Chapter V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

Physical education and sports has now become an integral part of the educational process as it prepares an individual for real life. Induction of the basic principles of science, physical education and sport has become a subject of scientific research and volleyball is no exception. Volleyball has developed into a highly competitive sports which requires high level development of physical fitness and great stamina besides perfection in skills of the game.

The purpose of the study was to investigate the relationship of physical, physiological and motor skill variables to volleyball playing ability and to find out the combined contribution of physical, physiological and motor skill variables separately to volleyball playing ability. A secondary purpose of the study was to compare the experimental variables between successful and unsuccessful volleyball players and also among playing
positions such as all rounders, spikers and set uppers.

The subjects were one hundred thirty five male school volleyball players who participated in the male state level school volleyball tournament held at district Bilaspur (H.P.) in November 1987. The dependent variables was volleyball playing ability and independent variables were physical, physiological and motor skill variables. Volleyball playing ability was determined by taking the average of subjective grading by three experts who based their judgement on five point rating scale. Physical variables included speed, arm strength, explosive power, dynamic balance, agility, wrist flexibility, ankle flexibility, trunk hyper extension, shoulder flexibility, age, height and weight which were recorded with the help of 50 yard dash, Roger's arm strength, Sargent vertical jump, modified Bass test, Semo agility test, goniometre, bridge-up test, shoulder rotation test, school records and scale marked on wall. Physiological variables included pulse rate, systolic blood pressure, diastolic blood pressure, pulse pressure, body fat, lean body weight and cardiovascular endurance which were measured by resting pulse beat per minute, sphygmomanometer and stethoscope, skinfold caliper and 1.5 mile run respectively. Motor skill variables were
volleying, serving, passing and set up which were measured by AAHPER Volleyball skill Tests. The tests were administered in the class room and on the ground of Govt. Sr.Sec. School Bilaspur (H.P.) during school State Tournament held in November 1987 for collection of data.

Tester Competency, reliability of tests and subject reliability were established by test retest method and the reliability co-efficient were found to be satisfactorily high.

The data were analysed using Pearson's Product Moment Correlation (r) for assessing the relationships of the volleyball playing ability to each of the physical, physiological and motor skill variables, multiple correlation for assessing the combined contribution of physical variables to volleyball playing ability, physiological variables to volleyball playing ability and motor skill variables to volleyball playing ability. In order to assess limiting factors for volleyball playing ability, multi-regression equation was worked out. The significance of mean difference between the successful and unsuccessful volleyball player in each of physical, physiological and motor skill
variables were analysed by 't' ratio. 'F' ratio was also applied to find out the significant difference among all rounders, spikers and set uppers in physical, physiological and motor skill variables. When differences were found to be significant the Scheffe S and Newman – Kauls post hoc tests were applied to assess the significant differences between the paired means. Level of significance was set at .05.

Analysis of data disclosed significant relationship of volleyball playing ability to each of the following physical, physiological and motor skill variables:
speed ($r = -0.56$), arm strength ($r = 0.65$), explosive power ($r = 0.68$), dynamic balance ($r = 0.46$), agility ($r = -0.61$), wrist flexibility ($r = 0.26$), ankle flexibility ($r = 0.39$), trunk hyper extension ($r = -0.28$), shoulder flexibility ($r = -0.55$), age ($r = 0.19$), height ($r = 0.35$), weight ($r = 0.34$), pulse rate ($r = -0.44$), body fat ($r = 0.44$), lean body weight ($r = 0.33$), cardiovascular endurance ($r = -0.47$), volleying ($r = 0.73$), serving ($r = 0.58$), passing ($r = 0.44$) and set up ($r = 0.42$). The relationships between systolic blood pressure, diastolic blood pressure and pulse pressure to volleyball playing ability were not found to be statistically significant at .05 level of confidence.
Multiple correlation was computed to determine those physical, physiological and motor skill variables which contributed most to the volleyball playing ability. The result of the study indicated the following findings: explosive power \((3)\), agility \((5)\) and ankle flexibility \((7)\) contribute most to volleyball playing ability \((c)\)\( = R_c.357 = .7286\) among physical variables, cardio-vascular endurance \((7)\), lean body weight \((6)\) and pulse pressure \((4)\) contribute most to volleyball playing ability \((c)\)\( = R_c.764 = .5978\) among physiological variables, volleying \((v)\) serving \((s)\) contribute most to volleyball playing ability \((c)\)\( = R_c. VS = .7378\) among motor skill variables.

Multiple regression analysis resulted in the following equations for physical \((A)\), physiological \((B)\) and motor skill \((C)\) variables:

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A - X_c = .0582 X_3(\text{Explosive Power}) - .4119 X_5(\text{Agility}) + .0177 X_7(\text{Ankle Flexibility}) + 4.26.
\]

\[
B - X_c = -.0723 X_7(\text{Cardio-vascular Endurance}) + .0584 X_6(\text{Lean Body Weight}) + .0463 X_4(\text{Pulse Pressure}) + .768
\]

\[
C - X_c = .113 X_1(\text{Volleying}) + .037 X_2(\text{Serving}) - 2.64
\]

Where \(X_c\) is the predicted playing ability score in
number.

Analysis of data revealed significant differences between successful and unsuccessful volleyball players in the following physical, physiological and motor skill variables: speed (t = 8.06), arm strength (t = 8.76), explosive power (t = 19.65), dynamic balance (t = 5.49), agility (t = 13.11), wrist flexibility (t = 3.95), ankle flexibility (t = 4.05), trunk hyper extension (t = 5.43), shoulder flexibility (t = 10.00), age (t = 4.61), height (t = 3.51), weight (t = 2.96), pulse rate (t = 11.12), body fat (t = 4.64), lean body weight (t = 2.36), cardio-vascular endurance (t = 12.13), volleying (t = 19.38), serving (t = 10.58), passing (t = 9.56) and set up (t = 4.34). The difference successful and unsuccessful volleyball players in systolic blood pressure, diastolic blood pressure and pulse pressure were not found statistically significant at .05 level of confidence.

'F' ratio was also applied to find out the significant difference among all rounders, spikers and set uppers in physical, physiological and motor skill variables. Where the 'F' value was found to be significant, Scheffe S and Newman - Keuls post-hoc tests were used to observe which of the paired means were most significant.
An analysis of variance resulted in significant 'F' value in speed (F = 21.5), arm strength (F = 23.75), explosive power (F = 20.04), dynamic balance (F = 9.13), agility (F = 7.81), wrist flexibility (F = 6.06), shoulder flexibility (F = 9.63), height (F = 19.48), weight (F = 14.63), pulse rate (F = 10.22), systolic blood pressure (F = 4.67), diastolic blood pressure (F = 4.55), body fat (F = 18.13), lean body weight (F = 10.62), cardiovascular endurance (F = 28.00) Volleying (F = 5.87), and serving (F = 3.80).

The application of Scheffe S and Newman - Keuls post hoc tests indicated that there were significant differences between all rounders - set uppers and spikers - set uppers in speed, arm strength, explosive power, agility, dynamic balance, shoulder flexibility, height, weight, pulse rate, body fat, lean body weight, cardiovascular endurance and serving whereas all rounders - spikers did not exhibit significant difference in all the above mentioned variables. The significant differences were also found between all rounders - set uppers in wrist flexibility but the differences in all rounders - spikers and spikers - set uppers were insignificant. The significant differences were also found between the
paired means of spikers - set uppers in systolic blood pressure, diastolic blood pressure and volleying whereas differences in all rounders - set uppers' and spikers - set uppers were found insignificant in these variables.

**Conclusion**

Within the limitations of this study the following conclusions appeared as per the results obtained:

1. The physical variables namely, speed, arm strength, explosive power, dynamic balance, agility, wrist flexibility, ankle flexibility, trunk hyper extension, shoulder flexibility, age, height, and weight are significantly related to volleyball playing ability.

2. Among physiological variables pulse rate, body fat, lean body weight and cardio-vascular endurance are significantly related to volleyball playing ability whereas systolic blood pressure, diastolic blood pressure and pulse pressure are not found significantly related to volleyball playing ability.

3. Among motor skill variables volleying, serving, passing and set-up are significantly related to volleyball playing ability.
4. Explosive power, agility and ankle flexibility contribute the most towards the volleyball playing ability among physical variables.

5. Among physiological variables, cardiovascular endurance, lean body weight and pulse pressure contribute the most towards volleyball playing ability.

6. Volleying and serving contribute the most to volleyball playing ability.

7. There are significant differences between successful and unsuccessful volleyball players in physical variables such as speed, arm strength, explosive power, dynamic balance, agility, wrist flexibility, ankle flexibility, trunk hyper extension, shoulder flexibility, age, height, and weight.

8. In physiological variables, significant differences are found between successful and unsuccessful volleyball players in pulse rate, body fat, lean body weight and cardiovascular endurance. But, insignificant differences are observed in systolic blood pressure, diastolic blood pressure and pulse pressure.

9. Significant differences are noted in volleying, serving, passing and set up between successful and
unsuccessful volleyball players.

10. Significant differences are also noticed in the paired means of all rounders - set uppers and spikers - set uppers in speed, arm strength, explosive power, dynamic balance, agility, shoulder flexibility, height and weight, but difference in all rounders - set uppers is found insignificant. All rounders - set uppers have significant difference in wrist flexibility but differences in all rounders - spikers, and spikers - set uppers are found insignificant.

11. There are significant differences in the paired means of all rounders - set uppers and spikers - set uppers in pulse rate, body fat, lean body weight and cardiovascular endurance whereas, no significant differences are found in all rounders - spikers, in these variables. Further, significant differences are also found between spikers - set uppers in systolic and diastolic blood pressure whereas, insignificant differences are observed in all rounders - spikers and all rounders - set uppers.

12. There are significant differences in the paired mean of spikers - set uppers in volleying and serving. Significant difference is also observed in the paired mean of all rounders - set uppers in serving, whereas,
paired means of all rounder - spikers in volleying and serving; all rounders - set uppers in volleying are found insignificant in motor skill variables.

Recommendations

In the light of the results of this study, it is recommended that:-

1. The results of this study can be used by the physical education teachers and coaches as an aid in screening and selecting volleyball players.

2. In the training programme for volleyball players emphasis must be laid on improvement of explosive power, agility, ankle flexibility, cardiovascular endurance, lean body weight, pulse pressure, volleying and serving.

3. It is recommended that a similar study may be repeated by selecting subjects belonging to different age, sex and level of achievement other than those employed in the present study.

4. It is recommended that more intensive research work may be undertaken in other sports where the criteria
used for measuring success is the game performance.

5. It is recommended that a longitudinal study may be conducted to see if high scores on physical, physiological and motor skill variables act as limiting factors in a game of volleyball.

6. A similar study may also be undertaken utilizing the functional variables in addition to the variables chosen in this study.