The data collected according to the test procedures discussed in chapter III and the analyses of said data and their appropriate discussions have been made in this chapter. The results are presented dimensionwise in tabular form and discussions are made accordingly.

4.1. Personal data

The age, height and weight of the subjects have been considered as personal data and their mean values, range and SD are presented in Table No. -1.

Table - 1 Mean, range and SD of age, height and weight of the subjects.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Range</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Year)</td>
<td>23.11</td>
<td>21 – 25</td>
<td>± 1.28</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>156.66</td>
<td>150 – 168</td>
<td>± 4.62</td>
</tr>
<tr>
<td>Weight during Pre test July '94 (kg)</td>
<td>46.29</td>
<td>36 – 72</td>
<td>± 8.44</td>
</tr>
<tr>
<td>Weight during Post test March '95 (kg)</td>
<td>47.83</td>
<td>38 – 75</td>
<td>± 8.30</td>
</tr>
</tbody>
</table>
4.1.1. Age

It appears from the Table No - 1 that the mean age of the subjects was 23.11 years with the range between 21-25 and the variation of 1.28 years.

4.1.2. Height

From the Table No-1 it appears that the mean height of the subjects was 156.66cm tallest with a variation of 4.62 cm. The tallest subject was 168cm and the shortest one was 150cm.

4.1.3. Weight

It appears from the Table No-1 that a wide variation in weight was observed with the highest weight of 72Kg and the lowest 36 Kg. The mean weight was 46.29 Kg with a SD of 8.44 Kg at the onset of the training and after completion of training mean weight increased slightly and was 47.83± 8.30 Kg.

Regarding influence of training on body weight great variation may be observed among the researchers. While Glick and Kaufmann (1976), Housh et al. (1988). Yoshizawa et al. (1990) found increase of body weight following training, Pollock et al. (1975), Buccola and Stone (1976), McIntosh (1983), Whatley et al. (1994) found decrease in body weight following training.

On the other hand Gettman et al. (1978), Thomas (1978), Stacy et al. (1982), Hurley et al. (1984), Mcgown et al. (1990), Garber et al. (1992), found no change in body weight following training.

In the present study increase in body weight was observed following training. From the findings of the present study it may be inferred that, body weight may be altered due to influence of training depending on the nature of the training regimen.

4.2. Fitness variables

Six standard tests on fitness variables were conducted at the onset (July 1994) and at the end of the training course (March 1995) according to the test procedures mentioned in chapter III. The raw data collected from each test was converted to percentile scores according to the AAHPER Youth Fitness norms (1976) cited by Barrow (1979). The raw data and their corresponding percentile score of all the subjects have been given in Appendix No- A. In Table No -2 the mean of the percentile scores of six items obtained from pre and post tests are presented.
Table 2: Mean and SD of the pre and post test data of fitness variables and their comparison.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre Test</th>
<th>Post Test</th>
<th>SED</th>
<th>Obtained 't' value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexed Arm Hang</td>
<td>29.68</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run</td>
<td>52.56</td>
<td>47.83</td>
<td>19.67</td>
<td>0.21</td>
</tr>
<tr>
<td>Standing</td>
<td>77.44</td>
<td>69.72</td>
<td>10.95</td>
<td>0.53</td>
</tr>
<tr>
<td>Broad Jump</td>
<td>69.72</td>
<td></td>
<td>5.68</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 7. Comparison of body weight of the subjects before & after training.
Accordingly during discussion and analyses of the data the percentile scores would only be considered.

**Table - 2 Mean and SD of the pre and post test data of fitness variables and their comparison.**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre Test Mean SD</th>
<th>Post Test Mean SD</th>
<th>SED</th>
<th>Obtained 't' value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexed Arm Hang</td>
<td>52.33 ± 29.68</td>
<td>67.61 ± 22.72</td>
<td>3.21</td>
<td>4.76*</td>
</tr>
<tr>
<td>Sit Up</td>
<td>52.56 ± 19.67</td>
<td>72.78 ± 20.40</td>
<td>3.18</td>
<td>6.36*</td>
</tr>
<tr>
<td>Shuttle Run</td>
<td>77.44 ± 10.95</td>
<td>86.27 ± 5.83</td>
<td>2.52</td>
<td>3.49*</td>
</tr>
<tr>
<td>Standing Broad Jump</td>
<td>69.72 ± 5.68</td>
<td>72.55 ± 6.17</td>
<td>.53</td>
<td>5.32*</td>
</tr>
<tr>
<td>50 Yard Dash</td>
<td>64.44 ± 19.67</td>
<td>81.43 ± 15.37</td>
<td>3.67</td>
<td>4.65*</td>
</tr>
<tr>
<td>600 Yard Run-walk</td>
<td>74.89 ± 13.51</td>
<td>83.11 ± 16.37</td>
<td>1.07</td>
<td>7.65*</td>
</tr>
</tbody>
</table>

* Signifiant at .05 level.

**4.2.1. Strength Test.**

It appears from the Table -2 that the mean percentile scores of the pre and post tests of the Flexed Arm Hang test were 52.33 and 67.61. And the obtained 't'
value between two sets of scores was 4.76 which was significant at .05 level. 29.20% net improvement was observed on the post test score.

4.2.2. Muscular Endurance Test

The mean scores of pre and post test in Sit up were 52.56 and 72.78. The obtained ’t’ value between the two sets of scores was 6.36 which was also significant. Following organised physical education training the performance in sit up test was improved significantly in post test and the magnitude of improvement was maximum (38.50%) among the physical fitness tests conducted.

4.2.3. Agility Test

From Table No. 2 the mean scores of the pre and post tests in the Shuttle Run (agility test) performance were 77.44 and 86.27 respectively. 11.40% improvement was observed on the post test score. Physical training programme has positively influenced this improvement. The two sets of score when compared, the obtained ’t’ value 3.49 was also found significant at .05 level.

4.2.4. Leg Power Test

It appears from Table No. 2 that the mean percentile scores of the pre and post test in the Standing Broad Jump performance were 69.72 and 72.55 respectively. The obtained ’t’ value was 5.32 and found significant at .05 level. In comparison to other fitness tests the improvement in leg power test was minimum, only 4.06%.

4.2.5. Speed Test

The mean percentile scores of the pre and post tests in the 50 Yard Dash test were 64.44 and 81.43 respectively. Significant difference existed between the two means as the ’t’ value obtained was 4.65. 26.36% improvement was observed at the post test score from that of pre test score and may be attributed due to the training programme.

4.2.6. Cardiorespiratory Endurance Test

The mean scores of the pre and post tests in the 600 Yard Run-Walk test were 74.89 and 83.11 respectively. Comparing the means the obtained 't' value 7.65 was found significant at .05 level. Improvement in the post test was 10.97% from that of pre test and was comparatively low.
Fig. 8. Comparison of strength performance (shoulder girdle) before & after the training

Flexed arm hang test

Fig. 9. Comparison of endurance performance (muscular) of the subjects before & after the training

Sit-up test
Fig. 10. Comparison of agility performance of the subjects before & after the training

Scores

Shuttle run test
- Pre training
- Post training

Fig. 11. Comparison of leg power performance of the subjects before & after the training

Scores

Standing broad jump test
- Pre training
- Post training
4.2.7. Discussion

It appears from the Table No-1 that the post test scores were higher in all six test items than that of pre test scores. The comparison between pre and post test data was made according to standard statistical procedure and obtained 't' values in all the six items were found significantly different. It means post test scores were significantly higher than the pre test scores. From these findings it may be concluded that the performance in the six fitness test items were improved significantly following the participation in the organised physical education programme by the trainee females.

However the magnitude of the improvement was not equal in all the test items. Maximum improvement was observed in the sit up test (38.50%) followed by flexed arm hang test (29.20%). The magnitude of improvement was lowest in standing broad jump test (4.06%) followed by 600 yard run-walk test (10.97%). It means the arm and shoulder strength and abdominal muscle strength-endurance was in higher order than the leg explosive strength and general cardiorespiratory performance. In over all analysis it appears that female trainee subjects improved their physical fitness ability following the training programme adopted by the professional physical education training institute.

A number of researchers have shown that following well planned organised physical training, performances in selected physical fitness tests were improved significantly in men (Nunneys 1960; Metz, 1968; Mcnamara, 1978; Cunningham, 1981; Mandal and Bannerjee, 1990; etc) and in women (Edwards, 1974; Macdonald, 1983; Hassmen and Backmen, 1992;)

Sharkey (1990) has reported that exercise with medium resistance and repetition 15 to 25 may improve endurance as well as strength. Clark and Vaccaro (1979), Reid et al. (1987) have shown improvement in muscular strength endurance among young boys & girls and adult male respectively.

Weltman et al. (1986), Leatt et al. (1987) Housh et al. (1988) have particularly found improvement in vertical jump performance following training.

Harre (1982) and Fox (1981) have shown that running speed may be improved through training. Nunney (1960) found improvement in speed by circuit training method Bandopadhyay (1992) observed that improvement of running speed is possible if the training is very specific for the purpose and the duration of the training be not less than 8 to 10 weeks. Mandal and Banerjee (1989) found no improvement in running speed following six weeks multigym training, though strength gain was significant
Fig. 12. Comparison of speed performance of the subjects before & after the training

50-yard dash test

- Pre training
- Post training

Table 3. Mean and SD of the pre and post test data of formal

Fig. 13. Comparison of endurance performance (cardiorespiratory) of the subjects before & after the training

600-yard run-walk test

- Pre training
- Post training
Das and Banerjee (1992) observed that speed performance may be improved through appropriate training and longer the duration better was the magnitude of the improvement, among young soccer trainees.

Doolittle and Bigbee (1968), Katch et al. (1973), Kearney & Byrnes (1974), Ghosh and Banerjee (1985) found significantly high correlation between predicted oxygen uptake and performance in 12 minutes run-walk. Cooper (1968) found correlation of .897 between 12 min run with maximum oxygen uptake.

Therefore the findings of the present study were in agreement with the findings of the other researchers. Accordingly from the findings of the study in regard to fitness dimension it may safely be concluded that hypothesis no. -1, indicated in chapter 1.7 is accepted.

4.3. Performance in Selected Activities

Performance in selected activities were rated in a ten point scale as per procedure indicated in chapter III. selected activities were subdivided into four groups. Discussion are made group wise.

Table - 3 Mean and SD of the pre and post test data of formal activity and their comparison.

<table>
<thead>
<tr>
<th>Activities</th>
<th>Pre Test Mean</th>
<th>Post Test Mean</th>
<th>SED</th>
<th>Obtained 't' value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Callisthenics</td>
<td>6.10 ± .45</td>
<td>6.58 ± .46</td>
<td>.04</td>
<td>12*</td>
</tr>
<tr>
<td>Marching</td>
<td>3.77 ± .80</td>
<td>5.13 ± .87</td>
<td>.05</td>
<td>27.2*</td>
</tr>
<tr>
<td>Dumbbell</td>
<td>3.06 ± .86</td>
<td>7.14 ± .80</td>
<td>.20</td>
<td>20.4*</td>
</tr>
</tbody>
</table>

* Significant
4.3.1. Formal Activity

Formal activities comprised of callisthenics, marching and dumbbell. The mean scores in these three activities at pre and post test respectively and 't' value comparing the mean scores are presented in Table No - 3. In these three activities the post test means were found significantly higher than the pre test mean scores. It means performance in these three activities improved following participation in the physical education training programme. The duration of participation in these activities were about six weeks. However the magnitude of improvement in these three activities were not equal. The maximum improvement noticed in dumbbell (133.33%) followed by marching (36.07%) and in callisthenics it was minimum (7.86%). Since the pre test score in Callisthenics was considerably high, the magnitude of improvement after six weeks was minimum. Further more learning in dumbbell activity was probably easier and due to very nature of the activity the magnitude of improvement was considerably high.

Table - 4 Mean and SD of the pre and post test data of Rhythmical Activity rating scores and their comparison.

<table>
<thead>
<tr>
<th>Activities</th>
<th>Pre Test</th>
<th>Post Test</th>
<th>SED</th>
<th>Obtained 't' value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lazium</td>
<td>2.63</td>
<td>6.06</td>
<td>.11</td>
<td>31.2*</td>
</tr>
<tr>
<td></td>
<td>± .54</td>
<td>± .78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bratachari</td>
<td>5.39</td>
<td>6.22</td>
<td>.17</td>
<td>4.88*</td>
</tr>
<tr>
<td></td>
<td>± 1.09</td>
<td>± 1.31</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant

4.3.2. Rhythmical activity

In rhythmic group subjects participated in two different types of activities. These were LAZIUM (a classical indian light apparatus drill in combination with
Fig. 14. Comparison of performance of the subjects in the formal activities before & after the training

Scores

<table>
<thead>
<tr>
<th>Activity</th>
<th>Pre training</th>
<th>Post training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Callisthenics</td>
<td>6.1</td>
<td>6.58</td>
</tr>
<tr>
<td>Marching</td>
<td>3.77</td>
<td>5.13</td>
</tr>
<tr>
<td>Dumbbell</td>
<td>3.06</td>
<td>7.14</td>
</tr>
</tbody>
</table>

Fig. 15. Comparison of performance in the rhythmical activities before & after the training

Scores

<table>
<thead>
<tr>
<th>Activity</th>
<th>Pre training</th>
<th>Post training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lazium</td>
<td>2.63</td>
<td>6.06</td>
</tr>
<tr>
<td>Bratachari</td>
<td>5.39</td>
<td>6.22</td>
</tr>
</tbody>
</table>
rhythmic movements and BRATACHARI (a traditional Bengali physical culture, combined of vigorous movements to body parts, folkdance and traditional marshal art). The rating scores of these two activities were obtained according to the procedure indicated in chapter III. The mean rating scores of pre and post test in these two activities are presented in Table No - 4. The pre test score of LAZIUM was reasonably lower, 2.63. This is because LAZIUM activity is not very popular in eastern part of the country (W.B) in comparison of the western part of the country (MAHARASTRA state). The other rhythmic activity BRATACHARI is very popular in WEST BENGAL and even in schools this programme is being conducted. Therefore the mean pre test score was some what better (5.39) in comparison to LAZIUM. The post test score in both the activities were improved and the magnitude of improvement was very high in LAZIUM (130.41%). When the pre and post test means were compared, the obtained 't' value showed that the post test mean was significantly higher than the pre test score of both LAZIUM and BRATACHARI activities. The pre test was conducted in 3rd week of July '94 and the post test was conducted in 3rd week of September '94. Within the eight weeks period by participation in various physical activities and conditioning programme general physical fitness has improved. This has perhaps improved the balance and co-ordination of the body. A good performance in rhythmic activity is related to have a high degree of balance and co-ordination. Therefore improvement in the performance of rhythmic activities may be attributed due to the improvement of general fitness, along with balance, co-ordination etc. Moreover learning in rhythmic activities for female students are enjoyable and have a natural inclination towards dancing movement which perhaps influenced in the improvement of performance in rhythmic activities.

4.3.3. Individual Activity.

The individual activities in which the subjects had to undergo training during their course were gymnastics, track and field, tenikoit, and badminton. The performance in these events were rated according to the procedure already mentioned in chapter III. The mean scores of performance during pre and post test and 't' score comparing the two sets of means are presented in Table No-5.
Table - 5 Mean and SD of the pre and post test data of the Individual Activity and their comparison.

<table>
<thead>
<tr>
<th>Activities</th>
<th>Pre Test</th>
<th></th>
<th>Post Test</th>
<th></th>
<th>SED</th>
<th>Obtained 't' value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gymnastics</td>
<td>2.36</td>
<td>± .48</td>
<td>5.44</td>
<td>± .62</td>
<td>.14</td>
<td>22*</td>
</tr>
<tr>
<td>Track and Field</td>
<td>3.39</td>
<td>± .18</td>
<td>6.72</td>
<td>± .80</td>
<td>.19</td>
<td>17.52*</td>
</tr>
<tr>
<td>Tenikoit</td>
<td>3.22</td>
<td>± .97</td>
<td>5.97</td>
<td>± .79</td>
<td>.20</td>
<td>13.75*</td>
</tr>
<tr>
<td>Badminton</td>
<td>2.83</td>
<td>± .91</td>
<td>5.64</td>
<td>± .76</td>
<td>.11</td>
<td>25.55*</td>
</tr>
</tbody>
</table>

* Significant

4.3.3.1 Gymnastics

The pre test of gymnastic was conducted during 3rd week of December '94 and the post test was conducted during 4th week of March '95. In gymnastics the subjects had to learn floor exercises, vaulting horse and balance beam. The performance rating in these three events were taken separately and the mean of three events were considered as total performance rating of an individual in gymnastics.

The pre test performance rating in gymnastics was relatively low (2.36). This is because most of the subjects had no previous experience. However due to training for about three months they had to learn various events and by practice they improved their performance. In the post test the mean score observed was 5.44. The pre and post test means were compared accordingly and 't' value was found significant at .05 level. It simply means, by participation in various gymnastic events and probably
through appropriate learning the overall performance has significantly improved. The subjects were introduced in physical education training programme in July 1994 and after six months when their general strength, Co-ordination, muscular endurance etc. have improved then they were introduced to gymnastics programme. The improvement of general motor quality and confidence, motivation etc. perhaps influenced the gymnastics performance. Learning process in a new skill also have definitely influenced the higher rating at post test.

4.3.3.2. Track & Field.

In track and field events performance rating was made in similar fashion as indicated in gymnastics above. There were seven Track and Field events in which the subjects participated for about six and half months. There were two running events (short sprint & distance running), two jumping events (long, & high) and three throwing events (short, discuss & Javeline). The pre test was conducted in the month of September and cumulative performance rating, considering all events was 3.39. It appears from observation that only a few subjects had their previous experience in track and field events. Most of them had no personal participation experience in these events.

However during the course of training and within a span of six and half months the subjects improved a lot and have learned skills in executing performance in track and field events. For this reason post test cumulative performance score was improved (mean post test score was 6.72). The comparative analysis of the two means (pre and post test) showed that post test score significantly higher than that of pre test score. The computed 't' value was 17.52 and was found significant at .05 level. The improvement in post test score is obvious and this is due to learning phenomenon and other reasons which has already been mentioned in gymnastics performance analysis and are also equally applicable in track and field events.

4.3.3.3. Tenikoit

The mean pre test score was 3.22 with a variation of .97. The mean pre test score within the range of other individual sports in which the subjects were tested. Since the most of the subjects had no knowledge and personal experience in the game tenikoit, the score was relatively low. The pre test was conducted in 3rd week of Dec'94. The duration of participation in tenikoit, period between pre & post test was utilised by the subjects for development of specific skills and technical tactical
strategy of the game. Since the post test, score (5.97) was higher than pre test, it may be concluded that training programme helped them in improving performance in tenikoit. The pre and post test means were compared by 't' test and found post test significantly higher than the pre test. This also justified the positive improvement in performance of the game.

4.3.3.4. Badminton.

The mean pre test score of Badminton (Table No-5) was also relatively low like other individual activity. The duration of participation in this game during their training course was almost ten weeks. The pre test was conducted in 3rd week of Dec '94 and post test in 2nd week of March '95. The mean post test score (5.64) was found significantly higher than that of pre test score. This was evident from the obtained 't' value (25.55) which is highly significant and revealed that the post test mean score was significantly higher. The training programme underwent by the subjects helped considerably in improving their performance in Badminton.

Analysing the performance in four individual sports and games it may safely be concluded that the organised physical education training programme in which the subjects participated had a positive influence in improving performance capacity of the subjects. Moreover the teaching learning situation had a positive influence in this regard. The improvement of general fitness and motor capacity due to regular participation in well designed course programme also had a positive influence in improving skill performance in the said individual activity.

4.3.4. Group Activity (Small Area Games)

The group activities in which the performance tests conducted were four small area games namely KABADDI, KHO-KHO, NET-BALL, VOLLEYBALL. First two games are Indian National Games and are widely being played in this country including rural areas. In these games subjects had to learn a variety of skills specific to the game with necessary technical and tactical aspects. In the training programme of physical education course the subjects had to participate in variety sports and games but only four small area games were considered. Due to complications in learning, some very technical skill oriented games were excluded in this research programme. This is because the period allotted to these games were not sufficient to improve their performance. These games were Basketball, Hockey, Soccer, Cricket, Softball etc.
**Table - 6 Mean and SD of the pre and post test data of the Group Activity and their comparison.**

<table>
<thead>
<tr>
<th>Activities</th>
<th>Pre Test Mean SD</th>
<th>Post Test Mean SD</th>
<th>SED</th>
<th>Obtained 't' value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kabaddi</td>
<td>1.22 ± 1.55</td>
<td>4.44 ± 1.15</td>
<td>.12</td>
<td>26.83*</td>
</tr>
<tr>
<td>Kho-kho</td>
<td>1.17 ± 1.28</td>
<td>3.86 ± 1.33</td>
<td>.14</td>
<td>19.21*</td>
</tr>
<tr>
<td>Netball</td>
<td>2.72 ± .55</td>
<td>6.22 ± .65</td>
<td>.11</td>
<td>31.82*</td>
</tr>
<tr>
<td>Volleyball</td>
<td>2.58 ± 1.00</td>
<td>5.78 ± .65</td>
<td>.12</td>
<td>26.67*</td>
</tr>
</tbody>
</table>

* Significant

### 4.3.4.1 KABADDI.

The mean pre test score of this game was very low. This is because most of the subjects had no personal experience in this game. The contact nature and strength involve in this game perhaps force many girls to avoid this game. The duration of participation in training programme of KABADDI game was about eight weeks. The post test score was 4.44, not very high but when compared with pre test score, the 't' value obtained was found highly significant. Since pre test score was very low, the post test score though not very high, found significantly higher. Comparing the performance rating in individual sport and other group activities namely netball and volley ball it appears that the post test score in KABADDI was comparatively low, less than five in a ten point scale. It simply means that the time alloted to this game was not sufficient to improve performance capacity up to an optimal level. The motivation of the subjects and other related factors might have influenced the teaching learning situation during the course.
4.3.4.2. KHO KHO

In KHO KHO almost similar results was observed as in KABADDI. The efficiency in KHO-KHO game requires high level of fitness and skill of body movement. It appears from the Tabel No - 6 that the subjects had a poor capability in this game during pre test. The mean pre test score was 1.17. On enquiry the researcher understand that most of them had no personal experience of participation in this game. The duration of particiaption in this game was about eight weeks and the performance improvement in this game was not satisfactory. The post test mean score was 3.86 which was similar with pre test score of some individual sports. However when the mean pre and post test performance scores of KHO-KHO were compard by 't' test, value obtained was found statistically significant. The relatively low post test score was found significantly higher because pre test score was very very low. Conclusion in this regard may be same as in KABADDI, i.e the time spent in teaching-learning situation perhaps was not sufficient to improve performance capacity up to certain level. Many other factors which were not considered in this study may have influenced to restrict performance capacity.

4.3.4.3. Netball

The mean pre test score in Netball was 2.72 and the mean post test score was 6.22. The comparison of pre and post test score revealed a highly significant improvement. The obtained 't' value (31.82) was significant at .05 level. The skill involved in netball was rather simple and have some similarities with Basketball. Moreover before participation in netball the subjects had underwent the training programme in Basket ball for about ten weeks. The duration of participation in Netball was eight weeks and the course work definitely helped them in improving performance capacity in netball.

4.3.4.4. Volleyball

Volleyball is one of the important games in which organised physical education training programme is providing more emphasis. The duration of participation in volleyball training programme was about ten weeks, January '95 to March '95. The mean pre test score was 2.58 and mean post test score was 5.78. The difference between pre and post test was statistically significant which means post test performance rating was significantly higher. Moreover the training programme in volleyball helped them in improving their performance. It also be mentioned that inspite of emphasis
Fig. 16. Comparison of performance of the subjects in the individual activities before & after the training

Gym.*-Gymnastics; T&F=Track & Field

Considered the performance capacity in various physical activities participated by the trained females in the organised physical education training course may satisfy the demand of the individual, rhythmic and group activities were selected. Hypothesis no. - 2 relating skilled performance in selected physical activities be rejected.

Fig. 17. Comparison of performance of the subjects in the group activities before & after the training

4.4 Physiological Variables

Physiological variables measured in this study were heart rate at rest and following submaximal exercise, physical efficiency and the maximum Oxygen uptake capacity. The data is presented according to the procedure indicated in chapter 2 and the results are presented in the chapter in the text.
given the post test performance was not very high, though significantly higher than pre test. The performance in Volley ball is related to specific fitness and skill perception etc. The subjects underwent organised physical education training programme had improved their fitness capacity particularly in leg explosive strength which might have influenced the performance in volleyball. The learning factor, interest, attitude, motivation etc. may have played their roles in improving their performance.

By participation in training programme designed in physical education professional course had helped the subjects in improving the performance in group activities also along with individual activities. It appears that performance in post test i.e following training, in KABADDI & KHO-KHO was low in comparison to netball and volleyball in a ten point scale. The complexity in learning skill may be one of the factor but the duration of the programme participated in these games was comparatively less than volleyball and some other individual sport & games. The findings tend to indicate that duration of participation in the training of KABADDI and KHO-KHO were not sufficient to improve performance capacity at the same level with other games.

Considering the performance capacity in various physical activities participated by the trainee females in the organised physical education training course, it may safely be concluded that performances in formal, individual, rhythmical and group activities were improved significantly. Thereby the hypothesis no. - 2 relating to skilled performance in selected physical activities be rejected.

4.4. Physiological variables

Physiological variables measured in this study were heart rate at rest and following submaximal exercise, physical efficiency index and the maximum O₂ uptake capacity. The data collected according to the procedure indicated in the chapter III and the results are presented in this chapter in Table - 7.
Table - 7 Mean and SD of the pre and post test data of physiological variables and their comparison.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre Test Mean SD</th>
<th>Post Test Mean SD</th>
<th>SED</th>
<th>Obtained 't' value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resting Heart Rate</td>
<td>67.11 ± 9.31</td>
<td>63.61 ± 7.01</td>
<td>.82</td>
<td>- 4.27*</td>
</tr>
<tr>
<td>Exercise Heart Rate</td>
<td>159.56 ± 17.78</td>
<td>147.89 ± 14.53</td>
<td>4.12</td>
<td>- 2.83*</td>
</tr>
<tr>
<td>Physical Efficiency</td>
<td>68.72 ± 7.77</td>
<td>72.63 ± 8.11</td>
<td>.38</td>
<td>10.29*</td>
</tr>
<tr>
<td>Vo₂ max, liters / min</td>
<td>1.95 ± .37</td>
<td>2.53 ± .54</td>
<td>.09</td>
<td>6.44*</td>
</tr>
</tbody>
</table>

4.4.1. Resting Heart Rate.

The mean resting heart rate before training was 67.11 bpm with a variation of 9.31. Following training resting heart rate decreased and the mean value obtained was 63.61 bpm with a variation of 7.01. The decrement of resting heart rate was statistically significant and when the paired means were compared through 't' test the obtained 't' value was - 4.27 which was significant at .05 level.

Following training resting heart rate decreases is now an established conclusion. A number of researchers have shown this in their research report. Bramwell and Ellis (1929) found that in highly trained athlete resting heart rate may be as low as 45 bpm. Shoenfeld and Karen (1981) found lowest heart rate among marathon runners and observed a negative correlation between HR and Vo₂ max.

* Significant
Banerjee (1987) found mean resting HR of 60.16 bpm among state level football players. Malhotra (1973) found resting HR between 54 and 60 bpm among track and field Indian athletes.

Altei (1975), Mileisis et al. (1976) found a significant reduction in resting HR following training. In similar studies Bandyopadhyay (1992), Mandal and Banerjee (1994), Das and Banerjee (1995) have shown significant reduction in resting HR following training. The resting bradycardia (decreased heart rate) resulting from training is (a) most evident when athletic and non athletic subjects are compared and (b) less evident but still clear cut when sedentary subjects undergo a training programme (Frick et al. 1967).

Citing Badeer (1975), Frick et al. (1967), Winder et al. (1978), Fox and Methews (1981) concluded that resting bradycardia resulting from exercise training most likely involved two major components, i) a reduction or slowing in the intrinsc rate of the arterial pace maker, the S-A Node ii) an increase in parasympathetic (vagal) predominance on the pace maker rate as a result of a decrease in sympathetic activity.

The subjects of the present study were the participants in the organised physical education training for about 10 months and it is expected that the training bradycardia will occur in them and the possible reasons will be same as indicated above. The findings of the present study found similarities with many other researchers.

4.4.2. Exercise Heart Rate

Heart rate response against a submaximal exercise was recorded and the mean value of the two sets of tests (pre and post) are presented in Table - 7. The submaximal exercise was step up test, the details of which has been discussed in chapter III.

It may be observed from the table that heart rate response against the submaximal work load decreased following training. While at the pre test the mean value was 159.56 bpm. The difference between the two means was significant at .05 level. The 't' value obtained was – 2.83.

The data indicated that the organised physical education training in which the subjects underwent for a considerable period of time has influenced the cardiac efficiency positively. It means that the heart has to work less against the same work load during post test in comparison to the pre test.
Fig. 18. Comparison of RHR of the subjects before & after the training

RHR = Resting Heart Rate

- Pre training
- Post training

Fig. 19. Comparison of EHR of the subjects before & after the training

EHR = Exercise (submaximal) Heart Rate

- Pre training
- Post training

The findings of the study have indicated that the physical efficiency index (PEI) scores of the subjects, both male and female, have increased significantly after the training program. The PEI scores were calculated using the following formula:

PEI = (EHR - RHR) / EHR

where EHR is the Exercise Heart Rate and RHR is the Resting Heart Rate.

It appears from the table that in the pre-training phase, the mean EHR was 159.56 beats per minute, and in the post-training phase, the mean EHR was 147.89 beats per minute. This indicates a significant decrease in EHR, suggesting improved physical efficiency.

Since the PEI scores were not available in the table, the increase in physical efficiency was assessed through the decrease in EHR. The decrease in EHR is a highly positive correlation between physical education and efficiency, and it indicates that the P.E.I is considered to be an important criterion for evaluation of fitness. Groth and Ayling also observed that higher
Perhaps the most consistent and pronounced change associated with training is a decreased heart rate during submaximal exercise following training. The exercise bradycardia like the resting bradycardia is thought to be caused by modification within the heart muscle itself and within the autonomic nervous system.

The decreased submaximal heart rate may be either due to i) an intra-cardiac or Central mechanism, that is an effect directly on heart muscle itself or ii) an extra cardiac or peripheral mechanism that is an indirect effect resulting from alteration in trained skeletal muscle (Fric et al., 1967; Fox et al, 1975; Fox and Mathews, 1981;)

The specific training programme underwent by the subjects has improved of their level of fitness and therefore the changes observed in the heartrate response at rest and during submaximal exercise are quite evident.

Physical performance potentiality improvement has been corroborated by the improvement of physiological functioning as evident from heart rate response.

The findings of the present study has similarity with other researchers. Saltin et al. (1968); Kilbom, (1971) Schener and Tripton (1965) and many other researchers have shown that training elicits decrease in the heart rate response at submaximal work load.

Gillespie et al. (1980) Hickson et al. (1976) also demonstrated the specificity of sprint and endurance training effect in both animal and humans. However the magnitude of improvement (7.3%) for the female trainee subjects may be different due to specificity of the training.

4.4.3. Physical Efficiency Index.

The data of physical efficiency index obtained from pre and post test respectively are presented in Table No-7.

It appears from the table that mean P. E. I. Score was 68.72 with a variation of 7.77 and in the post test the mean value increased to 72.63 with a variation of 8.11. Since the mean scores were not equal, statistical computation have been made and the 't' value obtained was 10.29. It means the improvement in the post test (5.6%) was highly significant at .05 level.

P.E.I. reveals the cardiorespiratory endurance capacity and in the field of physical education and sports the P.E.I is considered to be an important criterion for evaluation of fitness. Ghosh and Banerjee (1985) have shown a highly positive correlation between P.E.I and distance running ability. They also observed that higher
the distance, higher its degree of relationship to P.E.I. Samanta and Biswas (1985) in a similar study found P.E.I in the range of 47 to 54 among the female physical education trainee students.

Measurement of CR endurance or P. E. I helps to classify persons by assessing their present physical condition and predicting success in certain activities on the basis of that results, a number of researchers (Dolittle and Bigbee, 1968; Katch and Henry, 1972; Keerney and Byrnes, 1974) have shown that Vo₂ max is highly co-released with CR endurance and r's ranging from .34 to .9.

The organised physical education programme in which the subjects of the present study actively participated has resulted significant improvement in physical fitness performance in all the six tests conducted. Almost all the physical fitness tests are the reflexion of the physiological potentialities. The cardiorespiratory endurance capacity development through training (ref. Table No-2) has resulted improvement in O₂ uptake capacity, which will be discussed later. Training also has significantly reduced exercise heart rate against a sub maximal work load (Table No 7). These two aspects heart rate and O₂ uptake capacity are clear indication of improvement of cardiorespiratory capacity. The P.E.I score improvement is the reflexion of the improvement of cardiorespiratory capacity. The findings of the present study therefore is obviously in line with the expectation. The mean score of P.E.I however was higher than the reports of the previous researchers, studied on trainee females.

The concurrent validity of the step test heart rate response to maximum oxygen uptake ranges from .32 to .77 with the median being approximately .44 (Cureton and Sterling, 1964; Gallagher and Brouha, 1943; Graybiel and West, 1945;). Step tests that use recovery heart rates tend to possess a lower degree of validity than do measuring instruments that use exercise heart rates. It is suggested that the step test should be used when it is impractical to use one of the more valid measuring instruments. One of the main advantages of the step test is that they can be administered to large number of individuals in a field situation without requiring expensive equipment or highly trained personnel. The step tests are practical for use in physical education classes.

4.4.4. Vo₂ max.

Maximal oxygen consumption is considered to be the primary physiological variables which explains the capacity of the respiratory and the cardiovascular system during work stress. Oxygen uptake capacity provides an unequivocal expression of
the ability of the cardiorespiratory system to transport oxygen from the atmosphere to the working tissues. Maximal oxygen uptake can be estimated by heart rate against a submaximal work load. Under normal conditions a highly linear relationship exists between maximal oxygen uptake and heart rate within any given individual. The well conditioned person can transport the same amount of oxygen at a lower heart rate than can the poorly conditioned one, given the similarity of such factors as weight and sex.

In the present study the maximum oxygen uptake was predicted from submaximal heart rate using Astrand-Rhyming Nomograph. Before on set of the training programme the predicted mean VO₂ max. of the subjects was 1.95 lit/min with the SD of .37 lit/min. The post test, which was conducted during eight months of physical education professional training course, showed a highly significant improvement in the mean predicted VO₂ max score. The mean VO₂ max as recorded was 2.53 lit/min with a variation of .54 lit/min.

The mean score have clearly shown an improvement in maximum oxygen uptake capacity following training, when the pre and post test means were compared. The obtained ‘t’ value was 6.44 which was statistically considered as highly significant (P<.05, Table No- 7). The improvement in this regard following training was about 29.74%.

Hickson (1985) observed improvement between 11% to 20% after ten weeks pregramme among female subjects. Massicotte (1983) reported an improvement of 18% to 19% in VO₂ max among women trainees. Eisenman (1975), Getchill (1975), Kilbom (1971) and many other scientists have indicated that following training significant improvement may be observed in physiological capacity including VO₂ max. Pollock (1973) observed that 5.20% improvement can be anticipated following 8-12 weeks training in the college age women. Saltin and Astrand (1967) have shown that VO₂ max is highest in athletes who compete and undergo endurance training.

The average VO₂ max values of Indian athletes as reported by Malhotra et al (1972) was 52-63 ml/min/kg. Therefore the findings of the present study are quite in proximity with the other leading researchers. A slightly higher percentage of improvement (29.74%) may be due to longer duration of training. Kilbom (1971) opined that, in general, females benefit from training just as males do and that this benefit is brought through similar physiological changes. This is true for maximal work performance as well as for submaximal efforts. Fox and Mathew (1981) indicated that
Fig. 20. Comparison of PEI of the subjects before & after the training

PEI = Physical Efficiency Index

Pre training  | Post training

Fig. 21. Comparison of maximum oxygen uptake capacity of the subjects before & after the training

LITER/MINUTE

Pre training  | Post training

The result and discussion on the findings of the three psychological variables based on the subjects of the study are presented below.
the increase in maximal aerobic power is similar in females and males following identical programmes. Therefore it may be concluded that improvement of VO₂ max among the subjects of the study is a clear indication of physiological adaption due to chronic exercise programmes that are being followed in the physical education training institutes.

Considering the heart rate response at rest and during exercise, Physical Efficiency Index and VO₂ max at the onset of training course and after completion of training programme, it may be concluded that the physiological potentialities of the trainee females improved significantly. Thus the hypothesis no-3 relative to physiological variables be accepted.

4.5. Psychological variables

Psychology in sports & physical activity is an important contribution to holistic development of participation in the athletic areas. The psychology of learning and performance in particular has been an area of study in which the teacher and coach have continually sought guidance as to the nature of psychomotor abilities and skill with which they were concerned, and to the ways in which most effective performance might be achieved. The response capabilities of the individual are dependent upon his innate neuromotor make up, his physical structure and the typical level of activation.

A number of researchers have shown that chronic exercise can influence positively the mental health aspect, mood, and decreased anxiety and thereby beneficial to the wellbeing of the individual (Brown 1988, Dishman 1988, Morgan 1980).

The result and discussion on the findings of the three psychological variables measured on the subjects of the study are presented below:-
Table - 8  Mean and SD of the pre and post test data of psychological variables and their comparison.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre Test</th>
<th>Post Test</th>
<th>SED</th>
<th>Obtained 't' value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sports Achievement</td>
<td>23.8</td>
<td>26.78</td>
<td>.66</td>
<td>4.52*</td>
</tr>
<tr>
<td>Motivation</td>
<td>± 2.82</td>
<td>± 4.24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State Anxiety</td>
<td>40.39</td>
<td>34.5</td>
<td>1.60</td>
<td>– 3.68*</td>
</tr>
<tr>
<td></td>
<td>± 10.22</td>
<td>± 7.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trait Anxiety</td>
<td>42.33</td>
<td>38.56</td>
<td>1.20</td>
<td>– 3.14*</td>
</tr>
<tr>
<td></td>
<td>± 7.27</td>
<td>± 7.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leadership</td>
<td>50.72</td>
<td>54.89</td>
<td>5.83</td>
<td>.72</td>
</tr>
<tr>
<td></td>
<td>± 31.12</td>
<td>± 24.85</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant

4.5.1. Sports Achievement Motivation

Motivation is the conceptual term used to explain the cause of one initiating and sustaining action, as well as the intensity at which it is pursued. It consists of determinants of physiologic drives and psychologic motives which are acquired in response to our social and physical environment. The concept of motivation specifically achievement motivation has attracted the interest of many sports researchers. Motivation appears to be the key to an accomplishment either in sports or in any other competitive area (Dorothy 1978).

The theory of achievement motivation attempts to account for the determination of the direction, magnitude and persistance of behaviour in a limited but very important domain of human activities. It applies only when an individual knows that his performance will be evaluated in terms of standard of excellence and
that consequence of his action will be either favourable (success) or un favourable (failure). That is in other words a theory of achievement oriented performance (Atkinson 1964).

In the present study sports achievement motivation questionnaire was administered at the beginning of the training course (July 1994) and the same test was conducted after completion of the training course (March 1995-after eight months).

The mean scores obtained from pre and post test are presented in Table No-8. It appears form the table that the mean pre test score was 23.8 with a variation of 2.82. According to the SAMT questionnaire subjects scoring below 24 are characterised as "low" in sports achievement motivation. Those scoring below 30 but above 24 are considered as "moderate" and scoring above 30 are considered as "highly motivated". Accordingly form the pre test score it may be considered that the subjects of the study were "low" in sports achievement motivation. However the mean post test score, 26.78 with a variation of 4.24, signifies a positive improvement in sports achievement motivation. The comparison between the pre and post rest means revealed a significant improvement in the achievement motivation. The obtained 't' value 4.52 was found to be significant at .05 level. It means the subjects may be considered as "moderate" in sports achievement motivation and that a positive improvement obtained at post test. It further proved that the training course in which the subjects underwent for eight months have significantly improved their sports achievement motivation.

Bujurke et al (1993) have shown that achievement motivation is a contributing factor to athletic performance. They found the significant relationship between achievement motivation with selected sports performance. The subjects of the present study have improved their performance in physical fitness as well as in most of the skill oriented performance and this perhaps influenced in achieving a better sports achievement motivation test score following training.

Kamlesh et al (1987) used the sports achievement motivation test in 43 female intercollegiate players and found them as 'moderate' which has a similarity with the present study.

4.5.2. Anxiety

In sport as in life anxiety is viewed as an improtant area and considered i) as a biological reaction pattern ii) as an intense emotional state iii) as a psychological
phenomenon. Research findings on anxiety in the context of physical activity and sports are divergent. Kamlesh (1990a) extensively reviewed the related literature in this regard and concluded that i) as an essential ingredient of human behaviour anxiety plays a paradoxical role in athletic performances, it helps as well as retards performance, ii) high trait anxiety seems to be an attribute with superior athletes, iii) apparently there is some evidence to conclude that acquisition of athletic skills and resonably adequate physical fitness help reduced anxiety, iv) as the level of sports competition rises the proportional rise in the level of anxiety in athletes is an inevitable reactivity, v) an optimal level of anxiety is conducive to athletic performance but this optimal level differs from individual to individual.

Kamlesh (1990b) further concluded that Indian athletes in general and female athletes in particular exhibited higher level of anxiety. In the present study state and trait anxiety was measured according to the method discussed in the chapter 3.3.5. The test was conducted twice at the beginning of the training course (July 1994, pre test) and after the completion of the training course (March 1995, post test).

The anxiety score obtained from the questionnaire test are presented in Table No-8. It appears from the table that the pre test mean score of state anxiety was 40.39 with a variation of 10.22. The mean trait anxiety score was 42.33 with a variation of 7.27.

The scoring of the questionnairie of spielberger (1970) is usually ranged between 20 to 80 and higher the score the greater is the level of anxiety. Therefore both trait anxiety and state anxiety score at pre test of the subjects may be considered as moderate level. Table No 8 further revealed that following eight months participation in physical education training course the mean scores of both trait and state anxiety have reduced. The post test mean state anxiety score was 34.5 and the mean trait anxiety score was 38.56. Since the mean pre and post test scores were not equal, 't' test was employed to find the significance of difference. The 't' score between the two sets of means of state anxiety was – 3.68 which shows a significant reduction in state anxiety following training. Similarly the 't' score obtained for comparing two means of trait anxiety was – 3.14 which was statisically significant. It means significant reduction in trait anxiety following training has resulted among the subjects.

Morgan et al. (1970), Cratty(1989), Bird and Cripe (1986) have shown that anxiety was systematically reduced following long term participation in exercise, regardless of the nature of physical activity. Performance was said to increase
Fig. 22. Comparison of sports achievement motivation of the subjects before and after the training.

Fig. 23. Comparison of anxiety level of the subjects before & after the training.
systematically with increases in arousal up to a certain points. Increases beyond that point would hinder or lower performance. Recent evidence relative to performances and anxiety has demonstrated support for the inverted -U hypothesis (Martens & Landers 1970), weingberg and Ragan (1978).

Therefore anxiety reduction following participation in organised physical education programme as shown by the subjects of the present study are quite consistent with the findings of leading researchers.

Analysing the pre and post test data of sports achievement motivation and anxiety level it appeared that the training has positively and significantly influenced both the sports achievement motivation and anxiety level. Thereby it may safely be concluded that the hypothesis no - 4(a) be rejected.

4.5.3. Leadership

Progress in a profession is indispensable and the quality and amount of that progress are closely related to leadership. Professional leadership is the force which starts and then continues to terms the wheels of professional growth and progress. Bookwalter (1967), Fiedler (1964) developed a model to explain leadership effectiveness and indicated interrelationship of four facts: i) The situation ii) task to be accomplished iii) leader iv) the characteristics of the group. One does not become a leader in the profession through chance, however. The responsibility falls on one because one has a background of experience and training together with the profession of vital, dynamic, personal characteristics. The bottom line is a professional competency.

The organised physical education training programme in which the subjects of the study participated for about ten months was aimed to develop professional leadership quality, a dynamic role model for effective teaching learning situation. For objective assessment in the regard of leadership quality of the subjects was measured at the beginning of the training course (July, 1994) and after completion of the training course (March 1995).

The leadership measurement technique has already been discussed in chapter 3.3.5.3 and mean scores obtained at pre and post test are indicated in Table No.. 8. The mean pre test score was 50.72 with a variation of 31.12. It means that there is a wide variation in the leadership quality among the subjects. Following training the leadership quality has improved. Post test mean score was 54.89 with a variation
of 24.85, while the mean score is increased and the variation is decreased. However the mean gain was statistically not significant since the 't' value comparing the pre and post test means .72 was markedly less than the required value of 2.12, to be significant at .05 level. This findings indicated that organised physical education programme in which the subjects participated has significantly improved physical fitness, physiological and psychological qualities but failed to develop desirable leadership qualities up to the optimum level.

The leadership quality improved marginally but not significant. The distribution of score obtained by the subjects for leadership quality is depicted below :-

<table>
<thead>
<tr>
<th>Leadership Score</th>
<th>Pre-test No. of subjects</th>
<th>Post test No. of Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 30</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>31-40</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>41-50</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>51-60</td>
<td>00</td>
<td>3</td>
</tr>
<tr>
<td>61-70</td>
<td>00</td>
<td>2</td>
</tr>
<tr>
<td>71-80</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>81-90</td>
<td>00</td>
<td>2</td>
</tr>
<tr>
<td>91-100</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td>Above - 100</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

It appears that out of 18 subjects only three scored above hundred and 14 subjects scored below fifty of which 5 subjects was even below thirty. In the post test only one subject could score above hundred and remaining 17 were almost equally distributed from thirty to ninety. It means in most cases the leadership qualities have improved and the choice of leader were not restricted to only few persons rather 8 subjects scored between fifty one to ninety.

It may not be out of place to mention that the subjects of the study were not a homogeneous group. They were from various parts of the state and their socioeconomic condition and cultural back ground were different. Many of them were from rural areas and obviously were shy and therefore their pre test scores were comparatively low. However the organised physical education training programme provided opportunity to express and show their leadership quality. The reasons for
insignificant improvement may be due to various factors and some factors were beyond
the scope of this research, for example cultural, educational, socio-economic, family
background etc.

The scope of leadership opportunity was limited in the training course due to
heavy burden of syllabus. It may so happen that actual potentiality of the subjects
could not be estimated through the test procedure employed. However in conclusion
it may safely be inferred that organised physical education training has a definite role
not only in developing physical qualities but also in developing an individual as a
potential leader of physical education profession. The mean leadership score at post
test was higher than that of pre test but the improvement was not statistically significant.
Considering the result and analysing the data it may be concluded that hypothesis no
- 4(b) on leadership quality be rejected.

4.6. Psycho-physiological Reactivity

A serious problem surrounding the exercise/stress research relating to
psychological profile is that dependent measures have generally been based on self
report (questionnaire which makes the results vulnerable to subject bias). A more
objective index of individual susceptibility to exercise stress may be found in the
responsibility of the autonomic nervous system to a standardise psychological
challenge. Activation of the autonomic nervous system and the cardiovascular
response to exercise are generally regarded as the common path way by which stress
compromises our health (Geus 1992). Psychophysiology is the discipline of evaluating
physiological measures in the human regarding information about behavioral
concomitants.

Arousal pertains to one's level of physiological activation, that instigates or
activates behaviour. Arousal is a neutral term in that it does not take into account
aspects of accompanying emotions on thoughts. For measuring the
psychophysiological aspects arousal level have been considered in this study. Reaction
time measurement has been considered as central neural arousal and skin
conductance as autonomic neural arousal. The influence of chronic physical activity
on these two aspects of psychophysiological reactivity have been discussed on the
basis of data from measurement of reaction time and skin conductance and are
presented below.
4.6.1. Reaction Time.

Response. Physical activity particularly on the chronic type might be expected to influence cognitive factors which would otherwise diminish with age. Reaction time measures provide a broad index of how effectively the central nervous system is functioning. In the present study reaction time both simple and choice have been used as a measure of psychophysiological reactivity.

The data collected according to the procedure mentioned in the chapter No. 9 table 9. Mean and SD of the pre and post test data of psychophysiological reactivity and their comparison.

Fig.24. Comparison of leadership quality of the subjects before & after the training.

<table>
<thead>
<tr>
<th>Reaction Time (ms)</th>
<th>Pre training</th>
<th>Post training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin</td>
<td>112</td>
<td>92</td>
</tr>
<tr>
<td>Conductance</td>
<td>11.19</td>
<td>11.13</td>
</tr>
<tr>
<td>Obtained 't' value</td>
<td>4.90</td>
<td>6.73</td>
</tr>
<tr>
<td>* Significant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


It appears from the Table No-9 that mean pre test score of simple reaction time was 341.11 ms ± 43.37 ms and in the post test mean score reduced to 312.22
4.6.1. Reaction Time.

Reaction Time is the time elapsed between the signal and the start of the response. Physical activity particularly on the chronic type might be expected to influence cognitive factors which would otherwise diminish with age. Reaction time measures provide a broad index of how effectively the central nervous system is functioning. In the present study reaction time both simple and choice have been used as a measure of psychophysiologial reactivity.

The data collected according to the procedure mentioned in the chapter No III and the mean score of simple and choice reaction time at pre and post test are presented in Table No-9.

Table - 9 Mean and SD of the pre and post test data of Psychophysiological reactivity and their comparison.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre Test</th>
<th>Post Test</th>
<th>SED</th>
<th>Obtained 't' value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reaction Time (S)</td>
<td>341.11</td>
<td>312.22</td>
<td>3.78</td>
<td>- 7.64*</td>
</tr>
<tr>
<td>± 43.37</td>
<td>± 36.87</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reaction Time (C)</td>
<td>425</td>
<td>392</td>
<td>4.90</td>
<td>- 6.73*</td>
</tr>
<tr>
<td>± 32.76</td>
<td>± 19.52</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skin</td>
<td>1.12</td>
<td>.92</td>
<td>.03</td>
<td>- 6.67*</td>
</tr>
<tr>
<td>Conductance</td>
<td>± .19</td>
<td>± .13</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant


It appears from the Table No-9 that mean pre test score of simple reaction time was 341.11 ms ± 43.37 ms and in the post test mean score reduced to 312.22 ms ± 36.87 ms.
Analysing the pre and post test data it appears that simple reaction time significantly reduced following training. The pre test data was obtained at the onset of the training session (July '94) and the post test data was obtained at the end of the training programme (March '95). By participation in an organised physical education training programme for about nine months the physical efficiency and the physiological potentialities have improved, certain psychological qualities were in a better state and therefore the psychophysiological reactivity will decrease, is not unexpected. The training in this case has significantly reduced the simple reaction time.

4.6.1.2. Choice Reaction Time.

The mean score of choice reaction time at pre test was 425 ms ± 32.76 ms which was higher than the simple reaction time. The mean post test score of choice reaction time was 39.2 ms ± 19.52, like simple reaction time, choice reaction time was also reduced following training. The pre and post test mean scores of choice reaction time were compared and obtained 't' (-6.73) found significant. It means training has significantly reduced the choice reaction time of the subjects.

The reasons for reduction of simple reaction time and choice reaction time are same. Reaction time reflects a number of central nervous system condition which theoretically influenced by exercise induced physiological adaptation. Powell (1983) indicated that the development of cardiovascular fitness in sedentary subjects would reduced the simple and choice reaction time. Hascelik (1989) also reported a shortening of reaction time following exercise programme. Therefore the findings of the present study, in respect of reduction of simple and choice reaction time following training are in consonance with the findings of leading researchers.

4.6.2. Galvanic Skin Conductance.

In recent years skin conductance has been used as a measure in exercise testing. Steptoe (1990) and Roth (1989) have also used skin conductance as a measure of stress reaction relating to physical activity. In the present study skin conductance was measured as a psychophysiological responses. Skin conductivity refered to the electrical properties of the skin. Galvanic skin response (G.S.R) assess the resistance or conductivity of the skin to electrical current which increases with increasing arousal. The data collected on G.S.R according to the procedure indicated in chapter III.
Fig. 25. Comparison of reaction time of the subjects before & after the training

Since the means were different, a t-test was conducted to find the significance of difference, if any. The obtained t-value was 1.8 which revealed that the difference between pre and post test scores was significant. It means following the physical activity programme for one week period of time (nine subjects), the skin conductance (SC) was significantly among the subjects of the study. Stem et al. (1992) observed the same result. Also, hourly at rest did not differ greatly between pre and post training phase.

Fig. 26. Comparison of skin conductance of the subjects before & after the training

Pre training
Post training

0.0
0.5
1.0
1.5

0.92
1.12

Pre training
Post training

MILLI SECOND

Simple
Choice

341.11
312.22
425
392
The data obtained are presented in Table No - 9. It appears from table that mean pre test score of G.S.R was 1.12 mhos and score following training, mean post test skin resistance score was reduced to .92 mhos.

Since the means were different, "t" test was conducted to find the significance of difference, if any. The obtained 't' value was - 6.67 which revealed that the difference between pre and post test scores was significant. It means following organised physical education training programme for considerable period of time (nine months) the skin conductivity reduced significantly among the subjects of the study. Steptoe et al. (1992) observed that SC level at rest did not differ reliably between pre and post training phase.

Russell (1983) found no difference between exercise condition and a controlled condition in the skin conductance. Hollonander et al. (1984), Steptoe et al. (1990) opined that the unfit subjects manifested higher skin conductance at rest. Mondal et al. (1994) found significant reduction in SC on senior citizen but on sedentary subjects this reduction was not evident.

The reduction of SC among the subjects of this study indicated that the training programme underwent by them have influenced the SC and there by lowered the autonomic arousal. Thus the observations of the study found similarities with other researchers.

It may not be out of placed to mention that regular exercise has lasting effects on psychological functioning, effecting the physiological response to stress in general. Regular exercise may enhance the belief that one is capable of performing certain physical activities. This in turn increase the physical self efficacy, together with true improvements in endurance capacity, flexibility, body composition etc and will improve physical self confidence and physical self acceptance. Training influences the physiological stress response is now well established but how far it can influence the psychophysiological reactivity has not been profoundly established by the current literature. Since stress reactivity is dependent on the subjective appraisal of the stressor, that in turn depends on psychological make up, it is not unrealistic to expect a training - induced change in psychological characteristics to be reflected in reduced reactivity. The various training induced adaptations in the organisation of the autonomic nervous system and in the target organs, critically influenced the physiological reactivity. By its physiological effects fitness training may still reduce stress reactivity, even if little psychological effects of training on stress reactivity are found (Geus 1992).
Analysing the data relating to psychophysiological reactivities on the scores of reaction time and skin conductance respectively, the hypothesis no-5 on psychophysiological reactivity be accepted.

4.7. Coefficient of Correlation

Dependent variables considered in this study were fitness related six parameters. These variables were correlated with the independent variables of three dimensions considered in this study. These were physiological (Vo₂ max and Physical Efficiency Index), Psychological (Motivation, Anxiety, Leadership), Psychophysiological (Skin conductance, Reaction Time).

The computed values of coefficient of correlation are presented for pre test data in Table No- 10 and post test data in Table No - 11. Out of fifty four sets of coefficient of correlations on pre test data none of their values were found statistically significant, however coefficient of correlation between skin conductance vs standing broad jump and skin conductance vs 600 yard run and walk were found high enough but not significant at .05 level. The required 'r' value to be significant at .05 level is .468 and the obtained values in this regard was slightly falls short of the required value. Similarly Physical Efficiency Index vs speed and Cardio Respiratory Endurance relationship were also to some extent, high but not statistically significant.

Table 10

Coefficient of correlations (Pre test r values) between dependent (fitness) and independent variables.

<table>
<thead>
<tr>
<th>Fitness (Dependent variables)</th>
<th>P. E. I</th>
<th>Vo₂</th>
<th>Motivation</th>
<th>Anxiety St.</th>
<th>Anxiety Tr.</th>
<th>Leadership</th>
<th>R. T (S)</th>
<th>R. T (C)</th>
<th>SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexed Arm</td>
<td>.14</td>
<td>-.33</td>
<td>.09</td>
<td>-.07</td>
<td>-.33</td>
<td>-.08</td>
<td>.07</td>
<td>-.02</td>
<td>.21</td>
</tr>
<tr>
<td>Hang</td>
<td>-.23</td>
<td>-.05</td>
<td>.21</td>
<td>-.28</td>
<td>-.33</td>
<td>.21</td>
<td>-.22</td>
<td>.15</td>
<td>.19</td>
</tr>
<tr>
<td>Sit up</td>
<td>.05</td>
<td>-.05</td>
<td>-.05</td>
<td>-.05</td>
<td>-.26</td>
<td>.08</td>
<td>-.10</td>
<td>-.20</td>
<td>.17</td>
</tr>
<tr>
<td>Standing B. J.</td>
<td>.10</td>
<td>.08</td>
<td>-.01</td>
<td>-.08</td>
<td>-.12</td>
<td>-.13</td>
<td>-.23</td>
<td>.04</td>
<td>.45</td>
</tr>
<tr>
<td>50 Yard dash</td>
<td>.37</td>
<td>.03</td>
<td>.18</td>
<td>-.07</td>
<td>-.27</td>
<td>-.31</td>
<td>-.24</td>
<td>.03</td>
<td>.10</td>
</tr>
<tr>
<td>600 Yard Run-walk</td>
<td>.35</td>
<td>-.05</td>
<td>.17</td>
<td>-.18</td>
<td>-.01</td>
<td>.11</td>
<td>-.36</td>
<td>-.03</td>
<td>.43</td>
</tr>
</tbody>
</table>
It appears from the co-efficient of correlation study of pre test data that fitness variables were not found very much related with either of the physiological, psychological or psycho-physiological variables. It may not be out of place to mention here that all the subjects of the present study were neither regular athletes nor highly fitness trained young women. Only a few were regular athlete and had experience in athletics. Probably the wide range of variation in fitness performances (dependent variables) had influenced the correlationship with the independent variables.

However correlations on the post test data revealed a some what different pictures. Four sets of correlations were found statistically significant and another eight sets of correlations were though high but not significant at .05 level.

Table 11

Coefﬁcient of correlations (Post test r values) between dependent (fitness) and independent variables.

<table>
<thead>
<tr>
<th>Fitness (Dependent variables)</th>
<th>P. E. I</th>
<th>Vo₂</th>
<th>Motivation</th>
<th>Anxiety St.</th>
<th>Anxiety Tr.</th>
<th>Leadership</th>
<th>R. T (S)</th>
<th>R. T (C)</th>
<th>SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexed Arm</td>
<td>.72</td>
<td>-.19</td>
<td>-.13</td>
<td>-.33</td>
<td>-.29</td>
<td>.40</td>
<td>.16</td>
<td>.25</td>
<td>.20</td>
</tr>
<tr>
<td>Hang</td>
<td>-.20</td>
<td>.08</td>
<td>.22</td>
<td>-.40</td>
<td>-.31</td>
<td>.12</td>
<td>-.08</td>
<td>.15</td>
<td>.22</td>
</tr>
<tr>
<td>Sit up</td>
<td>-.11</td>
<td>-.20</td>
<td>.05</td>
<td>-.40</td>
<td>-.31</td>
<td>.12</td>
<td>-.08</td>
<td>.15</td>
<td>.22</td>
</tr>
<tr>
<td>Shuttle run</td>
<td>-.11</td>
<td>.10</td>
<td>.15</td>
<td>-.12</td>
<td>-.31</td>
<td>.87</td>
<td>-.03</td>
<td>-.25</td>
<td>.49</td>
</tr>
<tr>
<td>Standing B. J.</td>
<td>-.11</td>
<td>.10</td>
<td>.15</td>
<td>-.12</td>
<td>-.31</td>
<td>.87</td>
<td>-.03</td>
<td>-.25</td>
<td>.49</td>
</tr>
<tr>
<td>50 Yard dash</td>
<td>-.18</td>
<td>-.13</td>
<td>.34</td>
<td>-.16</td>
<td>-.48</td>
<td>.03</td>
<td>-.39</td>
<td>-.22</td>
<td>-.06</td>
</tr>
<tr>
<td>600 Yard dash</td>
<td>.35</td>
<td>.29</td>
<td>.22</td>
<td>-.41</td>
<td>-.11</td>
<td>.01</td>
<td>-.25</td>
<td>-.15</td>
<td>.23</td>
</tr>
</tbody>
</table>

From the 'r' values Table No-11 it appears that arm and shoulder girdle strenght vs Physical Efficiency Index was found highly significant. On the other hand relationship between each of state anxiety and leadership were found highly related with arm and shoulder girdle strength, though statistically not significant. Similarly relationship between muscular endurance and both state and trait anxiety were though highly related but not significant.

Similar results were observed between simple reaction time vs agility and speed. Speed and motivation was also found highly related. Cardiorespiratory
endurance and state anxiety relationship was also found highly related \((r = .41)\), which was slightly fall short of required significant value. The relationship between Physical Efficiency Index and cardio-respiratory endurance was also found to some extent high \((r = .35)\) but not statistically significant.

From the correlations study on post test data it may be concluded that following training the fitness status improved, at the same time, training has influenced the physiological and Psychophysiological potentialities to some extent. These change of status of women trainee by virtue of their participation in organised physical education programme perhaps have influenced the dependent variables to be correlated with selected independent variables of three dimensions.

The negative relationships found in this study may be attributed due to directions of scores e.g. speed, agility and cardiorespiratory endurance scores which were measured by time and lower the score better was the performance. Similarly lower the anxiety score better was the psychological state. In case of reaction time similar statement may be made, lower the reaction time score better was the psychophysiological reactivity. Therefore negative correlation relationship found in this study were quite obvious and due to the nature of tests scores.

4.8. Concluding discussion

Results of the various tests & measurements and their statistical data, parameter wise have been presented in this chapter according to the said criteria. Discussions over the findings have been made separately. Analysing the results, one can find a general trend of agreement on the influence of organised physical education programme on trainee females. The fitness components measured in this study have indicated a general improvement on the fitness status. Training programmes have also influenced the physiological responses and adaptive changes have shown the improvement of cardiorespiratory efficiency. This changes are not unlikely rather in consonance with the established norms and literature. Since there is a competition in a training programme, Sports Achievement Motivation of the subjects improved significantly. On the other hand a general improvement of fitness status and physiological potentialities in all probablity have provided the subjects a better self concepts, confidence, attitude towards physical activity and thereby reduced the anxiety level. This direction of change in psychological aspects is also supported by psycho-physiological reactivity. The stimulus response time has significantly reduced,
there by a better reaction time was achieved. The G.S.R decreased significantly indicating a lowered arousal level following training. The total approach of the organic systems of the body due to exposer of a long term training programme have not only brought an adaptive changes but also influence the stress reactivity. This exercise induce stress have profoundly influenced the psychological aspects and psychophysiological reactivity and thus influenced to cope this stress.

It may so happen that this adaptation to stress may have influenced their quality of life and wellbeing in general and definitely it has a global influence-i.e., other aspects of life, interaction in the family and work place, a better humanistic approach. one of the important aspect of the training programme underwent by the subjects was to develop leadership quality, so that the trainee females would be true professional leaders in future. Unfortunately the findings of the study did not indicate a significant improvement in leadership quality following training.

The improvement in fitness performances in physical activities, physiological, and psychophysiological potentialities may be made through very many other type of training programmes e.g. aerobics, weight- training etc. But the whole purpose of the organised physical education programme in a training institute is to develop leadership quality along with fitness & skill related improvements. Therefore in concluding remark the researcher is hesitant to say that this training programme designed for the female subjects was not sufficient to elicit a desirable and significant change in leadership quality, perhaps, failed to achieve to the cherished objectives. Therefore I would suggest the institute offering physical education professional training course should give more emphasis on such programmes which will influence positively the leadership qualities because the basic objective is to develop professional leaders.