

Assessment of changes in risk factors of metabolic syndrome**Amit Upadhyay¹, Dushyant Kumar², Abhishek Sharma³, Sonal Garg^{4*}**¹*Assistant Professor, Department of Physiology, Mata Gujri Memorial Medical College, and Lions Seva Kendra Hospital Kishanganj, Bihar, India*²*Assistant Professor, Department of Physiology, K. D. Medical College, Hospital & Research Center, Mathura, UP, India*³*Assistant Professor, Department of Physiology, S.N. Medical College & Hospital, Agra, UP, India*⁴*Assistant Professor, Department of Physiology, MMIMSR, Mullana, Ambala, Haryana, India***Received: 14-07-2021 / Revised: 09-08-2021 / Accepted: 28-09-2021****Abstract**

Background: Metabolic syndrome is defined by a constellation of interconnected physiological, biochemical, clinical, and metabolic factors that directly increases the risk of cardiovascular disease, type 2 diabetes mellitus and all causes mortality. The present study was conducted to assess changes in risk factors of metabolic syndrome. **Materials & Methods:** 80 subjects in age ranged 20-40 years of both genders were included. Height, weight, body mass index and various risk factors for metabolic syndrome such as waist circumference, blood pressure, fasting blood sugar, triglycerides and high-density lipoprotein were assessed at baseline and after one year. International Physical Activity Questionnaire (IPAQ) was used to objectively assess physical activity levels of the participants. **Results:** Total score of walking (MET-minutes/week) was 452.6 and 832.9, total moderate activity (MET-minutes/week) was 432.5 and 625.4, total vigorous activity (MET-minutes/week) was 80.4 and 124.6, total physical activity (MT-minutes/week) was 1214.5 and 1854.2, sitting total (minutes/week) was 3650.2 and 2652.8 and average sitting minutes/day was 524.0 and 375.2. The difference was significant ($P < 0.05$). **Conclusion:** There was reduction in waist circumference and triglyceride level over 1 year.

Keywords: Blood pressure, fasting blood sugar, Metabolic syndrome

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Introduction

Metabolic syndrome is defined by a constellation of interconnected physiological, biochemical, clinical, and metabolic factors that directly increases the risk of cardiovascular disease, type 2 diabetes mellitus, and all cause mortality[1]. Insulin resistance, visceral adiposity, atherogenic dyslipidemia, endothelial dysfunction, genetic susceptibility, elevated blood pressure, hypercoagulable state, and chronic stress are the several factors which constitute the syndrome. Metabolic syndrome (MS) is diagnosed in an individual if any three of the five risk factors for metabolic syndrome are present[2]. The five risk factors for MS include i) Waist circumference more than 80 cm in females and more than 90 cm in males ii) Systolic blood pressure more than or equal to 130 and/ or diastolic blood pressure more than or equal to 85 mm of mercury iii) Fasting blood glucose more than or equal to 100 mg/dl iv) Serum triglycerides more than or equal to 150 mg/dl v) Serum HDL less than 40 mg/ dl in males and less than 50 mg/dl in females[3].

Worldwide prevalence of MetS ranges from <10% to as much as 84%, depending on the region, urban or rural environment, composition (sex, age, race, and ethnicity) of the population studied, and the definition of the syndrome used[4]. In general, the IDF estimates that one-quarter of the world's adult population has the MetS. Higher socioeconomic status, sedentary lifestyle, and high body mass index (BMI) were significantly associated with MetS[5]. The present study was conducted to assess changes in risk factors of metabolic syndrome.

Materials & methods

The present study comprised of 80 subjects in age ranged 20-40 years of both genders. All were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. Height, weight, body mass index and various risk factors for metabolic syndrome such as waist circumference, blood pressure, fasting blood sugar, triglycerides and high-density lipoprotein were assessed at baseline and after one year. International Physical Activity Questionnaire (IPAQ) was used to objectively assess physical activity levels of the participants. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

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Results

Table 1: Comparison of anthropometric & biochemical variables

Parameters	At baseline	1 year	P value
Weight (Kg)	56.2	57.9	0.80
BMI (Kg/m ²)	20.3	21.8	0.91
Waist circumference (cm)	81.2	74.5	0.02
Systolic blood pressure (mm/Hg)	122.4	126.2	0.87
Diastolic blood pressure (mm/Hg)	76.2	82.6	0.09
Fasting glucose (mg/dl)	86.2	92.4	0.01
High density lipoprotein (mg/dl)	46.2	49.0	0.12
Triglycerides (mg/dl)	112.1	96.2	0.04

Table I, graph I shows that mean weight at baseline was 56.2 Kg and after 1 year was 57.9 Kg. BMI (Kg/m²) was 20.3 and 21.8, waist circumference (cm) was 81.2 and 74.5, systolic blood pressure (mm/Hg) was 122.4 and 126.2, diastolic blood pressure (mm/Hg) was 76.2 and 82.6, fasting glucose (mg/dl) was 86.2 and 92.4, high density lipoprotein (mg/dl) was 46.2 and 49.0 and triglycerides (mg/dl) was 112.1 and 96.2 at baseline and after 1 years respectively. The difference was significant (P < 0.05).

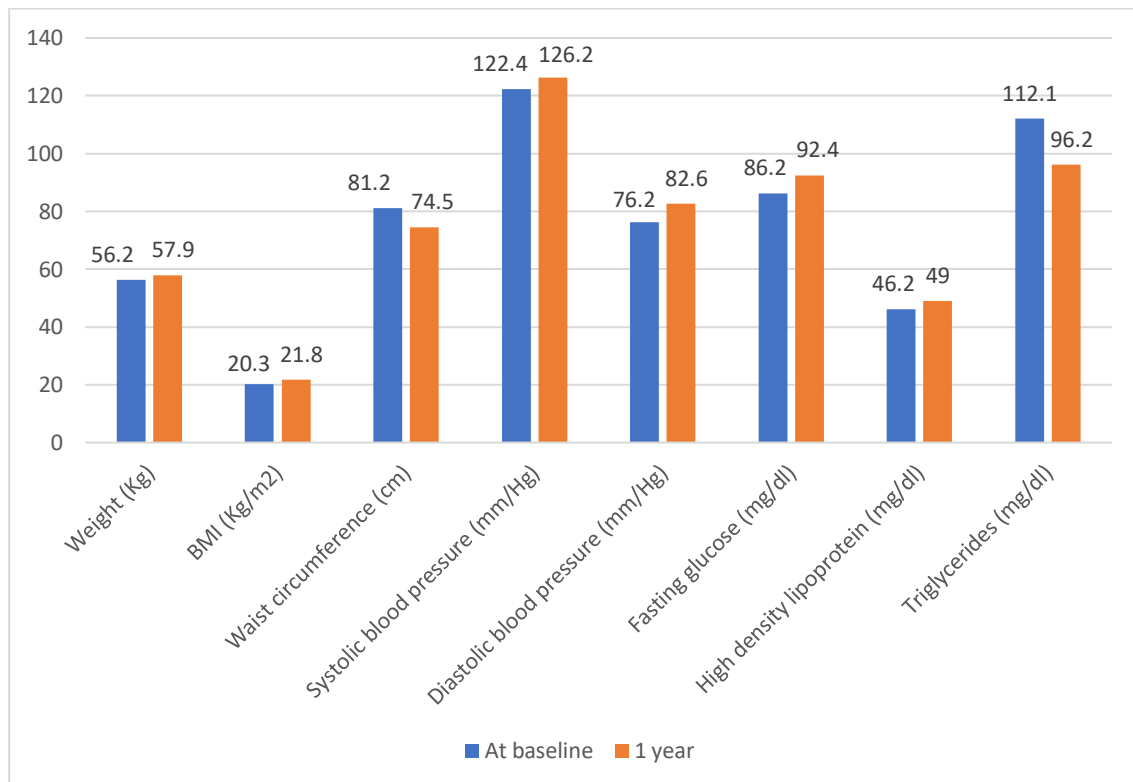


Fig 1: Comparison of anthropometric & biochemical variables

Table 2: Assessment of IPAQ scores

IPAQ scores	At baseline	1 year	P value
Total Score of walking (MET-minutes/week)	452.6	832.9	0.62
Total Moderate Activity (MET-minutes/week)	432.5	625.4	0.91
Total Vigorous Activity (MET-minutes/week)	80.4	124.6	0.82
Total Physical Activity (MT-minutes/week)	1214.5	1854.2	0.74
Sitting total (minutes/week)	3650.2	2652.8	0.21
Average sitting minutes/day	524.0	375.2	0.01

Table II, graph II shows that total score of walking (MET-minutes/week) was 452.6 and 832.9, total moderate activity (MET-minutes/week) was 432.5 and 625.4, total vigorous activity (MET-minutes/week) was 80.4 and 124.6, total physical activity (MT-minutes/week) was 1214.5 and 1854.2, sitting total (minutes/week) was 3650.2 and 2652.8 and average sitting minutes/day was 524.0 and 375.2. The difference was significant (P < 0.05).

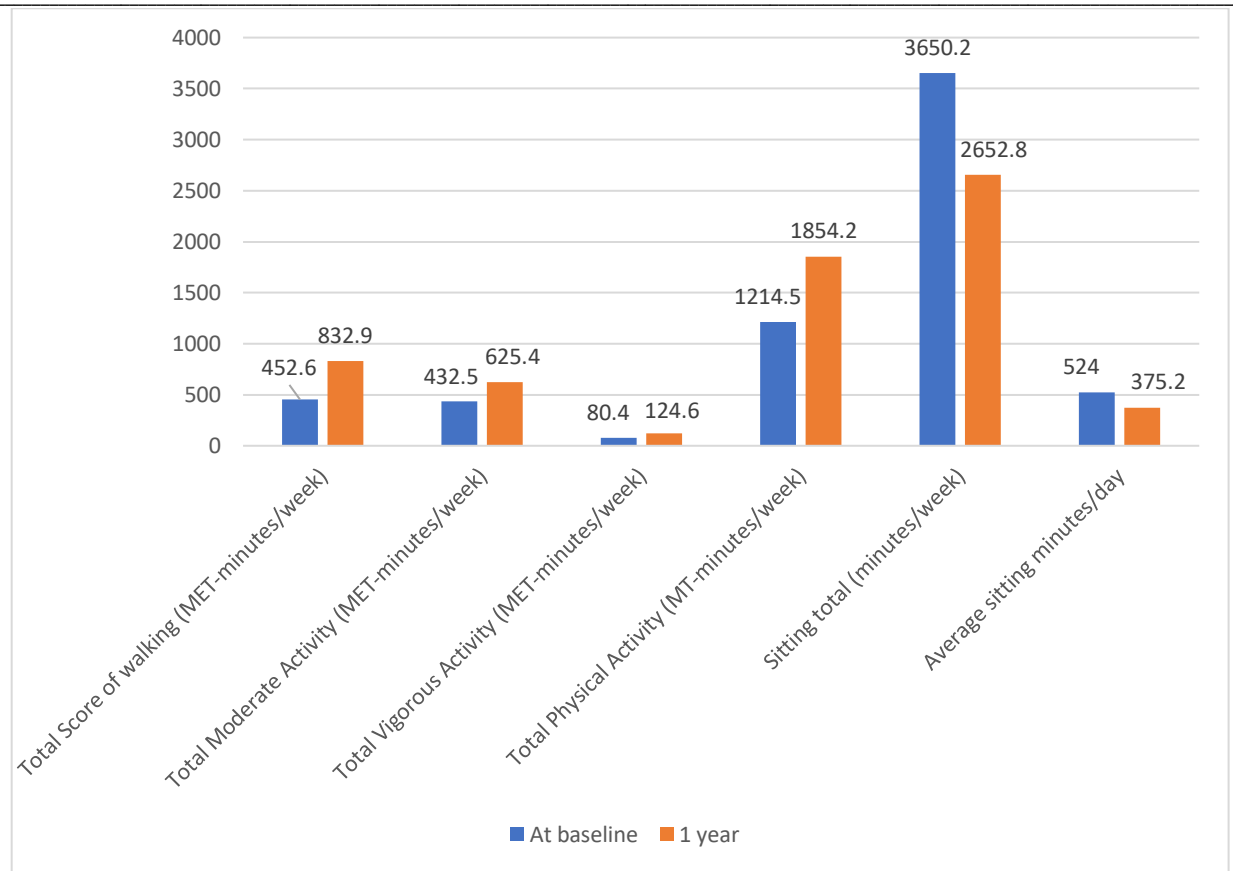


Fig 2:Assessment of IPAQ scores

Discussion

The metabolic syndrome (MetS) is a major and escalating public-health and clinical challenge worldwide in the wake of urbanization, surplus energy intake, increasing obesity, and sedentary life habits[6]. MetS confers a 5-fold increase in the risk of type 2 diabetes mellitus (T2DM) and 2-fold the risk of developing cardiovascular disease (CVD) over the next 5 to 10 years[7]. Further, patients with the MetS are at 2- to 4-fold increased risk of stroke, a 3- to 4-fold increased risk of myocardial infarction (MI), and 2-fold the risk of dying from such an event compared with those without the syndrome regardless of a previous history of cardiovascular event[8]. This dyslipidemia is characterised by a spectrum of qualitative lipid abnormalities reflecting perturbations in the structure, metabolism, and biological activities of both atherogenic lipoproteins and antiatherogenic HDL-C which includes an elevation of lipoproteins containing apolipoprotein B (apoB), elevated TGs, increased levels of small particles of LDL, and low levels of HDL-C. Insulin resistance leads to an atherogenic dyslipidemia in several ways[9]. The present study was conducted to assess changes in risk factors of metabolic syndrome.

In present study, mean weight at baseline was 56.2 Kg and after 1 year was 57.9 Kg. BMI (Kg/m²) was 20.3 and 21.8, waist circumference (cm) was 81.2 and 74.5, systolic blood pressure (mm/Hg) was 122.4 and 126.2, diastolic blood pressure (mm/Hg) was 76.2 and 82.6, fasting glucose (mg/dl) was 86.2 and 92.4, high density lipoprotein (mg/dl) was 46.2 and 49.0 and triglycerides (mg/dl) was 112.1 and 96.2 at baseline and after 1 years respectively. Bhagat et al[10] evaluated changes in risk factors of metabolic syndrome after one year of its identification in young college going students of an urban Northern India population. Out of 88 participants, 16 participants were diagnosed with MS at baseline but after one year the number reduced to 8. Percentage decrease in triglyceride levels (13.5%) was maximum followed by decline in waist circumference

(8.9%) fasting blood glucose showed an increase by 6.6%. However, HDL, blood pressure, weight and BMI showed no significant change after one year. 70.6% of participants showed reduction in WC followed by reduction in fasting blood glucose and triglyceride levels of 66.7% participants. Elevation of HDL levels was observed in 38.5% of the participants. Thus there was least improvement in HDL in the study population after one year. The increase in IPAQ physical activity scores after one year as compared to baseline was not statistically significant but the total sitting and average sitting time showed a statistically significant decline after one year.

We observed that total score of walking (MET-minutes/week) was 452.6 and 832.9, total moderate activity (MET-minutes/week) was 432.5 and 625.4, total vigorous activity (MET-minutes/week) was 80.4 and 124.6, total physical activity (MT-minutes/week) was 1214.5 and 1854.2, sitting total (minutes/week) was 3650.2 and 2652.8 and average sitting minutes/day was 524.0 and 375.2. Maison et al[11] conducted a prospective population-based cohort study of 937 individuals aged 40–65 years who underwent oral glucose tolerance testing on two occasions at 4.5-year intervals. Changes in the components of the metabolic syndrome were analyzed by principal component analysis in the entire population and in a subgroup of 471 individuals who did not receive pharmaceutical therapy for hypertension and dyslipidemia. Principal component analysis identified three independent factors in men: a blood pressure factor (systolic and diastolic blood pressure and BMI), a glucose factor (fasting and 120-min post-load glucose, BMI, waist-to-hip ratio [WHR], and fasting insulin level), and a lipid factor (triglycerides and HDL cholesterol, BMI, WHR, and fasting insulin level). In women, an additional factor was identified, which included BMI, WHR, fasting insulin, and triglycerides. Analysis of the contribution of these variables to the different subdimensions indicated that BMI was the central feature of the syndrome in both sexes.

We found that total score of walking (MET-minutes/week) was 452.6 and 832.9, total moderate activity (MET-minutes/week) was 432.5 and 625.4, total vigorous activity (MET-minutes/week) was 80.4 and 124.6, total physical activity (MET-minutes/week) was 1214.5 and 1854.2, sitting total (minutes/week) was 3650.2 and 2652.8 and average sitting minutes/day was 524.0 and 375.2. Mohan et al[12] reported isolated lipid abnormalities in 47 to 51% in rural-urban non diabetic cohort essentially highlighting the low HDL and elevated Triglycerides. The classical Indian lipid triad is low HDL, elevated triglyceride and elevated LDL cholesterol is the most common finding in most other Indian studies.

Conclusion

Authors found that there was reduction in waist circumference and triglyceride level over 1 year.

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