encountered.17% overweight cases are encountered.7% adolescents had low HDL and 11% had high LDL.Out of the total 100 cases, only 26% had adequate knowledge regarding cardiovascular risk factors. A few studies from around the world have documented a very high prevalence of cardiovascular risk factors. However, data of knowledge of risk factors is limited.1

Worldwide, overweight /obesity epidemic has been the driving force for CVD and metabolic syndrome. In this study, 17% cases are found to be overweight.Females outnumbered males (females, n=15, males n=2) and the difference is found to be statistically significant (p-value <0.05). No case of obesity was found. .The findings are not so consistent with the study conducted by Grace Mary GEORGE et al 1where 9.5% &11.5% were overweight and obese respectively. In the study conducted by Sheila S Barret et al 61/3 adolescents were found overweight. In the study conducted by Ashleigh et al it was shown that overweight/obesity 12.4% and14.3% respectively. While the study performed by Gerda Maria Hass et al5 showed that 1/3 females and ½ males were overweight.

Waist circumference is an important component of the most recent and frequently applied diagnostic criteria of metabolic syndrome .In this study, Waist circumference of >90 cm was found in males- n=9 while >80cm in females - n=24 and the difference was statistically significant (p-value<0.05) .In the study conducted by Rajeev Gupta et al 2w.c. 27.4 % males had waist circumference >80cm and 15.6% females had >90cm.

Diabetes Mellitus is the leading cause of mortality and morbidity world over. It is expected to continue as the major health problem owing to its serious complications. Top 5 countries with highest prevalence are India China, US, Indonesia and Japan.It is anticipated that by the year 2030 the number of diabetics globally will double from the present figure of 250 million. In India, its incidence is estimated at 7 % of adult population. Largely due to genetic susceptibility combined with changing lifestyle of low activity high calorie diet in the growing middle class Indians. In the present study,Prediabetes is found amongst 30% adolescents. Females predominated over males (females, n=16, males - n=14). However the difference is not statistically significant (p-value>0.05) No case of frank diabetes was found. The findings of prediabetes are more compared to those obtained from the study of Ashleigh et al where prediabetes/diabetes were 15%.Values obtained from the study conducted by Rajeev Gupta et al2 showed that 1% males and 0.4% females are diabetic.

The blood pressure is the single most useful test for identifying individuals at a high risk of developing CHD.Hypertension accelerates the atherosclerotic process8.It increases the risk of cardiovascular diseases by 60%.Hence it becomes very useful to record it at an early stage and start the preventive measures if it is raised .In this study, Prehypertension was found among 22% adolescents. Females outnumbered males (females- n=12, males-n=10) .However this difference was not statistically significant.(p-value >0.05). Only 1 female case of stage-1 hypertension was encountered who was advised to attend the hypertension clinic. The findings were different than those of the previous study by Grace Mary George et al1 where 12.4% cases were prehypertensive, stage-1 hypertension 6.8% and stage-2 hypertension-1.4%.While study conducted by Ashleigh et al4 showed prehypertension/hypertension to be 14%The study conducted by Rajeev Gupta et al2 showed that 5.6% and 3.1% males and females respectively were hypertensive. While study conducted by Gerda Marie Hass et al 5showed 14.6% adolescents to be prehypertensive.

Abnormalities in plasma lipoproteins and derangements in lipid metabolism rank among the most firmly established and best understood cardiovascular risk factors.Moreover the phenotype of low HDL and high triglycerides is common in India and poses a risk factor in cardiovascular diseases. In this study, Low HDL is found in 7% cases. (females- n=6, males- n=1). Borderline high LDL is found in 11% cases (females-n=7, male-n=4). Borderline high triglycerides is found in 17 % cases(females-n=10 , males- n=7)Females predominated over males in all the three but the difference is not statistically significant .(p-value >0.05) In the study done by Ashleigh et al4 6% cases had low HDL and 22% had high/borderline LDL. In the study done by Gerda Maria et al 4 11.2% and 11.8% males and females were recorded to have borderline high LDL. 2.1% males and 2.3% females had low HDL. Rajeev Gupta et al2 in their study found that 16.2% and 49.7% males and females respectively had low HDL .9.4% males and 8.9% females had borderline high LDL.Hypertrigl yceridemia (>150 mg/dl) in 9.7 % and 6 % in males and females respectively.

Sedentary life style is associated with a greater risk of development of early CHD.There is an evidence that regular exercise can increase HDL and decrease body weight and blood pressure which are beneficial to cardiac health 8. In this study, 19% adolescents were found to indulge in no physical activity for at least an hour per day in previous week (females- n=15 ,males- n=4). No. Of hours spent in sedentary activities was also calculated.25% of the cases spent 7-8 hrs. in sedentary activities where females predominated over males (females-n=20 , males-n=5) and this difference was statistically significant (p-value <0.05)while 8%spent >8 hours in sedentary activities in the previous week wherein females were predominant too (females-n=5 , males ,n=3)But this difference was not statistically significant (p- value >0.05) .In the study done by Grace Mary George et al 1 4.8% adolescents indulged in no physical activity for at least an hour per day in the previous week .In the same study15% cases spent >8 hours in sedentary activities, while 29% of them spent 7-8 hours in sedentary activities.

In the present study, fruits and vegetables were consumed daily by 10% and 97% individuals respectively. The findings are not consistent with that obtained from the study conducted by Grace Mary George et al1 showed 42% and 76% individuals consuming fruits and vegetables respectively. Angelina Maria et al7 showed that there was low consumption of fruits and vegetables in their study population

In the present study, awareness about cardiovascular risk factors was found to be adequate in 26% adolescents and inadequate in 26% adolescents .While Grace Mary George et al 1in their study observed that 25.4% adolescents had adequate knowledge of risk factors while 20.21% had inadequate knowledge.

THE METABOLIC SYNDROME (syndrome X) consists of a constellation of metabolic abnormalities that confer increased risk of CVD.and diabetes mellitus. Greater industrialization worldwide is associated with rising rates of obesity, which is anticipated to dramatically increase prevalence of metabolic syndrome.11No. Of components of metabolic syndrome in the cases is calculated in the study. In this study, Metabolic syndrome was found to be prevalent in 7 % cases where females outnumbered males.(females- n=5 ,males-n=2).However the difference is not statistically significant (p-value >0.05) It is found that 6% have three components where females predominated over males(females, n=4 and males, n=2) and this difference is not statistically significant (p-value >0.05) .Only one female individual of the 100 study cases was found to have all the four components. Prediabetes is found to be the most common component while low HDL the least common component. Patricia Khashayam et al 3 in his study on the metabolic risk factors found that 2.5 % study population hadMetabolic syndrome. 2.15% had three components and

0.3% had all the four components of metabolic syndrome. In contrast our study, low HDL was the most common component while high blood pressure was the least common component in their study. In their study, Rajeev et al 2 encountered3.4 %males and 3.6% females with metabolic syndrome.

It has been estimated that in countries where smoking is a widespread habit, it is responsible for 25% deaths in less than 65 years of age in men.Ciggaretes seem to particularly be important in causing sudden deaths from CHD especially in men below 50 years of age. 8Smoking was prevalent among 2% adolescents who were males. In the study done by Grace Mary George etal1 it was reported that 5 % of them consumed any form of tobacco .Rajeev Gupta et al2 in their study ascertained 11.8% males and 1.4% females to be indulging in smoking or tobacco use.

Family history of cardiovascular disease was reported amongst 7 % adolescents. This is quite lower as compared to the study done by Grace Mary George et al 1 where the value was found to be 20%.

CONCLUSION:

There is an increasing worldwide epidemic of non- communicable diseases which is taking a serious toll on the health of the population. Cardiovascular diseases and their risk factors hence need to be studied appropriately.

In the present study we conclude that cardiovascular risk factors have a high frequency distribution among adolescents(30%) with a high female preponderance(female: male ratio 2.5:1). Prediabetes was the singlemost important and preventable risk factor affecting 30% cases. Furthermore , awareness of these risk factors was present in only 1/4th (=26%) of the adolescents.

REFERENCES

1. Grace Mary George ,Kamlesh Kumari Sharma,Sivasubramaniam Ramakrishnan, Sanjeev kumar A study of cardiovascular risk factors and its knowledge among school children in Delhi IHJ may- june 2014 ,263-271
2. Rajeev Gupta ,Anoop Mishra, ,Naval K Vikram ,Dimple Kondal, Shaon Sen Gupta ,Aachu Agrawal and R M Pandey ,Younger escalation of cardiovascular risk factors in Asian Indian subjects;BMC Cardiovascular disorders,9:28:1-12
3. Patricia Khashayar, Ramin Heshmat, Mostafa Qorbani, Mohammad Esmaeil Motlagh,, Tahere Aminaee, Gelayol Ardalan, Yasin Farrokhi-Khajeh-Pasha, Mahnaz Taslimi, Bagher Larijani, and Roya Kelishadi Metabolic Syndrome and Cardiovascular Risk Factors ina National Sample of Adolescent Population in the Middle Eastand North Africa: The CASPIAN III StudyInternational Journal of EndocrinologyVolume 2013, Article ID 702095,1- 8
4. Ashleigh L. May,, Elena V. Kuklina,, and Paula W. Yoon, Prevalence of Cardiovascular Disease Risk Factors among US Adolescents, 1999-2008,Pediatrics 2012:1035-1041
5. Gerda Maria Haas , Klaus Georg Parhofer and Peter Schwandt; Prevalance of cardiovascular disease risk factors in migrants participating in the PEP family study , Nuremburg International Journal of Preventive Medicine v.1(1);Winter 2010;1-103
6. Barret SC, Huffman FG ,Johnson P et al .A cross sectional study of Jamaican adolescents' risk for type 2 diabetes and cardiovascular diseases BMJ open 2013;3:1-10
7. Angélica María Ochoa Avilés , cardiovascular risk factors among Ecuadorian adolescents: a school based health promotion intervention, Ghent university academic bibliography,2015:172 pages.
8. Parks textbook of social and preventive medicine, Epidemiology of chronic non communicable diseases and conditions: 337-340
9. NCEP: ATP III 2001 AND IDF criteria for metabolic syndrome, Harrison: Principles of Internal Medicine, 1510
10. National institute of health,National heart lung and blood institute.Clinical guidelines on identification evaluation and treatment of overweight in adults U.S, Dept. of health and human general public health-1998 Harrison 631
11. Harrison's principles of internal medicine, The Metabolic Syndrome: 1509
12. NCEP expert panel on determination evaluation and treatment of high blood cholesterol in adults JAMA 2001 285, 2486-97 .Implication of recent trials for NCEP adult treatment panel 111 guidelines.SM Grundy et al for the Coordinating committee of NCEP circulation 110:227.2004 Harrison 3600
13. Chobalmin et al Harrison 2047
14. American Diabetes association 2007 .Harrison 2968
15. NCEP ATP III Risk classification of triglycerides:JAMA 2001; 285:2486