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Original research article

To study the risk factors of cardio metabolic abnormalities and metabolic syndrome among adolscent population

[1]Dr. Prashant Sitaram Chandankhede, [2]Dr. Nitin Kamble
[1]Assistant Professor, Biochemistry, SSIMS, Bhilai, Chhattisgarh, India
[2]Associate Professor, Community Medicine, SSIMS, Bhilai, Chhattisgarh, India

Corresponding Author:
Dr. Prashant Sitaram Chandankhede (prashantchandankhede966@gmail.com)

Abstract

Background: The cardio-metabolic abnormalities are the cardio-metabolic risk factors including abdominal obesity, hypertension, dyslipidemia, hyperglycemia. The presence of overweight and cardio metabolic abnormalities are more common in higher socioeconomic group which is related with difference in lifestyle.

Aim: To study the risk factors of cardio metabolic abnormalities and metabolic syndrome among adolescent population.

Material and Methods: A cross sectional study was carried out in rural area of Primary Health Centre. All adolescent in the age group of 10-19 years of Primary Health Centre, were included in study.
Considering prevalence of one or more cardio-metabolic abnormality to be 67.7% among adolescents,[5] sample size of 369 was required at α-error=5%, non-response rate 10%.

Result: Out of 405 subjects we found 10.6 % of subjects had family history of obesity, 5.9% of subjects had family history of hypertension and 3.2 % of subjects had family history of Diabetes. In study population, 5.4 % of subjects were found to overweight group (85^{th}-<95^{th} percentile), 59.3% had normal BMI (<85^{th} percentile) and 35.3% were thin group (<5^{th} percentile).[59]

Conclusion: The early identification of cardio metabolic risk factors can help with an attempt to prevent or delay metabolic syndrome, diabetes and cardiovascular disease.
The adolescent from affluent family, family history of obesity, hypertension and diabetes are at high risk, thus, need to modify their lifestyle.

Keywords: Metabolic abnormalities, metabolic syndrome, adolscent population

Introduction

The cardio-metabolic abnormalities are the cardio-metabolic risk factors including abdominal obesity, hypertension, dyslipidemia, hyperglycemia. The constellations of these risk factors are responsible for metabolic syndrome. The final products of this syndrome which affect the cardiovascular system are the endothelial dysfunction, atherosclerosis and coronary artery disease [3]. Person with metabolic syndrome have a three fold greater risk of coronary heart disease and stroke and more than four fold risk of cardiovascular mortality [4]. The presence of overweight and cardio metabolic abnormalities are more common in higher socioeconomic group which is related with difference in lifestyle.

Material and Methods

Study design and study population

A cross sectional study was carried out in rural area of Primary Health Centre. All adolescent in the age group of 10-19 years of Primary Health Centre, were included in study. The subjects who were not willing to remain fasting or were not willing to participate in the study were excluded.

Sample size and their selection

Considering prevalence of one or more cardio-metabolic abnormality to be 67.7% among adolescents [5], sample size of 369 was required at α-error=5%, non-response rate 10%. The subjects were selected by using simple random sampling. The sampling frame available with department of Community Medicine was used for drawing the sample.

Data collection

The study was commenced after obtaining clearance from the Institutional Human Ethical Committee. The subjects were selected after obtaining written informed consent from them. Detailed history was

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taken including past and present status of health of parent, occupation, education, dietary intake and addiction of subjects etc. Using pre-designed proforma anthropometric measurement, and laboratory investigation like fasting blood glucose level, lipid panel compromising total cholesterol, triglyceride, high density lipoprotein, low density lipoprotein, and very low-density lipoprotein were noted in the pretested proforma.

Statistical Analysis

For this purpose, EPI-INFO software version 6.04 & Health Watch Pro version.
3.1 software was used. Chi square test was applied to test the significance of difference between two group and p value < 0.05 considered as significant.

Results

Family history of obesity, hypertension and diabetes in study population

Out of 405 subjects we found 10.6% of subjects had family history of obesity, 5.9% of subjects had family history of hypertension and 3.2% of subjects had family history of Diabetes.

Table 1: Family history of obesity

Family history of obesity	Number of subjects	Percentage
Yes	43	10.6
No	362	89.4
Total	405	100

Table 2: Family history of Hypertension

Family history of Hypertensive	Number of subjects	Percentage
Yes	24	5.9
No	381	94.1
Total	405	100

Table 3: Family history of Diabetes

Family history of Diabetes	Number of subjects	Percentage
Yes	13	3.2
No/Don't know	392	96.8
Total	405	100

Table 4: Distribution of impaired fasting glucose

Impaired fasting glucose (mg/dl)	Number of subjects	Prevalence
≥100	56	13.8
<100	349	86.2
Total	405	100

[FBS ≥ 100mg/dl is considered as impaired fasting glucose.]

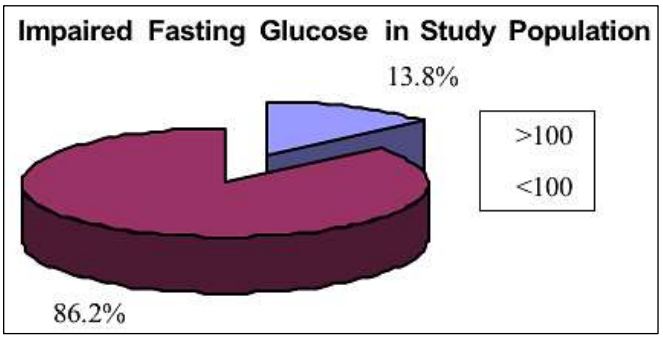

Fig 1

BMI in study population

In study population, 5.4 % of subjects were found to overweight group (85th-<95th percentile), 59.3% had normal BMI (<85th percentile) and 35.3% were thin group (<5th percentile) [59]. None of the participants was obese.

Table 5: BMI distribution

BMI (percentile)	Number of subjects	Percentage
Overweight	22	5.4

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Normal	240	59.3
Thin	143	35.3
Total	405	100

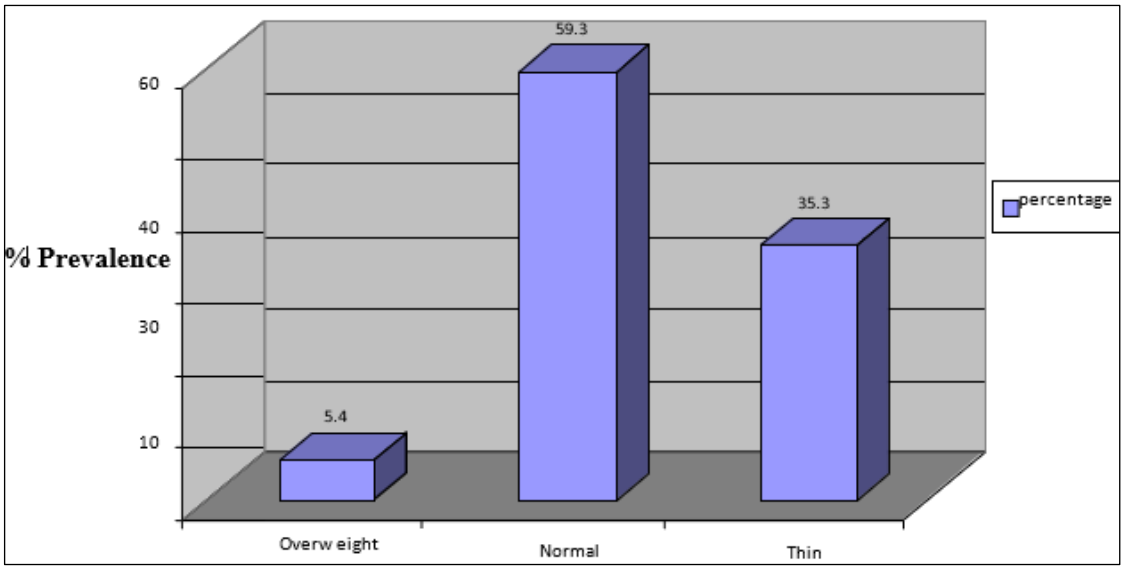

Fig 2: BMI distribution in study population

High blood pressure in study population

Among the study subjects, 24.4% had high blood pressure levels, i.e. ≥90th percentile for age, sex and height.

Table 6: Distribution of high blood pressure

High blood pressure (percentile)	Number of subjects	Prevalence
≥90th	99	24.4
< 90th	306	75.6
Total	405	100

[≥ 90th percentile is considered as high blood pressure]

Discussion

The cardio-metabolic abnormalities are the cardio metabolic risk factors including abdominal obesity, Family history of obesity, hypertension and diabetes. It was found that increase in BMI predisposes the adolescent individual to higher blood pressure and subsequently hypertension. A similar finding was also reported elsewhere in India, Hungary [171] and France [172]. Higher blood pressure and increase in BMI are the part of metabolic syndrome.

In the present study, metabolic syndrome was significantly associated with family history of obesity (p<0.05). We found that the prevalence of metabolic syndrome was significantly higher being 25% among those with family history of hypertension as against 8.9% among those without family history of hypertension (p<0.05). Similarly, the prevalence of metabolic syndrome was significantly higher being 18.6% among those with family history of obesity as against 8.8% among those without family history of obesity (p<0.05).

In the present study, the prevalence of impaired fasting glucose was 13.8%. Balagopal *et al.* [206] reported 5.1% prevalence of pre-diabetes in youth aged 10-17 years and prevalence of diabetes and pre-diabetes among adults were 5.1% and 13.5%, respectively in India, while the Williams *et al*. in his study found that the prevalence of impaired fasting glucose in US adolescent was 7.0% [207]. A comparatively higher prevalence of impaired fasting glucose reported in our study can be attributed to difference in study setting and population. It can also be due to difference in definition used for impaired fasting glucose.

Conclusion

Therefore, we conclude that there is definitely alarming situation as per prevalence of cardio metabolic abnormalities and metabolic syndrome are concerned, even in rural communities. The early identification of cardio metabolic risk factors can help with an attempt to prevent or delay metabolic syndrome, diabetes and cardiovascular disease.

The adolescent from affluent family, family history of obesity, hypertension and diabetes are at high risk, thus, need to modify their lifestyle.

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