

## COMPARATIVE STUDY ON EFFECT OF LIFE STYLE ON LEFT VENTRICULAR FUNCTION BETWEEN SEDENTARY AND NONSEDENTARY INDIVIDUALS

Piyush makwana \*, Anju Mehta \*\*, J.M. Jadeja \*\*\*

\*Tutor, Dept of Physiology, GMERS Medical College, Himmatnagar, \*\*Additional Professor, Dept of Physiology, B.J.Medical College, Ahmedabad, Gujarat, \*\*\*Professor and Head, Dept of Physiology, B.J.Medical College, Ahmedabad, Gujarat

**Abstracts: Background:** A sedentary life style includes less than 150 minutes of moderate physical activity or less than 60 minutes of vigorous physical activity per week<sup>1</sup>. It also refers to any waking activity characterized by energy expenditure  $\leq 1.5$  metabolic equivalents and a sitting or reclining posture<sup>7</sup>. Sedentary lifestyles increase all causes of mortality, double the risk of cardiovascular diseases, diabetes, and obesity, and substantially increase the risks of colon cancer, high blood pressure, osteoporosis, depression and anxiety<sup>8,9</sup>. In the present study we have compared left ventricular function between sedentary and nonsedentary subjects. **Method:** Total 150 healthy male subjects were included in study out of which 50% subjects were living sedentary life and 50% subjects were living nonsedentary life style. Cross sectional study was conducted in which history taking, physical examination and cardiovascular parameters and left ventricular function parameters were taken. **Result:** The observation revealed that there was significant difference between cardiovascular parameters and left ventricular function parameters between sedentary and nonsedentary group. **Conclusion:** lower value of cardiac output, stroke volume and end diastolic volume in sedentary subjects compared to nonsedentary subjects predisposes them to cardiovascular morbidity and mortality.

**Key Words:** Stroke volume, Cardiac output, End diastolic volume, Sedentary and nonsedentary life style.

**Author for correspondence:** Piyush Makwana, Tutor, Department of Physiology, GMERS Medical College, Himmatnagar. E-mail: mpiyush007@gmail.com

### Introduction:

A sedentary lifestyle is a type of lifestyle with no or irregular activity. It is a mode of living in which a person, an adult or child, does not engage in sufficient physical activity or exercise for what is generally considered healthy living<sup>7</sup>. A sedentary life style includes less than 150 minutes of moderate physical activity or less than 60 minutes of vigorous physical activity per week. It also refers to any waking activity characterized by an energy expenditure  $\leq 1.5$  metabolic equivalents and a sitting or reclining posture<sup>1</sup>. Increasing sedentary lifestyle combined with the growing use of technology in daily life is causing higher levels of physical inactivity among persons of all ages, both in developed and developing countries. In 2008 according to United States American National Health Interview Survey (NHIS) 36% of adults were considered inactive, 59% of adults had never participated in vigorous physical activity lasting more than 10 minutes per week.<sup>17</sup> In countries around the world between 60% and 85% of adults are simply not active enough to benefit their health.<sup>18</sup> Lack of exercise causes muscle atrophy,

i.e. shrinking and weakening of the muscles and accordingly increases susceptibility to physical injury. Additionally, physical fitness is correlated with immune system function; a reduction in physical fitness is generally accompanied by a weakening of the immune system.<sup>15</sup> WHO study on risk factors suggest that inactivity, or sedentary lifestyle, is one of the 10 leading global causes of death and disability.<sup>11</sup> More than two million deaths each year are attributable to physical inactivity.<sup>11</sup>

### Aims and objectives:

The present study was planned to find out relationship between life style and left ventricular function in terms of changes in various cardiovascular parameters.

Objectives of the study are:

- To study the effect of sedentary life style on parameters of left ventricular function like stroke volume, cardiac output, end

systolic volume ,end diastolic volume and ejection fraction.

- To study the effect of nonsedentary life style on parameters of left ventricular function like stroke volume,cardiac output,end systolic volume ,end diastolic volume and ejection fraction .
- To compare left ventricular function of sedentary and nonsedentary subjects .
- To create awareness among sedentary subjects that exercise is an excellent way to significantly improve their health and to prevent cardiovascular health hazards.

#### Material and Methods :

Comparative Study was conducted at U.N.Mehta Institute of cardiology, Ahmedabad during cardiac health checkup .Total 150 healthy subjects were included in study out of which 50% subjects were living sedentary life and 50% subjects were living nonsedentary life style. Subjects suffering from cardiovascular disease, diabetes mellitus, smokers and alcoholics are excluded from study. The subjects, to be enrolled for the study, were informed about the study and procedure details and an informed consent was obtained. The subjects were all healthy asymptomatic.

A routine physical examination was performed on the subjects and the required physical measurements were recorded: Weight, height, Body mass index, waist circumference, waist/height ratio,heart rate blood pressure ,mean blood pressure. After taking written informed consent history taking, general and systemic examination carried out and then for left ventricular function assessment subjects were taken to Echocardiography room. Echocardiography was recorded at lying down position at rest. By using M mode parameters were calculated. Various parameters for left ventricular function were measured using M mode Echocardiography like stroke volume ,end systolic volume ,end diastolic volume ,ejection fraction and cardiac output in sedentary and nonsedentary subjects .Data obtained was entered in

Microsoft excel sheet . Data was expressed as mean value  $\pm$  standard deviation and corresponding 95% confidence intervals (CIs).Statistical analysis was performed using unpaired t test.

**Result: Table 1: Statistical analysis of Baseline Characteristics of Sedentary and Nonsedentary individuals.**

Trait	Sedentary Mean $\pm$ SD	Nonsedentary Mean $\pm$ SD	Test P<0.05
BMI (Kg/m <sup>2</sup> )	26.78 $\pm$ 3.73	22.76 $\pm$ 3.16	3.8 $\times$ 10 <sup>-11</sup>
WC(cm)	94.92 $\pm$ 10.26	88.4 $\pm$ 7.87	2.08 $\times$ 10 <sup>-5</sup>
Waist/height ratio	0.56 $\pm$ 0.05	0.52 $\pm$ 0.04	1.19 $\times$ 10 <sup>-6</sup>
SBP (mmHg)	132.2 $\pm$ 12.75	128.1 $\pm$ 8.95	0.03
DBP (mmHg)	82.53 $\pm$ 6.60	80.8 $\pm$ 5.14	0.07
Heart rate (per minute)	80.34 $\pm$ 10.01	78.72 $\pm$ 10	0.36
Respiratory rate	20.53 $\pm$ 9.072	19.29 $\pm$ 1.73	0.24
Hours of sitting per day (hour)	7.46 $\pm$ 0.84	2.76 $\pm$ 0.80	2.27 $\times$ 10 <sup>-7</sup>

In unpaired t test P value <0.05 then result is significant and if p value >0.05 then result is insignificant.

**Table 2: Comparison of parameters of left ventricular function between sedentary and nonsedentary subjects**

Trait	Sedentary Mean±SD	Nonsedentary Mean± SD	T test P<0.05
End systolic volume	38.17±12.37	39.90 ±18.81	0.53
End diastolic volume	94.89±24.72	103.28± 22.29	0.03
Stroke volume	57.55± 14.71	65 ± 13.48	0.001
Ejection fraction	61.09± 6.68	67.73± 6.15	$2.79 \times 10^{-9}$
Cardiac output	4.52± 1.30	5.23 ±1.27	0.001

In unpaired t test P value <0.05 then result is significant and if p value >0.05 then result is insignificant.

#### Discussion:

End diastolic volume, Stroke volume, Cardiac output, Ejection fraction of sedentary group was found to be statistically significant in nonsedentary group. Though there was slight decrease in end systolic volume of sedentary subjects as compared to nonsedentary subjects but results were not statistically significant. BMI, Systolic blood pressure, Diastolic blood pressure were found to

be statistically significant in sedentary group as compared to nonsedentary group. Heart rate, Respiratory rate were found to be significant in sedentary group as compared to nonsedentary group. Hours of sitting per day was found to be significant in sedentary group as compared to nonsedentary group. **Jayalaxmi MK**<sup>10</sup> et al in her study found that low levels of physical activity are associated with an increased risk of weight gain and significant increase in blood pressure. (Jayalaxmi MK et al 2010)<sup>10</sup>. **Armin Arbad –Zadeh**<sup>18</sup> et al in his study found that A sedentary lifestyle during healthy aging is associated with decreased left ventricular compliance, leading to diminished diastolic performance(Armin Arbad –Zadeh et al 2004)<sup>18</sup> **Shilpa gantela**<sup>13</sup> et al in her study found that when athletes were compared with subjects living sedentary life style there was increasing in end diastolic volume ,cardiac output ,stroke volume at rest and during exercise thus enhancing left ventricular functional capacity in athletes . (Shilpa Gantela et al 2010)<sup>13</sup>. Regular dynamic exercise induces significant physiological adaptations of cardiac functioning ,which allows higher peak work capacity making exercising individuals more work efficient than the non exercising sedentary lifestyle individuals .<sup>13</sup>

#### Conclusion:

From the observation we can obtain following conclusion towards aims and objectives of our study .Systolic blood pressure, mean blood pressure were found statistically significant higher in sedentary group than nonsedentary group. End diastolic volume, Stroke volume, Cardiac output and Ejection Fraction were found statistically significant lower in sedentary group than nonsedentary group. Physical inactivity decreases the production of Nitric Oxide (NO) by the abnormal endothelium, which leads to changes in vessel diameter leads to vascular structural changes which result in hypertension<sup>2</sup>. Physical activity increases peripheral venous tone.This increases the central blood volume and thus ventricular preloading<sup>10</sup>.An expansion of plasma volume is an early response to training , probably mediated by adjustments in the renin aldosterone system,ventricular preloading is increased contributing to increase of cardiac stroke volume in nonsedentary individuals<sup>17</sup> . In the

heart End diastolic volume forms preload and stretching of the cardiac muscle fibers leads to increase their initial length depending on End diastolic volume<sup>10,17</sup>. Those who are sedentary, an exercise program is an excellent way to significantly improve their health. Maintaining a healthy lifestyle, including exercise, will result in increased energy levels throughout working period. The benefits of regular physical activity are numerous, people who exercise live longer and healthier.

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