



## A COMPARATIVE STUDY ON MUSCULAR FITNESS AMONG THE DAIRY SCIENCE STUDENTS OF KALABURAGI DISTRICT

**Dr. Anand Shrimant**

Assistant Professor (Contract), Dairy Science College, Mahagaon Cross, Kalaburagi.



### ABSTRACT

Muscular fitness denotes the functional efficiency of the muscular system and it encompasses the components of Muscular Strength, Muscular Power, Muscular Endurance and Muscular Flexibility. Muscular strength is described as the ability of maximum amount of resistance that can be overcome by a muscle group or groups of muscles in a single maximum effort. Muscular power represents the capacity of the explosive nature of a particular muscle group or groups of muscles and represents the capacity of overcoming resistance in terms of time. Muscular endurance refers to the ability of overcoming the lighter amount of resistance over a number of times in sustainable manner by the muscles or groups of muscles without being fatigued quickly. Muscular flexibility refers to the ability of having higher elasticity in the muscles or groups of muscles leading to higher tonus for the muscles or groups of muscles and thereby allowing higher range of motion of the proximal joint of such muscles. Though muscular strength is not identified as a component of health fitness, but the muscular endurance and the muscular flexibility are included as components of health fitness. In terms of physical performance and sports performances all the four are included as fitness components and to excel in sports all the four muscular components are essential in different proportions keeping in view of the sporting activity involved. Even sports participation also is viewed as a means of enhancing health to individuals, whereas the concept of excellence in sports leads to the concept of recreation to human beings. In terms of sports performance the muscular power component is highly valued. It would be ideal to possess the attitude of physical fitness and if the attitude of physical fitness can be inculcated in the adolescents and youth, it would serve excellent benefits to the society and to nation. Though the physical fitness comes by involvement in physical exercises scientifically designed, it can also happen due to the type of lifestyle and the physical activity requirements of the regular life could also influence this attitude. The Dairy Science College students are one important student population with a specific study pattern and they study different streams of study or branches of study and would require different kinds of physical movements during their study period, which could cause lasting influence on their lifestyle and on the physical fitness attitude also.

**KEYWORDS:** Muscular Strength, Power, Endurance, Flexibility.

### INTRODUCTION

Physical fitness and health are interrelated as confirmed by many studies in the fitness studies across globe. Higher the physical fitness, higher the health status of an individual, though physical fitness may not be a single component, whereas there are several sub components in it. Though physical fitness is essential, it would be highly necessary that individuals need to engage in regular exercises or physical activities in order to see that the necessary cytokines are regularly secreted in the muscle to prevent the occurrence of several non-communicable diseases. Student life is very significant in terms of imbibing

positive lifestyle behaviors, which will make the individuals highly productive throughout the life time. One such lifestyle behavior is physical activity behavior, which significantly influences the health status of the individuals. Hence, exposure to physical activities or to exercise routines during the student days would help individuals to gain positive attitude towards the active life and keep themselves healthy. This exposure may even be through the kind of workload the students face during their study period and higher physical workload during the student period because of academics could also make such individuals to be more inclined towards physically active life. Since, the muscular fitness is the primary factor in determining an individual's fitness, whether it be sports fitness or health fitness, more research is now revolves around the muscular fitness and muscular contraction derived chemical substances. Difference in academic requirement could also cause for differences in their physical fitness. Due to involvement in physical activities make the students to differ in their muscular fitness and muscular fitness need to be measured with its sub components. Since, the muscular fitness is more appropriate and feasible form of fitness component that would help to understand the general physical fitness standards of the students, the present study envisaged to study the differences in the muscular fitness sub components among the different selected streams of Dairy Science College students and to find out the reason for such differences if exist. The present study envisaged to find out whether there were any differences in the muscular fitness (muscular power) levels of the Dairy Technology, Dairy Chemistry, Dairy Microbiology, Dairy Engineering and **Dairy Business Management** students of Dairy Science College and to find out if there were differences exist, whether these differences were significant.

#### METHODOLOGY:

A total of 120 male engineering students in the age range of 18 to 22 years from Dairy Science College of Kalaburagi district participated in this research project. Fifty students for each of the five selected streams of the Dairy Science study were included. The included streams of the study were Dairy Technology, Dairy Chemistry, Dairy Microbiology, Dairy Engineering and **Dairy Business Management**. The written acknowledgements were obtained from all the individuals. Muscular power of the individuals of the study was measured through the Vertical Jump performance test and also through the Margaria Kalamen power step test. The set up for the Margaria Kalamen test protocols is as follows. The individual has to run from six meters into a flight of twelve stairs with a height of 17.5 cms of each stair. There would be marking on third, sixth and ninth steps. The individual has to run fast and step up the stairs with maximum speed to the twelfth and beyond each time covering three steps in each stride. Hence, on touch of the first step, the individual has to jump to the third and then to the sixth and then to the ninth and then to the twelfth steps. Time in seconds is recorded between the third and ninth stairs and is applied in the following equation to obtain the muscular power in watts. The distance of height for the six stairs between the third and ninth would be 1.05 meters. The equation to obtain the muscular power:

$$P = (M \times D) \times 9.8/t$$

P = Power in watts, M = mass of the individual ie weight in Kgs, D = distance of height between the 3rd and 9th stairs ie 1.05 meters, 9.8 = gravity constant and t = time in seconds. The obtained P was used for comparison and statistical analysis. Analysis of Variance (ANOVA) was used to find out whether the selected five streams of Dairy Science students of the study differ significantly in their four muscular fitness components. The level of significance used was 0.05. Tukey's HSD post hoc test was conducted to find out the source of the significant difference i.e. among the groups differences.

**RESULTS AND DISCUSSION:*****Analysis on the muscular power measured by Vertical Jump test protocol:*****Table I Analysis of Variance for Muscular power (Vertical Jump test)**

| Source                     | SS       | df  | MS      | F     | P                 |
|----------------------------|----------|-----|---------|-------|-------------------|
| Treatment (between Groups) | 4249.29  | 4   | 1062.32 | 23.18 | <b>&lt;0.0001</b> |
| Error                      | 11228.18 | 245 | 45.82   |       |                   |
| Total                      | 15477.47 | 249 |         |       |                   |

Table I analysis clearly indicates that there is significant difference among the five groups of the study with respect to their muscular power measured through the Vertical Jump test protocol as indicated in the table (F= 23.18 at P of <0.0001). Tukeys HSD post hoc test (table II) is applied to find out group wise comparisons among all the groups of the study.

**Table II. Tukey HSD test :(at 0.05 the significant difference = 3.72)**

| Groups/Mean              | Dairy Technology<br>47.3 | Dairy Microbiology<br>40.28 | Dairy Engineering<br>39.48 | Dairy Business Management<br>38 |
|--------------------------|--------------------------|-----------------------------|----------------------------|---------------------------------|
| Dairy Chemistry 47.75    | 0.45<br>N. Sig           | 7.47<br>Sig                 | 8.27<br>Sig                | 9.75<br>Sig                     |
| Dairy Technology 47.3    | -                        | 7.02<br>Sig                 | 7.82<br>Sig                | 9.3<br>Sig                      |
| Dairy Microbiology 40.28 | -                        | -                           | 0.8<br>N. Sig              | 2.28<br>N. Sig                  |
| Dairy Engineering 39.48  | -                        | -                           | -                          | 1.48<br>N. Sig                  |

According to Table .No.II Dairy Technology students group of the study possess significantly higher muscular power measured through the Vertical jump test when compared to the Dairy Microbiology students group ( 7.47, significant at 0.05 for HSD of 3.72), Dairy Engineering students group (8.27, significant at 0.05 for HSD of 3.72) and Dairy Business Management students group (9.75, significant at 0.05 for HSD of 3.72) but, not when compared to the Dairy Chemistry students group (0.45, not significant at 0.05 for HSD of 3.72). Also the Dairy Chemistry students group showed significantly higher muscular power measured through the Vertical jump test when compared to the Dairy Microbiology students group (7.02, significant at 0.05 for HSD of 3.72), Dairy Engineering students group (7.82, significant at 0.05 for HSD of 3.72) and **Dairy Business Management** students group (9.3, significant at 0.05 for HSD of 3.72). Dairy Microbiology students group, Dairy Engineering students group and the Dairy Business Management students groups of the study did not show any significant difference among themselves in terms of the muscular power measured through the Vertical Jump test protocol.

***Analysis on the muscular power measured by Margaria Kaleman test protocol:***

Table III analysis clearly indicates that there is significant difference among the five groups of the study with respect to their muscular power measured through the Margaria Kaleman test protocol as indicated in the table (F= 6.05 at P of <0.00011). Tukeys HSD post hoc test (table IV) is applied to find out group wise comparisons among all the groups of the study.

**Table III. Analysis of Variance for Muscular power (Margaria Kaleman test)**

| Source                     | SS        | df  | MS       | F    | P        |
|----------------------------|-----------|-----|----------|------|----------|
| Treatment (between Groups) | 85053.87  | 4   | 21263.46 | 6.05 | <0.00011 |
| Error                      | 860523.86 | 245 | 3512.34  |      |          |
| Total                      | 945577.73 | 249 |          |      |          |

According to Table .No.III Dairy Chemistry students group of the study possess significantly higher muscular power as measured by Margaria Kaleman test protocol when compared to the Dairy Business Management students group (40.15, significant at 0.05 level of HSD of 32.58), Dairy Engineering students group (43.83, significant at 0.05 level of HSD of 32.58), Dairy Microbiology students group (45.5, significant at 0.05 level of HSD of 32.58), but not when compared to the Dairy Technology students group of the study (13.36, not significant at 0.05 level of HSD of 32.58).

**Table IV. Tukey HSD test (at 0.05 the significant difference = 32.58)**

| Groups/Means                           | Dairy Technology<br>472.65 | Dairy Business<br>Management<br>445.86 | Dairy<br>Engineering<br>442.18 | Dairy<br>Microbiology<br>440.51 |
|--|----------------------------|--|--------------------------------|---------------------------------|
| Dairy Chemistry<br>486.01              | 13.36<br>N. Sig            | 40.15<br>Sig                           | 43.83<br>Sig                   | 45.5<br>Sig                     |
| Dairy Technology<br>472.65             | -                          | 26.79<br>N. Sig                        | 30.47<br>N. Sig                | 32.14<br>N. Sig                 |
| Dairy Business<br>Management<br>445.86 | -                          | -                                      | 3.68<br>N. Sig                 | 5.36<br>N. Sig                  |
| Dairy Engineering<br>442.18            | -                          | -                                      | -                              | 1.67<br>N. Sig                  |

According to Table .No.IV Dairy Technology students group did not show any significant difference when compared to Dairy Business Management students group (26.79, not significant at 0.05 level of HSD of 32.58), Dairy Engineering students group (30.47, not significant at 0.05 level of HSD of 32.58), Dairy Microbiology students group (32.14, not significant at 0.05 level of HSD of 32.58). Also the Dairy Business Management students group did not show significant difference when compared to Dairy Engineering students group (3.68, not significant at 0.05 level of HSD of 32.58), Dairy Microbiology students group (5.36, not significant at 0.05 level of HSD of 32.58). There is no significant difference between Dairy Engineering and Dairy Microbiology student groups of the study (1.67, not significant at 0.05 level of HSD of 32.58).

Muscular power indicates the ability of a group of muscles or muscles belonging to a body segment like upper body or lower body of overcoming resistance in terms of time. Though the strength of the muscles is more primary and a prerequisite for the muscle power, for functional physical activities power element of the muscular fitness is more important. The possibility is that the muscular power enhances with the more robust and reactive kind of physical activities. In terms of the muscular power measured through the vertical jump performance test protocol, both the Dairy Chemistry and Dairy Technology streams groups of the study showed significantly higher when compared to the other three groups (Dairy Engineering, Dairy Business Management and Dairy Microbiology) of the engineering streams of the study. Whereas with respect to the muscular power measured through the Margaria Kaleman power test protocol, only Dairy Chemistry group of the study showed significantly higher when compared to the other four groups of the study.

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**CONCLUSION:**

Dairy Chemistry and Dairy Technology student groups of the study with the advantage of being exposed to the various kinds of physical activities during their study or academic requirements, showed significantly higher muscular power of the upper body measured through pushups, when compared to the Dairy Engineering group, Dairy Business Management group and Dairy Microbiology student groups of the study. Only Dairy Chemistry students group of the study, showed significantly higher muscular power of the lower body measured by Margaria Kaleman power test when compared to the other four groups of the study.

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