CHAPTER-V
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of this study was to investigate and compare the physical stress and physiological variables in relation to performance of inter-university level male and female gymnasts.

The subjects of the study were one hundred eighty seven inter-university level male and female gymnasts (one hundred and fifteen males and seventy two females) belong to different cultural background of India and who represented their respective university teams in All India Inter-university Gymnastics Championships held at Guru Nanak Dev University, Amritsar (Punjab) during the year 2001-2002 age raging from 17 to 25 yrs.

The scores obtained from BBBS battery was applied to measure the psychological stress of the university gymnasts. This battery in capable of measuring the four dimensions of stress namely anxiety Frustration, pressure and conflict.

Blood pressure (systolic and diastolic) and the heart rate was recorded. Performances scores of each gymnasts was obtained from the record or the interuniversity competition were chosen as the criterion measures for the study.
Scale of Physical Stress (SPS) of Bisht Battery of Stress Scales (BBSS)\(^1\) prepared and standardized by Bisht was used to measure the four components of stress e.g. anxiety, frustration, pressure, and conflict. The questionnaire consists of 60 items in which there are positive and negative statements which indicate the frequency of stress score provides the adding these frequency and quantity stress score provides the total stress scores. Physical frustration components have 22 items in which seven items show the negative response and fifteen items have positive response physical conflict pressure have sixteen items out of which two are negative response and in physical anxiety there are seventeen items. Where two negative response were recorded. The test is highly reliable which is dependability efficient 0.91 Stability coefficient 0.83 and internal consistence 0.78. 

To assess the stress of gymnasts on psychological and physiological variables, mean, standard deviation\(^2\) and t-ratio were computed.\(^3\)


The Persons product moment correlation was applied to find out the relationship between competitive performance scores of gymnasts- components of stress and physiological variables.

The ANOVA was determined to find out the differences in stress on high, Mediocre, and low performance gymnasts separately. An analysis of variance (F-ratio) was also applied to determine the significance difference between male and female gymnastics on their stress as well as physiological variables. Where F-ratio was found significant, the Scheffe’s Test of Post hoc Comparison was applied. The significant level was set at .05 level.

To find out the significance of difference between their frequency and quantity means of four dimensions physical stress of inter-university level male and female gymnasts, t-ratio was computed. The male and female gymnasts expressed statistically significant differences in their frequency on frustration (3.92), conflicts (2.31), pressure (6.35) and anxiety (9.18)

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dimensions of physical stress. The differences in their quantity on frustration (8.17), conflicts (4.15), pressure (5.42) and anxiety (4.81) dimensions of physical stress were also statistically significant.

To compare the male and female gymnasts in their frequency and quantity on four dimensions of stress, t-test was computed with high, mediocre and low achiever male and female gymnasts. High achiever male and female gymnasts expressed statistically significant differences in their frequency on frustration (2.83), pressure (3.93) and anxiety (3.50) dimensions of physical stress. The differences on conflicts (0.73) dimension of physical stress was not statistically significant. The high achiever male and female gymnasts also expressed statistically significant differences in their quantity on frustration (2.75), pressure (3.63), and anxiety (3.09) dimensions of physical stress. But they did not differ significantly in their quantity on conflicts (1.32) dimension of physical stress.

Mediocre male and female gymnasts expressed statistically significant differences in their frequency on frustration (3.06), conflicts (3.33) pressure (2.65) and anxiety (5.73) dimensions of physical stress. The mediocre male and female gymnasts also expressed statistically significant differences in their quantity on frustration (2.75) and pressure (3.63) dimensions of physical stress. But they did not differ significantly in their
quantity on conflicts (1.32) and anxiety (1.88) dimension of physical stress.

Low achiever male and female gymnasts expressed statistically significant differences in their frequency on pressure (3.81) and anxiety (5.23) dimensions of physical stress. The differences on frustration (1.25) and conflicts (0.73) dimensions of physical stress were not statistically significant. The low achiever male and female gymnasts also expressed statistically significant differences in their quantity on frustration (5.36), pressure (3.49), and anxiety (2.02) dimensions of physical stress. But they did not differ significantly in their quantity on conflicts (1.32) dimension of physical stress.

Analysis of Variance (ANOVA) was used to find out the significance of differences among inter-university level male and female gymnasts as a whole on four dimensions of physical stress i.e. frustration, conflicts, pressure and anxiety as independent variables for all the subject taken collectively as well as separately. Where ever F-ratio was found significant, the Scheffe’s Test of post-hoc Analysis was carried out to identify the significance of difference between ordered paired means of four dimensions of physical stress. The level of significant was set at .05 level.

The analysis of variance (ANOVA) with both sex and four dimensions of physical stress as independent variables resulted highly
significant F-ratio for frustration (38.58), conflicts (21.37), pressure (33.81) and anxiety (55.29) dimensions of physical stress.

The male gymnasts of inter-university level were compared separately, resulted significant F-ratio for physical stress (135.69). The critical observation of mean scores indicated that inter-university level male gymnasts were more under frustration followed by anxiety, pressure and conflicts. Whereas the female gymnasts of inter-university level were compared separately, significant F-ratio was also obtained for physical stress (90.49). The critical observation of mean scores indicated that inter-university level female gymnasts were also more under frustration followed by anxiety, pressure and conflicts.

To established the relationship between competitive performance score of male and female gymnasts of inter-university level and sum of frequency and quantity of four dimensions of stress, Pearson’s Product Moment Correlation Coefficient $r$ was computed. Further, the relationship was also established between competitive performance score of male and female gymnasts of inter-university level and frequency and quantity of four dimensions of stress separately. The level of significance chosen was .05.

The analysis of data revealed that the significant correlation existed among male gymnasts in between competitive performance score
and anxiety dimension of stress. But the male gymnasts of inter-university level had no significant correlation between competitive performance score and frustration (-0.171) followed by conflicts (0.017) and pressure (-0.089). In case of female gymnasts, the analysis of data revealed that the significant correlation was found between competitive performance score and conflicts (0.294) followed by pressure (0.277) dimension of stress. The significant correlation was not found between competitive performance score and frustration (0.169) followed by anxiety (0.189) dimension of stress.

Male gymnasts had significant correlation between their frequency of conflicts and competitive performance score (0.276) followed by pressure (0.263) dimension of stress. But they had no significant correlation between their frequency of frustration (0.128) and competitive performance score followed by anxiety (0.171) dimension of stress. In case of female gymnasts, they had no significant correlation between their frequency of frustration and competitive performance score (-0.271) followed by anxiety (-0.033), conflicts (0.038) and pressure (0.190) dimensions of stress.

Male gymnasts had significant correlation between their quantity of frustration and competitive performance score (0.194) followed by
conflicts, (0.232) pressure (0.234) and anxiety (0.175) dimensions of stress. In case of female gymnasts, they had no significant correlation between their quantity of frustration and competitive performance score (0.062) followed by conflicts (0.057), pressure (-0.177) and anxiety (0.148) dimensions of stress.

To established the relationship between competitive performance score of high achiever, mediocre and low achiever male and female gymnasts of inter-university level and frequency and quantity of four dimensions of stress, Pearson’s Product Moment Correlation Coefficient r was also computed. The level of significance chosen was .05.

High achiever male gymnasts of inter-university level had insignificant correlation between their frequency of frustration and competitive performance score (0.051) followed by conflicts, (-0.142) pressure (-0.035) and anxiety (0.092) dimensions of stress. In case of female gymnasts, they had no significant correlation between their quantity of frustration and competitive performance score (0.484) followed by conflicts (0.133), pressure (0.059) and anxiety (0.345) dimensions of stress.

High achiever male gymnasts of inter-university level had insignificant correlation between their quantity of frustration and
competitive performance score (0.178) followed by conflicts, (0.128) pressure (-0.065) and anxiety (0.026) dimensions of stress. In case of female gymnasts, they had also insignificant correlation between their quantity of frustration and competitive performance score (-0.143) followed by conflicts (0.225), pressure (0.277) and anxiety (-0.280) dimensions of stress.

Mediocre male gymnasts of inter-university level had insignificant correlation between their frequency of frustration and competitive performance score (0.236) followed by conflicts, (0.293) pressure (0.088) and anxiety (0.149) dimensions of stress. In case of female gymnasts, they had also insignificant correlation between their frequency of frustration and competitive performance score (0.023) followed by conflicts (-0.103), pressure (-0.248) and anxiety (0.090) dimensions of stress.

Mediocre male gymnasts of inter-university level had insignificant correlation between their quantity of frustration and competitive performance score (-0.074) followed by conflicts, (-0.124) pressure (0.013) and anxiety (0.169) dimensions of stress. In case of female gymnasts, they had also insignificant correlation between their quantity of frustration and competitive performance score (-0.614) followed by
conflicts (-0.109), pressure (0.084) and anxiety (-0.398) dimensions of stress.

Low achiever male gymnasts of inter-university level had significant correlation between their frequency of frustration and competitive performance score (0.362) followed by conflicts (0.278) and pressure (0.289) dimensions of stress. But they had no significant correlation between anxiety and competitive performance score (0.189). In case of female gymnasts, they had insignificant correlation between their frequency of frustration and competitive performance score (-0.222) followed by conflicts (-0.047), pressure (0.062) and anxiety (0.135) dimensions of stress.

Low achiever male gymnasts of inter-university level had significant correlation between their quantity of frustration and competitive performance score (0.299) followed by conflicts (0.434) pressure (0.367) and anxiety (0.266) dimensions of stress. In case of female gymnasts, they had no significant correlation between their quantity of frustration and competitive performance score (0.297) followed by conflicts (-0.142), pressure (-0.085) and anxiety (0.051) dimensions of stress.

To find out the significance of difference between means of pre-test and post-test on physiological variables for male and female gymnasts of inter-
university level separately, t-ratio was computed. Analysis of Variance (F-ratio) was also applied to determine the significance difference between male and female gymnastics on pre-test and post test of physiological variables. To established the relationship between competitive performance score of male and female gymnasts of inter-university level and physiological variables, Pearson’s Product Moment Correlation Coefficient r was computed. The significant level was set at .05 level.

The analysis of data revealed that the male gymnasts expressed statistically significant differences on pre-test and post-test of heart rate (18.40) and diastolic blood pressure (6.56). But they did not differ on pre-test and post-test of systolic blood pressure (1.77). In case of female gymnasts, the differences on pre-test and post-test of heart rate (19.31), systolic blood pressure (5.13) and diastolic blood pressure (2.22) were statistically significant.

ANOVA revealed that the male and female gymnasts expressed statistically significant differences very high on pre-test of systolic blood pressure (122.49) and diastolic blood pressure (150.52). But they did not differ significantly on pre-test of heart rate (0.012). The male and female gymnasts had insignificant F-ratio on post-test of heart rate (2.42), systolic blood pressure (2.52) and diastolic blood pressure (1.74) were statistically
significant.

The analysis of data revealed that the male gymnasts expressed statistically insignificant correlation between pre-test of heart rate and competitive performance score (-0.127) followed by systolic blood pressure (-0.256) and diastolic blood pressure (-0.068). In case of female gymnasts, they had also insignificant correlation between pre-test of heart rate and competitive performance score (-0.365) followed by systolic blood pressure (-0.238) and diastolic blood pressure (0.008).

The male gymnasts also expressed statistically insignificant correlation between post-test of heart rate and competitive performance score (0.047) followed by systolic blood pressure (-0.438) and diastolic blood pressure (-0.245). In case of female gymnasts, they had also insignificant correlation between post-test of heart rate (-0.533) and competitive performance score followed by systolic blood pressure (-0.051) and diastolic blood pressure (0.053).
Conclusions

Within the limitations of the present study, the following conclusions are enumerated:

1. Male and female gymnasts at inter-university level had variation in their frequency and quantity on four dimensions of stress i.e. frustration, conflicts, pressure, and anxiety.

2. Male gymnasts were found more frustrated, anxious, conflicted, and under pressure than their female counterparts.

3. High achiever male and female gymnasts at inter-university level had dissimilarity in their frequency and quantity on three dimensions of stress except conflict.

4. High achiever male and female gymnasts were found under more frustration, conflicts, pressure and anxiety than their female counterparts.

5. Mediocre male and female gymnasts at inter-university level existed dissimilarity in their frequency on all the dimensions of stress. They had also differentiation in their quantity on frustration and pressure, but similarity on conflicts and anxiety dimensions of stress.

6. Low achiever male and female gymnasts at inter-university level exhibited variation in their frequency on pressure and anxiety dimensions of stress, but similarity on frustration and conflicts dimensions of stress.
They had also variation in their quantity on three dimensions of stress except conflict.

7. Inter-university level male and female gymnasts as a whole had variation on the set of four dimensions of stress.

8. Inter-university level male and female gymnasts were found more under frustration followed by anxiety, pressure and conflicts. dimensions of stress.

9. Male gymnasts exhibited significant correlation between anxiety and competitive performance score and insignificant correlation in rest of dimensions of stress, where as female gymnasts had significant correlation between conflicts – competitive performance score followed by pressure factor of physical stress.

10. Male gymnasts also had different correlation between their frequency of conflicts – competitive performance score followed by pressure, but similarity in frustration and anxiety. Where as female gymnasts had similar correlation between all dimensions of stress and competitive performance score.

11. Inter-university level male gymnasts had different correlation between their quantity of frustration - competitive performance score followed by conflicts, pressure and anxiety factors of stress. Where as female
gymnasts had similar correlation between all dimensions of stress and competitive performance score.

12. High achiever and mediocre male and female gymnasts exhibited similar correlation between their frequency and quantity of all dimensions of stress and competitive performance score.

13. Low achiever male gymnasts existed variation in correlation between their frequency of frustration-performance score followed by conflicts, and pressure factors of stress. Whereas female gymnasts had similar correlation between all dimensions of stress and competitive performance score.

14. Low achiever male gymnasts had variation in correlation between their quantity of all dimensions of stress and competitive performance score. Whereas female gymnasts had similar correlation between all dimensions of stress and competitive performance score.

15. Pre-test and post-test heart rate and diastolic blood pressure of inter-university level male gymnasts were found dissimilar. But systolic blood pressure of inter-university level male gymnasts was similar.

16. Pre-test and post-test heart rate and systolic and diastolic blood pressure of inter-university level female gymnasts were found dissimilar.
17. Inter-university level male and female gymnasts had variation in pre-test systolic and diastolic blood pressure. But they had similarity in pre-test heart rate and post-test heart rate, systolic and diastolic blood pressure.

18. Inter-university level male and female gymnasts had similar correlation between pre-test and post-test heart rate - competitive performance score followed by systolic blood pressure and diastolic blood pressure.

**Recommendations**

In the light of the findings of the present study, the following recommendation are made:

1. It is recommended that Indian coaches may modify their training program for both sex gymnasts according to the four psychological dimensions of stress and physiological variables.

2. A similar study may be replicated on schools level gymnasts.

3. A study may be conducted to find out the differences in male and female Indian gymnasts in relation to their age and achievement levels.

4. A study may be conducted to find out the differences in male and female national and international gymnasts of India.

5. A similar study may be replicated on different individual and team game players of different levels with their competitive performance relationship.