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# Comparetive study on body composition among Kho-Kho players, Kabaddi players, physical education trainee students and untrained females

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**Abstract**
Purpose of the present study was to find out the influence of varied type of physical activities on the components of body composition. For conducting the study total 100 female subjects [25 untrained females, 25 Physical education trainee students, 25 state level kho-kho players and 25state level kabaddi players] of 22 to 25 years were selected from Alipore Hastings college, and kho-kho and kabaddi players were selected randomly from different district of West Bengal, India,. Criterion measured for conducting the study were Body mass index (BMI), fat percentage, fat mass (FM), lean body mass (LBM) and lean mass to fat mass ratio. Mean and standard deviation were used as descriptive statistics. ANOVA and "t" test were used to compare the groups on components of body composition. It was found that there was no significant difference on BMI among the selected groups. But there were significant differences on fat percentage, fat mass, lean body mass and lean to fat mass ratio among the selected four groups. There were significant differences between the group of untrained females and with all other selected groups on all the components of body composition except the difference between Physical Education trainee students and untrained females on lean body mass. Among the trained groups, there was significant difference on lean to fat mass ratio between the group of physical Education trainee students and Kabaddi players. It was also found that in lean to fat mass ratio, physical education trainee students were better than the subjects of other groups. So it can be concluded that regular participation in different type of training or physical activity programme helps to reduce and maintain the body fat percentage and at the same time it also helps to increase and maintain the lean body mass and lean to fat mass ratio.

**Keywords:** Kho-Kho, Kabaddi, physical education, lean to fat mass ratio, lean body mass, fat mass

## 1. Introduction
Body composition is now widely used as an indicator of fitness. It is the amount of fat versus lean muscle tissue [1]. Total body fat exists in two depots or storage sites. Essential fat stored in the bone marrow as well as in the heart, lungs, liver, spleen, kidneys, intestine, muscles, and lipid-rich tissues of the central nervous system. This fat is required for normal physiologic functioning. Where, storage fat accumulates in adipose tissue [2]. A healthy adult female body should have 20 to 25 percent fat level [1]. The percentage of storage body fat should have approximately 15% in female [2]. Significantly above these amounts may indicate excess body fat. Athletes will have a body fat percentage lower than this level. In general, most athletes experience greater performance benefits at body fat percentages between 10 to 25 percent for women depending on the sports [1]. Because body fat contributes no strength advantage and limits endurance, speed and movement through space [1]. Above mentioned all the components are the components of physical fitness [3]. This fitness helps to perform daily tasks vigorously and alertly, with energy left over for enjoying leisure time activities and meeting emergency demands [3]. So, the investigator wants to find out the level of fat percentage, fat mass, lean body mass and lean mass to fat mass ratio of untrained females and with this the female engaging themselves in different type of activity and training programmes.

## 2. Materials and Methods
The following methodological steps were taken in order to conduct the present study.

### Selection of the subjects
Total 100 females (25 untrained students, 25 Physical Education trainee students, 25state level Kho-kho players and 25 state level kabaddi players) were selected randomly from different district of West Bengal, India. Their age ranged from 22 to 25 years who were involved in regular practice for their respective games of Kabaddi and Kho-Kho and the students of physical Education were the regular participant of their planned physical activity.

### Criterion measured for conducting the study were-
a. Body Mass Index (BMI) was measured by using formula weight in kg/Height in meter$^2$
b. Fat percentage (F%): was considered by the measurements of circumferences [2].
c. Fat mass (FM)
d. Lean Body mass (LBM)
e. Lean to fat mass ratio

### For the purpose of the analyses, the employed statistical procedures were-
Mean; SD, AOVA and "t" test for observing the differences among the mean of selected body composition components. The level of significance was set at .05 level of confidence

## 3. Result and Discussion

**Table 1:** Mean and standard deviation(SD) of personal data (age, height and body weight) of selected four groups

| Groups | Age(year) | | Standing height (meter) | | Body weight(kg) | |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD |
| Untrained female | 23.68 | ±3.997 | 1.545 | ±0.04866 | 48.16 | ±6.55 |
| Physical education trainee | 23.92 | ±0.7024 | 1.541 | ±0.04406 | 46.82 | ±6.220 |
| Kho-kho players | 23.44 | ±2.083 | 1.543 | ±0.04347 | 49.32 | ±6.395 |
| Kabaddi Players | 22.90 | ±2.269 | 1.559 | ±0.02972 | 51.20 | ±4.360 |

Table 1 showed the mean and standard deviation of personal data (age in year, height in meter and weight in kg) of selected four female groups.

**Table 2:** Mean, Standard deviation and "F" values of components of body composition of selected four groups

| Groups | BMI | | FAT % | | FAT MASS (kg) | | Lean Body Mass (kg) | | Lean-to-fat ratio |
|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | |
| Untrained female | 20.16 | ± 2.58 | 21.86 | ± 4.48 | 10.69 | ±3.30 | 37.47 | ± 4.31 | 3.76:1 |
| Physical education trainee | 19.71 | ±2.53 | 15.25 | ±5.08 | 7.39 | ±3.37 | 39.43 | ±3.55 | 6.33:1 |
| Kho-kho players | 20.76 | ±2.54 | 14.58 | ±2.23 | 7.28 | ±2.02 | 42.06 | ± 4.842 | 5.98:1 |
| Kabaddi Players | 21.08 | ±1.91 | 16.83 | ±1.50 | 8.61 | ±0.99 | 42.59 | ±3.82 | 4.99:1 |
| F Values | 1.613 (ns) | | 20.62 P<0.05 | | 9.462 P<0.05 | | 8.213 P<0.05 | | 14.59 P<0.05 |

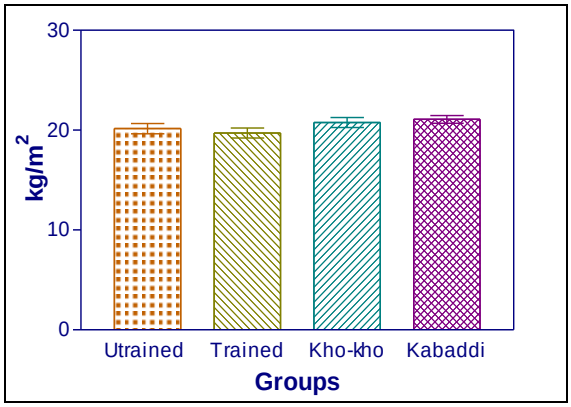


**Fig 1:** mean and standard error of BMI of selected four groups

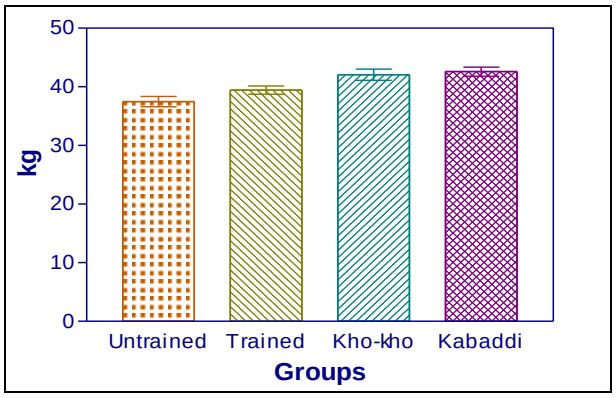


**Fig 3:** mean and standard error of lean body mass of selected four groups

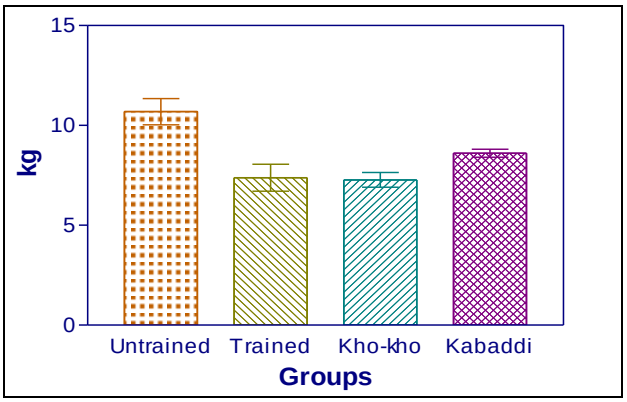


**Fig 2:** mean and standard error of fat mass of selected four groups

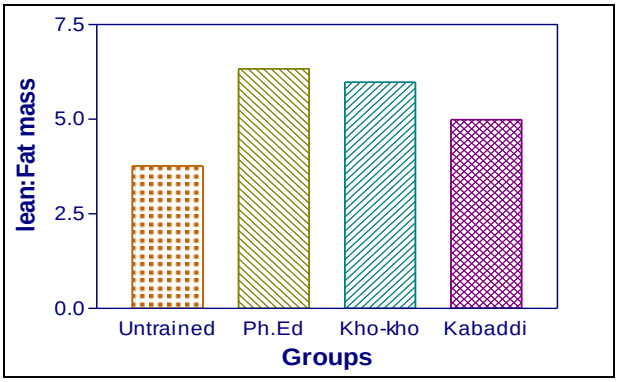


**Fig 4:** graphical representation of lean: fat mass of selected four groups

**Table 3:** "t" values of components of body composition between the selected groups

| Groups | Fat percentage | Fat Mass | Lean Body Mass | Lean body mass: Fat mass |
|---|---|---|---|---|
| Untrained female vs Physical education trainee | 6.450 P < 0.001 | 4.529 P < 0.001 | 1.668 P > 0.05 | 6.025 P < 0.05 |
| Untrained female vs Kho-kho players | 7.103 P < 0.001 | 4.684 P < 0.001 | 3.899 P < 0.01 | 5.195 P < 0.05 |
| Untrained female vs Kabaddi Players | 4.829 P < 0.001 | 2.856 P < 0.05 | 4.350 P < 0.001 | 2.879 P < 0.05 |

| | | | | |
|---|---|---|---|---|
| Physical education trainee vs Kho-kho players | 0.6530 P > 0.05 | 0.1546 P > 0.05 | 2.231 P > 0.05 | 0.8309 P > 0.05 |
| Physical education trainee vs Kabaddi Players | 1.555 P > 0.05 | 1.673 P > 0.05 | 2.682 P > 0.05 | 3.146 P < 0.05 |
| Kabaddi Players vs Kho-kho players | 2.202 P > 0.05 | 1.828 P > 0.05 | 0.4513 P > 0.05 | 2.316 P > 0.05 |

From table 2 it was found that there were significant differences among the selected four groups on fat percentage, fat mass, lean body mass and lean to fat mass ratio. But there was no significant difference on body mass index (BMI). From table 2 it was also found that Kabaddi players have much more lean body mass than other three groups where untrained female group acquired more fat mass than other three selected groups. But from table-2 it was also found that Physical Education trainee students were better in condition than the other three selected groups and untrained group showed poor ratio on lean to fat mass.

From table3 it was found that there were significant differences on fat mass between the groups of untrained female and with all other selected three groups. There were also significant differences on lean body mass between the groups of untrained female & kho-kho players and between untrained group and Kabaddi players. From table-3 it was also found that there was also significant differences on lean mass fat mass ratio between the groups of untrained female groups and with all other selected groups and between the group of physical Education trainee students and kabaddi players.

## 4. Discussion

According to J. Wilmore (1974), weight training programmes change the body composition for the average college-age male and female. He found little or no change in total body weight, significant loses of relative and absolute body fat, significant gain in lean body weight (presumably muscle mass) [4] In normal, if we see the BMI then it would be difficult to understand the difference between the untrained and trained females on healthy body composition. Because there was no any significant difference among the selected four groups on BMI. But if we see the percentage of body fat, fat mass, lean body mass and lean to fat mass ratio separately, then it was found that there were significant differences between untrained female group and with all other selected three trained groups.

Parvinder Sing (2013) found that the weight of Kabaddi players is much higher in comparison to weight of Kho-Kho players [5].

In present study it was also found that Kabaddi players have more body weight and it is because of having more lean body mass. Welham and Behnke [6] examined 25 professional footballers. They found that seventeen of the twenty-five athletes were not considered as being physically qualified for military duty or first class insurance risk, since all their body weights were more than 15 percent above height-weight table values. But high body density values indicated that the subjects' high weights due to their large amounts of muscular tissue rather than fatty tissue [2].

Burris (2003) observed that kho-kho players have significantly higher lean body mass values than the non-sporting population. This parameter, including all body tissues except for fat deposits, is considered a major precondition for a good performance in kho-kho [7]. Present study also revealed that the same scenario for having lean body mass.

A Jaiswal (2014) found the higher fatness among non-sportspersons than sportspersons [8]. Present study also revealed that untrained females have greater amount of fat mass than other three selected trained groups.

K.N. Pavlou *et al*. (1985) studied on the effects of exercise on lean body mass (LBM), fat mass (FM), maximal oxygen uptake (VO2max), and quadriceps (QD) strength were studied in 72 male, mildly obese. They found that Weight loss of the combined exerciser group and Non-exerciser group was not statistically different. Lean body mass of the exerciser group remain unchanged whereas in the non exerciser group it was reduced from accounting for 36% of total weight loss. Fat mass loss was greater for the exerciser group.

The kho-kho players also reported to have greater values in lean body mass than the control group [9], LBM compared to total BW is closely related to physiological parameters such as oxygen consumption, cardiac output, vital capacity, etc.

Gopal Chandra Saha (2012), studied on Anthropometric measurements and Body Composition of male athlete as Individual and male soccer players as subjects of Team Game. He found no significant difference on body composition between the soccer and track and field Athletes [10].

Present study also revealed that there were no any significant differences on fat percentage fat mass and lean body mass between the selected trained females groups.

## 5. Conclusions

1. Kabaddi players have more lean body mass than kho-kho players, Physical Education trainee students and untrained females.
2. Untrained females have more fat mass than the other three selected groups.
3. Physical education trainee students were better in lean to fat mass ratio than other three selected groups.

Lastly it can be concluded that regular participation in planned physical activity progrrame helps to reduce and maintain the body fat percentage and at the same time it also helps to increase and maintain the lean body mass lean to fat mass ratio.

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