# COMPARISON OF BMI, WAIST-HIP RATIO AND SKIN FOLDS OF WOMEN FOLLOWING DIFFERENT LIFE STYLE

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## ABSTRACT

*This study is an attempt to compare sports women and non-sports women in body composition condition parameters like Waist-hip ratio, body mass index and skin fold thickness like biceps, triceps, sub-scapular, supra-illiac. The age group was delimited to 32 to 37 completed years. The data was collected from twenty six sports women (who have left sports participation) and twenty six non-sports women (who never played competitive sports) on the above mentioned parameters. The level of confidence was set at 0.05 level and t test was applied to compare the collected data. It was hypothesized that sports-women are better in all the above mentioned parameters than non-sports women. After the statistical analysis, statistical significant difference was found in sub-scapular, supra-illiac and sum of four skinfolds(biceps, triceps, sub-scapular, supra-illiac). It means that, though the sports women had left competitive sports participation, they can maintain their pre-achieved body composition condition as compared to non-sports women in respect of sub-scapular, supra-illiac. and sum of four skinfolds.*

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## Introduction

We often consider the sports persons to be more fit than non sports persons. Yes of course they are!. But can it be possible to maintain their pre-achieved fitness conditions specially for women after leaving their physical activity or sports participation or they also become fatty as compared to non-sports women. We consider **Health** to be simply the absence of disease. Today we view it also as the presence of vitality – the ability to function with vigor and to live life actively, energetically, and fully. Vitality comes from wellness, a state of optimal physical, emotional, intellectual, spiritual, interpersonal, social, environmental, and even planetary well-being. At all ages and at all levels of physical and mental ability, people can increase their vitality and wellness.

Technological advances have made our lives increasingly inactive and sedentary; we drive car, ride escalators, watch television, and push papers around at school or work. Growing evidence points to lack of physical activity as a prime contributing factor to the array of perplexing degenerative diseases we now see in our society – heart disease, cancer, stroke obesity, diabetes, and hypertension, among others. Research concluded that exercise and physical activity are good for our health.

Our body is a wonderful moving machine, designed to be active. Our bones, joints and ligaments provide a support system for movement; our muscles perform the motions of work and play; our heart and lungs nourish our cell as we move through our daily life. Millions of years of evolution have made our body a precision tool capable of astonishing feats of speed, strength, endurance, and skill, all in the service of survival.  But our body is made to work best when it is active. Left unchallenged, bones lose their density, joints stiffen, muscles become weak, and cellular energy systems begin to degenerate. To be truly well, one must be active.

There is another basic reason to be physically fit, of course; it's fun and it feels good. Some people are active not because they are thinking about health benefits but simply because they enjoy it, whether they are skiing, swimming, hiking, playing basketball, or engaging in any of innumerable other activities. Sports provide the opportunity to be active, to develop strength and skills, to improve and excel , to challenge oneself or an opponent, to share victory and defeat with fellow team members, to compete. Many people who play sports feel that physical performance is an integral part of an active and exciting lifestyle.

Because of the unhealthy lifestyles that many young adults lead, physically they may be middle-aged or older! Healthy choices made today influence health a decade or two later. A

healthy lifestyle is self-controlled, and people need to be taught how to be responsible for their own health and fitness. Most people exercise because it improves their personal appearance and makes them feel good about themselves. Although many benefits accrue from participating in a regular fitness program and active people generally live longer, the greatest benefit of all is that physically fit individuals enjoy a better quality of life. These people live life to its fullest, with fewer health problems than inactive individuals who also may indulge in negative lifestyle patterns. Although compiling an all-inclusive list of the benefits reaped through a comprehensive fitness program is difficult, the following list provides a summary of many of these benefits:-

- Improves and strengthens the cardio-respiratory system (by facilitating oxygen supply to all parts of the body, including the heart, muscles, and brain).
- Maintains better muscle tone, muscular strength and endurance.
- Improves muscular flexibility.
- Lowers the risk for chronic diseases and illness (such as coronary heart disease, cancer, and strokes).
- Decreases the mortality rate from chronic diseases.
- Thins the blood so it is less likely to clot (decreasing the risk for coronary heart disease and strokes).
- Lowers blood pressure.
- Helps prevent diabetes.
- Helps people sleep better.
- Helps prevent chronic back pain.
- Relieves tension and helps in coping with life stresses.
- Raises levels of energy and job productivity.
- Extends longevity and slows down the aging process.
- Improves self-image and morale and helps fight depression.
- Motivates toward positive changes in lifestyle (better nutrition, quitting smoking, alcohol and drug abuse control).
- Speeds recovery time following physical exertion.

- Regulates and improves overall body functions.
- Improves physical stamina and counteracts chronic fatigue.

Improves quality of life; makes people feel better and live a healthier and happier life.

## Positive Effect of Getting Involved in Sports

Becoming involved with sports is beneficial in a number of ways. It promotes a healthy lifestyle, team building opportunities, strength, perseverance, leadership, discipline and confidence in self and abilities on and off the field. These are all important characteristics that will help children grow into strong, independent, smart and driven individuals. Sports have demonstrated a great deal of perseverance and self discipline. Growing up with these values in place will make the transition to adulthood a lot easier. It is hard to stand strong against peer pressures if a person doesn't have their core values and inner strength developed. Being physically fit also increases confidence and body posture. Participating in sports is a great way to improve self esteem and become a physically and mentally strong individual. It has been proven that teenage girls that are involved in sports lead safer and more productive lifestyles. Many girls who are not involved in physical activities are at higher risks of teen pregnancy, abusive relationships, and developing eating disorders. Girls that gain confidence and self-esteem by participating in sports are more likely to make more responsible and smart decisions that affect their life. It has also been proven that female athletes get better grades and perform well on standardized tests. For example, swimming is one of the top academic performing sports along with tennis and track and field. The habits of the sports carry over into school performance. When girls are given goals and kept busy their focus becomes in lined with what is best for their physical and emotional health.

Now a days the concept of increasing immune system is in discussion on various platforms. Everybody is giving stress on increasing immune system to fight against the pandemic COVID-19. Defense system of the immune

system is increased by exercise, diet, proper sleep cycle. We observed that a person catches the cold and cough with every change of season, while the other persons who live with him remain unaffected. The difference is of the defense system in both the persons. The first precaution suggested to fight against COVID-19 pandemic is to increase immune/defense system.

## Defensive system

The defense-capacity in a body is made up of chemicals and cells which fight against the foreign virus, parasitic elements, bacteria and even cancer-cells. This system is always alert and agile, fights with the enemy and keeps the body free from ailments. During healthy periods we are completely unaware of the war going on inside our body. This defensive system has been the subject of continuous research in the medical science. With the increase in the number of AIDS patients, the medical science went in to deep and intensive study of defense-mechanism, which has yielded new information about the body-defense-system. As and when the body comes in contact with different viruses, the body-system gears up to defend itself, and this defensive system increases its efficiency. At times, the system has to employ its emergency powers also. By understanding the functioning of the system, we can develop our resistance-capacity and defend ourselves from day-to-day ailments. In addition, we can also learn why to strengthen the defensive-mechanism during daily chores.

This defensive system works in two stages:-One is general and other is special.

**General defense system** is inborn in each person which cleans the body parts and protects us in natural way from the outer elements such as dust, bacteria, virus, fungus and even cancer-cells. Skin provides protection from dust and bacteria. Tears and salvia which contains lysozyme, kills the bacteria. Nose and the tiny hair that grow on the upper portion of the wind pope, bars the entry of bacteria, virus. Acid inside the stomach kill the tiny germs which are carried through consumable food items. Eater-cells means the white blood cells, eat-up the foreign virus-cells (natural killer) and do not allow the virus to grow in the

blood or muscles. They also eliminate the cancer-cells and disease prone cells.

**Special defense system** is not inborn, but acquired. If the virus or the infected tissues dodge the general defense-system and establish their existence, the white-blood-corpuscles in the blood, attack and kill them. This system normally develops during particular disease e.g. if a child is infected by chicken-pox, then his body develops a special defensive system which create anti-bodies to kill the chicken-pox virus (a protein which kills the micro-virus). However some antibodies remain inside the body. Theses anti-bodies are always prepared to fight the virus if infection occurs at a later stage. This process takes place in case of all the infections/contagious diseases. Vaccines are manufactured on this very theory. Bacteria or virus of a particular disease is injected in the blood, which develops the anti-bodies which are ready to face them. The white blood-corpuscles which engineer the special-defensive-system are of two kinds. B-cells that create special external anti-bodies (which are normally available in body-fluids). T-cell grows in the Thymus glands. They make the infected cells inactive. Associated t-cells warn the body against new viruses. They also diagnose the virus which have already developed in the body system. These cells produce proper anti-bodies. The lateral T-cells are called Killer-cells. These also help to inactivate or kill the infected cells or the wrongly divided cells of the body. The remaining T-cells signal all-well sign in the body.

## This resistance-capacity is developed through

**Diet:** Each person's diet is balanced depending on his/her topography. Inadequate content of vitamin C and E in the diet, weakens the defensive-system. Similarly iron-deficiency in the diet of young women make them vulnerable to severe diseases, only because the killer-cells have less power to kill the infected-cells. After prolonged intensive investigation it has been proved that larger amount of vitamin C, E and vita-keratin increase the capacity of the defense-system. Whether or not, the multi-vitamin tablets increase the resistance-capacity

is under active discussion, hence nutrition-rich balanced diet should be taken. Fresh fruits, vegetables for adequate vitamin C and meat, milk and eggs for vitamin E should be taken. That is why food is said to be healer as well as killer.

**Exercise:** It is commonly felt that exercise is beneficial. However, an astounding result has come out from a study which says that laborious or strenuous exercise; go to reduce the resistance-power. For example, in case of marathon runners the working of T-cells obstructs during three to four hours. According to experts, few pro-inspirants produced during strenuous jobs can create obstruction in the defensive-system. However, light exercise can prove to be boon for increasing the resistance-capacity. A study has proved that women who walked forty-five minutes for five days in a week, for 15 weeks, the capacity of killer-cells and formation of anti-bodies had increased. Compared to other women, these had 50% immunity from cold. Exercise and Asana, should provide encouragement to body and not tire it.

**Peace:** Stress, lack of time, running helter-skelter, examination, social separation and arguments between wife and husband, not only create worries but develop many diseases. It is often seen, that during examination-day the resistance-power weakens resulting in cough, cold and fever. Close-knit family relations, free nature and positive thinking are helpful for healthy life.

**Sleep:** Studies have indicated that sleep strengthens the defensive system. The natural killer-cells get more activated during slumber. Sleep also helps in protection from infection.

Public awareness and interest in physical fitness and health is much more obvious today than ten years ago. With today's sedentary and automated life-styles, nobody can take good health and physical fitness for granted. The way to ensure a life time of physical well-being is regular participation in exercise together with a proper diet, adequate rest, relaxation and good health practices.

When good health and fitness have been achieved, one will feel, look and perform better in leisure and work activities. Perhaps the greatest benefit of being healthy and fit is the degree of independence it affords. Research findings indicate that a fit individual uses less energy that an obese or weak one for any given movement or task, this is most certainly an asset to be prized in one's later years when energy levels may be lower.

Health related fitness requires desirable level of C.V. Fitness, percent body fat, flexibility and muscular strength and endurance. These help to prevent the incidence and severity of degenerative types of disease and increase work efficiency.

### Statement of the problem
### Statement of the problem is:
"Comparison of BMI, waist-hip ratio and skin fold of women following different life style."

### Significance of the problem

The purpose of this study is to know the body composition condition of women with different life style. For this, initially two groups are formed i.e sports women and non-sports women. Inspite of knowing the benefits of physical activities, most of the women prefer to live a sedentary life than involving themselves in any kind of physical activity. We observe that most of the women prefer physical activity like walking, aerobics, yoga, cycling etc. for only losing their weight.The reason behind this attitude is that most of the women are not aware of the importance of physical activity and its advantages like strength& endurance gain, proper heart & respiratory rate, proper body composition conditions like waist-hip ratio, body mass index and reduction of excessive fats etc in the initial stage of life. These all advantages have long-term positive impact in their later age.

It is also observed that most of the sports women left their respective games completely after marriage or delivering a baby. They even do not take part in any kind of recreational or relaxation physical activities. This kind of attitude decays their pre-achieved body composition conditions.

This study is an attempt to draw a practical conclusion whether these sports women can maintaintheir body composition conditions better for longer time as compared to non-sports women or not.

## Objectivesof the study

Following were the objectives of this study:
1. To study the body composition parameters like body mass index, waist-hip-ratio and skin fold thickness of sports women and non-sports women.
2. To compare the body composition parameters of sports women and non-sports women.

## Delimitations

1. The study was delimited to twenty six women of each sports and non-sports group.
2. The concept of sports women was delimited to the women players who had represented at-least inter-school or inter-collegiate or inter-club competition in any game.
3. The concept of non-sports women was delimited to the non-player women who had never played the competitive sports at any level in any kind of game.
4. The age was delimited to 32 to 37 completed years.
5. The study was delimited to the women of Nagpur city only.
6. The body composition parameters were delimited to:
   i) Body mass index
   ii) Waist-hip ratio
   iii) Skinfold thickness
7. The skin fold thickness was delimited to skinfold of biceps, triceps, sub-scapular, supra-illiac and total thickness of all four skinfolds.

## Limitations

There was no control over the health conditions, heredity, diet, interest, attitude and religion of the subjects. Hence, these were the limitations of this study.

## Hypothesis

1. It is hypothesized that sportswomen are superior in Body Mass Index than non-sports women.
2. It is hypothesized that sports women are superior in Waist-hip ratio than non-sports women.
3. It is hypothesized that sports women are superior in all the body composition condition parameters than non-sports women like bicep skin fold, triceps skin fold, sub-scapular skin fold, supra-iiliac skin fold and total of all these skin fold.

## Review Of Related Literature

Sukhdev Singh, Balwinder and Gobind Singh have studied the morphological characteristics and body composition between sports and non-sports girls of rural areas of Punjab. The present study was undertaken to examine the difference in body structure and some motor abilities between sports and non-sports girls. Total sixty-eight girls between the age group of 17-19 years were selected as subjects for the study. Out of these thirty-four girls were sports girls, who participated at least District level athletic or game competition and the other thirty –four girls were non-sports, who have never took active part in any event of game at any age level. Various body measurements including linear diameters, circumferences and skin folds were taken by following the standard technique of Tanner. Somatotypes were assessed with the help of Heath and Carter method. Percentage of body fat was estimated by applying the equation of Slaughter. Mean, Standard Deviation and independent student 't' test were used as statistical tools.It was found that sports girls were slightly heavier and taller than the non-sports girls, however the differences were non significant. They also possess significantly low rating of endomorphy and waist circumference than non-sports girls. Sports girls performed better in motor ability tests than non-sports girls, however the significant difference was only observed in standing broad jump. Result of this study depicted that rural non-sports girls being physically active did not differentiate much than the rural sports girls.

Kawaljit Kaur and S. K. Verma studied the physical characteristic of middle-aged females. Four hundred urban middle-aged women in the age group of 30-50 years were selected from three district of Punjab viz. Amritsar, Ludhiana and Patiala. These subjects were divided into 4 groups i.e. 30-35 years, 36-40 years, 41-45 years and 46-50 years. The measurement of weight, height, three circumferential measurements viz. thigh, calf and abdomen and eight skinfold measurement viz. biceps, triceps,

subscapular, suprailiae, abdomen, calf were taken on each subject. Standard statistical calculation were also used viz. mean, S.D., S.E.M.,C.V. and 't' test. In case of fat percentage, it was concluded that fat percentage has been found to increase progressively from 29.7% observed in 30-35 years age group to an average value of 45.9% in 45 to 50 years age group, in abdominal region.

B. NakhostinRoohi and F. Rahmani-Nia studied the obesity and fitness in college males and females. Sixty nine staffs (32 males, 37 females) were selected from Ardebil Azad University as subjects. Primary measurements were height, body mass index, subcutaneous skin folds and cardio-respiratory fitness. BMI was calculated from the equation: BMI = Body Mass (kg)/stature($m^2$). Skin fold thickness was used to estimate percent body fat using the Lohman Equation (laffayette caliper). Cardio-respiratory fitness was assessed using 1 mile walk test. 't' test was used for statistical analysis. It was found that fat percentages were significantly higher in women than men, but there were not any significant differences in BMI between males and females. $VO_2$max was significantly higher in men than women.

Priti Ojha Dubey, Prof. SushmaGhildyal and Dr. Rajeev Choudhar yhave studied the Comparison of Skinfolds among Different Age Groups Females. For this study, total 480 females between 20-50 age group were selected from the eight blocks of Varanasi District in U.P. Subjects were divided in 3 age groups as 21-30 years, 31-40 years and 41-50 years. Twenty females were selected for age group from each block. Seven anthropometric variables of skinfold like Biceps, Triceps, Sub-scapular, Mid-axillaries, Supra-iliac, Thigh and Calf were selected for this study. The data was gathered on their selected skinfold sites and analysis of variance was administered at 0.05 level of significance. Mean, S.D and analysis of variance (ANOVA) were calculated by using the statistical package of social science (SPSS). When the data was compared, it was clearly revealed that the 31-40 age group of female were having little more tendency to fat deposition in Supra-iliac, Mid-axillaries, Sub-scapular, Triceps, Biceps, Thigh and Calf in comparison to 41-50 yrs. of age group females.

The youngest group i.e.21-30 yrs. age were below in average to other groups. It was found that there was significant relationship between Biceps, Triceps, Sub-scapular, Mid-axillaries, Supra-iliac, Thigh and Calf when compared by F-ratio.

## Methodology
### Selection of samples

For the purpose of this study, total 52 women subjects of Nagpur were selected randomly. Two groups were formed from which 26 subjects were sports-women and 26 subjects were non-sports women. The selected age group was 32 to 37 completed years. They all have been tested on the body composition condition parameters like Body mass index, Waist-hip ratio, biceps skinfold, triceps skinfold, sub-scapular skinfold, supra-illiac skinfold and total of all these four skinfolds.

### Procedure of administration of tests
### Body Composition Condition Tests:

i) Body Mass Index
Objective: To measure the Body Mass Index of the subjects.
Equipments: Measuring Tape, Weighing Machine, Standard Body Mass Index Chart.
Administration: Body mass index (BMI), defined as body weight (in kilograms) divided by the square of height (in meters)
Scoring:BMI=Body weight(kg)/Height($m^2$). BMI correlates highly with direct measures of body fat.

ii) Waist-to-Hip Ratio
Objective: To measure distribution of body fat in the waist and abdomen.
Equipments: Measuring Tape.
Administration: Measure the waist and hips with the help of measuring tape in centimeters.
Scoring: Divide the waist measurement by the hip measurement. Ratios of more than 1.0 for men or 0.8 for women suggest elevated risk of overweight and its associated health risks.

iii) Skinfold Measurements:
Objective: To measure skinfold thickness.
Equipments: Skinfold caliper.
Tests: 　　　　　(a) Biceps Skinfold Width,
　　　　　　　　(b) Triceps Skinfold Width,
　　　　　　　　(c) Subscapular Skinfold Width,
　　　　　　　　(d) Supra-iliac Skinfold Width.

**(a) Biceps Skinfold Width**

Definition: It is the thickness of the double layer of skin plus subcutaneous fat, on the anterior side of upper-arm, over the biceps muscle at a level, mid way between the points acromiale and radiale, measured at a pressure of 10 gram per mm square.

Method: The subject with a naked arm is asked to stand at ease with hanging arms. Usually, the mid point of the upper-arm marked previously for measuring upper-arm circumference helps to provide a landmark for measuring biceps and triceps skinfolds as these are also to be taken at exactly the same level where the upper-arm circumference is measured. The skin and subcutaneous fat fold is picked at about 1 cm above the marked level of the anterior side of the biceps muscle. The jaws of the caliper are applied on the fold so that the marked horizontal line is approximately at a level of the mid point of the jaws and that the jaws hold a double layer of skin plus subcutaneous fat. The lighter arm of the caliper is slowly released so as to put full pressure of the jaws on the vertical skinfold. The reading is noted from the dial of the caliper about two seconds after leaving the smaller arm of the caliper when the reading is quite stable.

Scoring: The measurement is recorded correct upto 0.2 mm.

**(b) Triceps Skinfold Width**

Definition: It is the thickness of the double layer of skin plus subcutaneous fat on the posterior side of the upper arm over the triceps muscle in the middle of upper-arm.

Method: The method is the same as explained in case of biceps skinfold except that the fold in this case is picked up on the posterior side of upper arm over the triceps muscle.

Scoring: The measurement is recorded correct upto 0.2 mm.

**(c) Subscapular Skinfold Width**

Definition: It is the thickness of double layer of skin plus subcutaneous fat below the inferior angle of left scapula.

Method: The skinfold is picked diagonally below the inferior angle of the scapula almost parallel to the medial border of scapula, in such a way that the skinfold forms an angle of roughly 45° to the horizontal, with its lower end pointing outwards. The jaws of caliper are applied about half centimeter below the fold picking tip of the thumb. The measurement, as usual, is recorded after two seconds of releasing full pressure on the fold.

Scoring: The measurement is recorded correct upto 0.2 mm.

**(d) Supra-iliac Skinfold Width**

Definition: It is the thickness of double layer of skin plus subcutaneous fat over the iliac spine, on the left lateral side of the abdomen.

Method: A skinfold is lifted about 1 centimeter above and 2 mm medial to the anterior superior iliac spine on the left side. The jaws of the skinfold caliper are applied parallel to the natural direction of the picked up skinfold which is usually horizontal or slightly oblique pointing upwards latterly and downwards medially.

Scoring: The measurement is recorded correct upto 0.2 mm as in all other skinfold measurements.

### Design of the study

Random group design was used for the purpose of this study. Two groups i.e. Sports women and Non-sports women were formed for the purpose of this study

### Statistical Analysis

The collected data was analyzed with the help of suitable statistical procedures, 't' test was applied to make comparison between sports women and non-sports women. The level of significance was 0.05 level for this study.

The raw data was tabulated with the help of proper procedure and graphical representation was made wherever necessary. The analysis is presented in Table-1 to Table-6
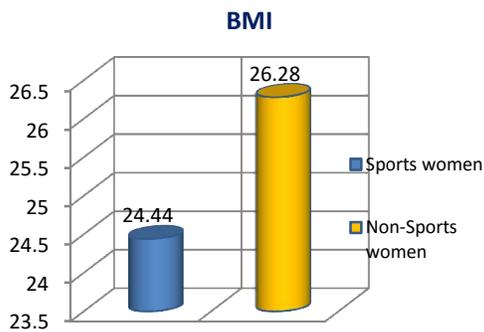
### Table 1

Table showing the comparison between the means of sports women and non-sportswomen test scores of Body Mass Index on the basis of 't' ratio

| M1 sports women | M2 Non sportswomen | D.M | S.E | 't' ratio | Required 't' value |
|---|---|---|---|---|---|
| 24.44 | 26.28 | 1.84 | 0.95 | 1.93 | 2.00 |

Table 1 reveals that: The mean values in case of Body Mass Index of sports women and non-

sports women were 24.44 and 26.28 respectively. Thus, the difference between the means was 1.84.In case of Body Mass Index, the difference was not found statistically significant at 't' test. The 't' test value obtained in respect of Body Mass Index was 1.93. For the mean difference to be significant at 0.05 level of confidence, the 't' value to be obtained should be greater than 2.00.

**Figure No.1**

Graphical Depiction of the means of Body Mass Index test score of sports women and non-sportswomen

**BMI**



**Table 2**

Table showing the comparison between the means of sports women and non-sports women test scores of Waist-to-Hip ratio on the basis of 't' ratio

| M1 sports women | M2 Non sportswomen | D.M | S.E | 't' ratio | Required 't' value |
|---|---|---|---|---|---|
| 0.85 | 0.87 | 0.02 | 0.016 | 1.16 | 2.00 |

Table 2 reveals that: The mean values in case of Waist-hip ratio of sports women and non-sports women were 0.85 and 0.87 respectively. Thus, the difference between themeans was 0.02.In case of waist-hip ratio, the difference was not foundstatistically significant at 't' test. The 't' test value obtained in respect of waist-hip ratio was 1.16. For the mean difference to be significant at 0.05 level of confidence, the 't' value to be obtained should be greater than 2.00.

**Figure No.2**

Graphical Depiction of the means of waist-hip ratio test score of sports women and non-sports women
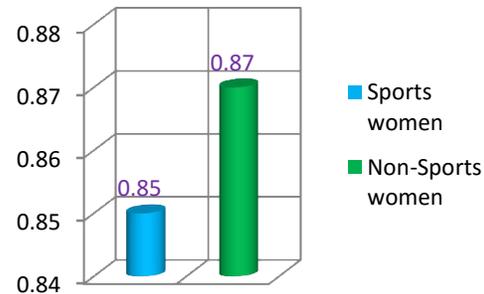
**Waist Hip ratio**



**Table 3**

Table showing the comparison between the means of sports women and non-sports women test scores of Biceps skinfold on the basis of 't' ratio

| M1 sports women | M2 Non sportswomen | D.M | S.E | 't' ratio | Required 't' value |
|---|---|---|---|---|---|
| 8.73 | 9.79 | 1.06 | 0.98 | 1.08 | 2.00 |

Table 3 reveals that: The mean values in case of biceps skin fold of sports women and non-sports women were 8.73 and 9.79 respectively. Thus, the difference between the means was 1.06.In case of biceps skin fold, the difference was not foundstatistically significant at 't' test. The 't' test value obtained in respect of biceps skin fold was 1.08. For the mean difference to be significant at 0.05 level of confidence, the 't' value to be obtained should be greater than 2.00.

**Figure No.3**

Table showing the comparison between the means of sports women and non-sports women test scores of Biceps skin fold on the basis of 't' ratio
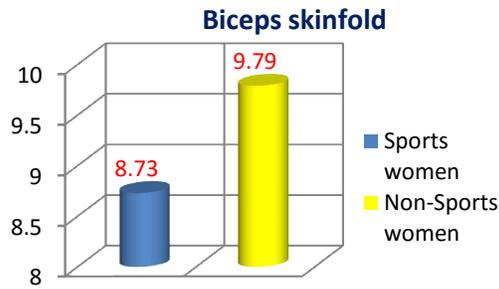
**Biceps skinfold**



**Table 4**

Table showing the comparison between the means of sports women and non-sports women test scores of Triceps skinfold on the basis of 't' ratio

| M1 sports women | M2 Non sports women | D.M | S.E | 't' ratio | Required 't' value |
|---|---|---|---|---|---|
| 15.27 | 16.33 | 1.06 | 1.20 | 0.88 | 2.00 |

Table 4 reveals that: The mean values in case of triceps skin fold of sports women and non-sports women were 15.27 and 16.33 respectively. Thus, the difference between the means was 1.06. In case of triceps skin fold, the difference was not found statistically significant at 't' test. The 't' test value obtained in respect of triceps skin fold was 0.88. For the mean difference to be significant at 0.05 level of confidence, the 't' value to be obtained should be greater than 2.00.

**Figure No.4**

Table showing the comparison between the means of sports women and non-sports women test scores of Triceps skin fold on the basis of 't' ratio
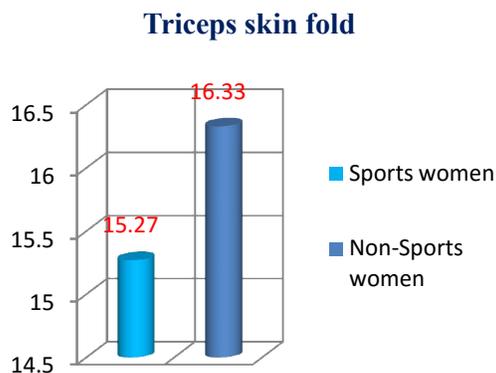
**Triceps skin fold**



**Table 5**

Table showing the comparison between the means of sports women and non-sports women test scores of sub-scapular skinfold on the basis of 't' ratio

| M1 sports women | M2 Non sports women | D.M | S.E | 't' ratio | Required 't' value |
|---|---|---|---|---|---|
| 13.73 | 16.85 | 3.12 | 1.16 | 2.68 | 2.00 |

Table 5 reveals that: The mean values in case of sub-scapular skin fold of sports women and non-sports women were 13.73 and 16.85 respectively. Thus, the difference between the means was 3.12. In case of sub-scapular skin fold, the difference was found statistically significant at 't' test. The 't' test value obtained in respect of sub-scapular skin fold was 2.68. For the mean difference to be significant at 0.05 level of confidence, the 't' value to be obtained should be greater than 2.00.

**Figure No.5**

Table showing the comparison between the means of sports women and non-sports women test scores of sub-scapular skin fold on the basis of 't' ratio
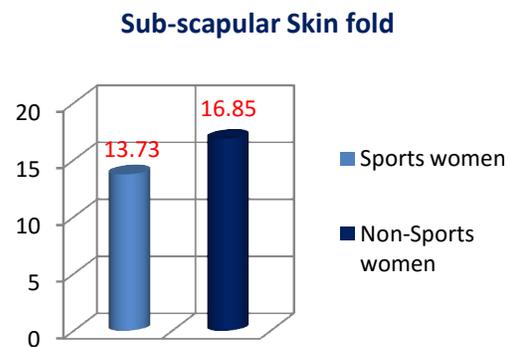
**Sub-scapular Skin fold**



**Table 6**

Table showing the comparison between the means of sports women and non-sports women test scores of supra-illiac skinfold on the basis of 't' ratio

| M1 sports women | M2 Non sports women | D.M | S.E | 't' ratio | Required 't' value |
|---|---|---|---|---|---|
| 14.46 | 17.85 | 3.39 | 1.21 | 2.80 | 2.00 |

Table 6 reveals that: The mean values in case of supra-illiac skin fold of sports women and

non-sports women were 14.46 and 17.85 respectively. Thus, the difference between the means was 3.39. In case of supra-illiac skin fold, the difference was foundstatistically significant at 't' test. The 't' test value obtained in respect of supra-illiac skin fold was 2.80. For the mean difference to be significant at 0.05 level of confidence, the 't' value to be obtained should be greater than 2.00.

**Figure No.6**

Table showing the comparison between the means of sports women and non-sports women test scores of supra-iliac skin fold on the basis of 't' ratio
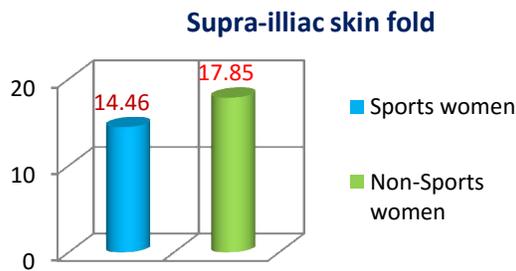
**Supra-illiac skin fold**



**Table 7**

Table showing the comparison between the means of sports women and non-sports women test scores of total of four skin folds on the basis of 't' ratio

| M1 sports women | M2 Non sports women | D.M | S.E | 't' ratio | Required 't' value |
|---|---|---|---|---|---|
| 52.19 | 60.81 | 8.62 | 3.70 | 2.33 | 2.00 |

Table 7 reveals that: The mean values in case of total of four skin folds of sports women and non-sports women were 52.19 and 60.81 respectively. Thus, the difference between the means was 8.62. In case of total of four skin folds, the difference was foundstatistically significant at 't' test. The 't' test value obtained in respect of total of four skin folds was 2.33. For the mean difference to be significant at 0.05 level of confidence, the 't' value to be obtained should be greater than 2.00.

**Figure No.7**

Table showing the comparison between the means of sports women and non-sports women test scores of total of four skin folds on the basis of 't' ratio

**Total of four skin folds**
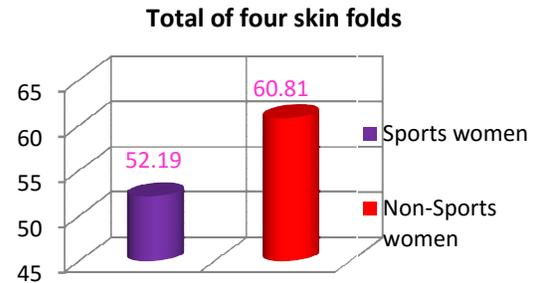


*Discussion of findings*

There is significant difference found in the parameters like sub-scapular, supra-illiac and total of four skin folds (biceps, triceps, sub-scapular, supra-illiac)

**Discussion of Hypothesis**

1. It is hypothesized that sports women are superior in Body Mass Index than non-sports women. The hypothesis on the basis of result of this study is rejected.
2. It is hypothesized that sports women are superior in Waist-hip ratio than non-sports women. The hypothesis on the basis of result of this study is rejected.
3. It is hypothesized that sports women are superior in all the body composition condition parameters than non-sports women.
The hypothesis on the basis of result of Biceps and Triceps is rejected.
The hypothesis on the basis of result of Sub-scapular, supra-illiac and total of four skin folds is accepted.

**Summary**

The intention of this study was to know the general fitness condition of womenwith different lifestyleand to compare various Physical Parameters of sports-women and non-sports women.
Total fifty twosubjects were randomly selected for the purpose of this study. Twenty sixsports-women were selected from the population who had represented at-least inter-school or inter-collegiate or inter-clubs in any kind of game from the age group i.e. thirty two to thirty seven. Most of the subjects (sports-women) selected for this study had participated at state or national level games.Twenty sixnon-sports women were selected from the population who

had never played a competitive sports in any game from the same age group.

Body composition condition parameters like waist-hip ratio, body mass index and skinfold thickness of biceps, triceps, sub-scapular, supra-illiacwere selected. Various tests were administered and data was collected from various offices, schools, institutions and residences for the purpose of this study. The collected data was analyzed with the help of suitable statistical procedures and't' test was applied to make comparison between sports-women and non-sports women data scores. The level of significance was 0.05 level for this study.

## Conclusions

In the light of result of this study following conclusions are drawn:

1. In case of Body mass index and waist hip ratio, Biceps and triceps skin fold, the significant difference was not found..

2. In case of sub-scapular, supra-illiac and total of four skin fold, statistical significant difference was found.So, sports-women are superior in these body composition condition parameters than non-sports women.

## Recommendations

1. Similar studies may be carried out for other parameters like strength, endurance, power etc.

2. As non-sports women are poor in sub-scapular, supra-illiac and total of four skin folds, it is recommended that they should take out some time for some sports or recreational activities like – walking, skipping, cycling, aerobics, yoga, dancing etc. which can help them to burn their fats in these body regions

3. It is recommended that sports wome n who have completely left playing should start playing at least one hour daily for their own fitness.

## References

1. Dr. Tambe Sanjay (2009). War Inside Body. The Hitavada, 11
2. Clarke Harrison H., Clarke David H.(1987). Application of Measurement to Physical Education.6th Ed; New Jersy:Prentice-Hall,Inc.
3. KansalDevinder K.(1996).Test and Measurement in sports and Physical Education.New Delhi: D.V.S. Publication .
4. HoegerW.K.Werner&Hoeger A. Sharon.(1997). Principles and Labs For Physical Fitness. Colorado: Morton Publishing Company.
5. Insel Paul M., Roth Walton T.,Core.(1994) Concepts in Health.7th Ed; California:Mayfield Publishing Company.
6. Hastad, Douglas N. and Lacy, Alan C.(1994)Measurement and Evaluation In Physical Education and Exercise Science. 2nd Ed; Arizona: Gorsuch Scarisbrick, Publishers Scottsdale.
7. VermaJ. P., G. Abdel-Salam Abdel-Salam.(2019)Testing Statistical Assumptions in Research.JohnWiley & Sons, Inc. 111 River Street, Hoboken, NJ 07030, USA.
8. Tancred Bill (1987). Health related Fitness. Hoaxer &Stoughton, London.
9. Singh, Sukhdev, Kaur,Balwinder and Singh, Gobind.(January –June 2010), A study of morphological characteristics and body composition between sports andnon-sports girls of rural areas of Punjab. Scientific Journal in Sportsand Exercise, Vo.6,No.1,14-18.
10. Kaur Kawaljit and Verma S. K. (July to Dec., 2005).To Study The Physical Characteristic of Middle-Aged Females. Indian Journal Of Sports Studies,Vol.5, No.2,6-11.
11. NakhostinRoohiB. and Rahmani-Nia F.(January, 2006).Obesity and fitness in college males andfemales.International Journal Of Fitness, Vol.2, Issue 1,7-14
12. Ojha Dubey Priti, Prof. GhildyalSushma, and Dr. Choudhary Rajeev. (2009).Comparison of skinfolds among different age group females.Journal.Indian Journal Of Physical Education Sports Medicine and Exercise Science,Vo.9, Issue 2,41-50

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