Chapter – V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of this study was to find out the relationships of selected physical and kinematical variables with the performance of Javelin throwers. The subjects were 100 athletes consisting of 50 male and 50 female Javelin throwers from different Universities, those who have participated in all India Inter University athletic meets. The subjects were ranging from 17-25 years of age depending upon the performance level of the athletes only those who have attained the performance level of 45 mts and 30 mts in case of male and female Javelin throwers respectively were considered as the subjects for the purpose of study. The criterion measure was performance of the subjects in Javelin throw.

Selected physical variables were age, height and weight, while kinematical variables were length of third stride, impulse stride, final stance, reverse stride, height of center of gravity of the subjects in final stance and moment release and height of release. The angular kinematical variables were angles of right and left ankle joint, right and left knee joint, hip joint, trunk inclination and elbow joint of throwing arm in
final stance and moment release. The performance of the subjects was recorded during the competitions.

The mean, standard deviation and coefficient of correlation (Persian product moment correlation) were calculated for the selected physical and kinematical variables and their relationship with the performance of Javelin throwers. The level of significance was 0.05.

The following physical and kinematical variables in respect of male Javelin throwers have shown significant relationship with the performance:

- Height of the subject ($r = 0.369$),
- Weight of the subject ($r = 0.659$),
- Height of center of gravity of the athletes in moment release ($r = 0.288$),
- Height of release ($r = 0.302$),
- Angle of left ankle joint in moment release ($r = 0.346$).

The selected kinematical variables who have shown insignificant relationship with the performance were:

- Age of the subjects ($r = 0.183$),
- Length of the third stride ($r = 0.031$),
- Length of impulse stride ($r = -0.200$),
- Length of final stance ($r = 0.146$),
- Length of reverse ($r = -0.033$) and height of center of gravity of the athletes in final stance ($r = 0.088$).
The angular kinematical variables in final stance have shown insignificant relationship with the performance were:

Angle of right ankle joint \( (r = -0.051) \), angle of left ankle joint \( (r = 0.112) \), angle of right knee joint \( (r = 0.145) \), angle of left knee joint \( (r = 0.080) \), angle of hip joint \( (r = -0.012) \), angle of trunk inclination \( (r = 0.101) \), angle of elbow joint of throwing arm \( (r = 0.044) \).

The angular kinematical variables in moment release have shown insignificant relationship with the performance were:

Angle of right ankle joint \( (r = 0.255) \), angle of right knee joint \( (r = 0.181) \), angle of left knee joint \( (r = 0.058) \), angle of hip joint \( (r = -0.175) \), angle of trunk inclination \( (r = -0.015) \), angle of elbow joint of throwing arm \( (r = 0.044) \).

In case of female Javelin throwers the kinematical variables have shown significant relationship with the performance were:

Length of reverse \( (r = 0.327) \).

The angular kinematical variables have negative significant relationship with the performance of female javelin throwers were:

Angle of left knee joint \( (r = -0.353) \), Angle of hip joint \( (r = -0.313) \).
The physical and kinematical variables in case of female Javelin throwers have insignificant relationship with the performance were:

Age of the subjects \( r = -0.008 \), height of the subjects \( r = 0.102 \) and weight of the subjects \( r = 0.187 \), length of the third stride \( r = -0.179 \), length of impulse stride \( r = -0.177 \), length of final stance \( r = -0.070 \), height of center of gravity of body in final stance \( r = 0.078 \), height of center of gravity of body in moment release \( r = -0.224 \) and height of release \( r = -0.225 \).

The angular kinematical variables have shown insignificant relationship with the performance in final stance were:

Angle of right ankle joint \( r = 0.148 \), angle of left ankle joint \( r = -0.122 \), angle of right knee joint \( r = -0.070 \), angle of left knee joint \( r = -0.221 \), angle of hip joint \( r = 0.011 \), angle of trunk inclination \( r = -0.002 \) and angle of elbow joint of throwing arm \( r = -0.024 \).

The angular kinematical variables have shown insignificant relationship with the performance in moment release were:

Angle of right ankle joint \( r = -0.009 \), Angle of left ankle joint \( r = -0.270 \), angle of right knee joint \( r = -0.126 \), angle of trunk inclination \( r = -0.176 \) and angle of elbow joint of throwing arm \( r = 0.023 \).
Conclusions

Within the limitations of the study following conclusions may be drawn for:

**Male Javelin Throwers**

1. Performance had shown significant relationship with the height of the subjects.
2. Performance had shown significant relationship with weight of the subjects.
3. Performance had shown significant relationship with height of C.G. of body at moment release of the subjects.
4. Performance had shown significant relationship with height of release of the subjects.
5. Performance had shown significant relationship with angle of left ankle joint at moment release of the subjects.
6. Performance had shown insignificant relationship with age of the subjects.
7. Performance had shown insignificant relationship with length of third stride of the subjects.
8. Performance had shown insignificant relationship with length of impulse stride of the subjects.
9. Performance had shown insignificant relationship with length of final stance of the subjects.

10. Performance had shown insignificant relationship with length of reverse of the subjects.

11. Performance had shown insignificant relationship with height of center of gravity of body at final stance of the subjects.

12. Performance had shown insignificant relationship with angle of right ankle joint at final stance of the subjects.

13. Performance had shown insignificant relationship with angle of left ankle joint at final stance of the subjects.

14. Performance had shown insignificant relationship with angle of right knee joint at final stance of the subjects.

15. Performance had shown insignificant relationship with angle of left knee joint at final stance of the subjects.

16. Performance had shown insignificant relationship with angle of hip joint at final stance of the subjects.

17. Performance had shown insignificant relationship with angle of trunk inclination at final stance of the subjects.

18. Performance had shown insignificant relationship with angle of elbow joint of throwing arm at final stance of the subjects.

19. Performance had shown insignificant relationship with angle of right ankle joint at moment release of the subjects.
20. Performance had shown insignificant relationship with angle of right knee joint at moment release of the subjects.

21. Performance had shown insignificant relationship with angle of left knee joint at moment release of the subjects.

22. Performance had shown insignificant relationship with angle of hip joint at moment release of the subjects.

23. Performance had shown insignificant relationship with angle of trunk inclination at moment release of the subjects.

24. Performance had shown insignificant relationship with angle of elbow joint of throwing arm at moment release of the subjects.

**Female Javelin Throwers**

1. Performance had shown significant relationship with length of reverse of the subjects.

2. Performance had shown negative significant relationship with angle of left knee joint at moment release of the subjects.

3. Performance had shown negative significant relationship with angle of hip joint at moment release of the subjects.

4. Performance had shown insignificant relationship with age of the subjects.

5. Performance had shown insignificant relationship with height of the subjects.
6. Performance had shown insignificant relationship with weight of the subjects.

7. Performance had shown insignificant relationship with length of third stride of the subjects.

8. Performance had shown insignificant relationship with length of impulse stride of the subjects.

9. Performance had shown insignificant relationship with length of final stance of the subjects.

10. Performance had shown insignificant relationship with height of center of gravity of body at final stance of the subjects.

11. Performance had shown insignificant relationship with height of center of gravity of body at moment release of the subjects.

12. Performance had shown insignificant relationship with height of release of the subjects.

13. Performance had shown insignificant relationship with angle of right ankle joint at final stance of the subjects.

14. Performance had shown insignificant relationship with angle of left ankle joint at final stance of the subjects.

15. Performance had shown insignificant relationship with angle of right knee joint at final stance of the subjects.

16. Performance had shown insignificant relationship with angle of left knee joint at final stance of the subjects.
17. Performance had shown insignificant relationship with angle of hip joint at final stance of the subjects.

18. Performance had shown insignificant relationship with angle of trunk inclination at final stance of the subjects.

19. Performance had shown insignificant relationship with angle of elbow joint of throwing arm at final stance of the subjects.

20. Performance had shown insignificant relationship with angle of right ankle joint at moment release of the subjects.

21. Performance had shown insignificant relationship with angle of left ankle joint at moment release of the subjects.

22. Performance had shown insignificant relationship with angle of right knee joint at moment release of the subjects.

23. Performance had shown insignificant relationship with angle of trunk inclination at moment release of the subjects.

24. Performance had shown insignificant relationship with angle of elbow joint of throwing arm at moment release of the subjects.

**Recommendations**

1. Similar studies may be conducted on the subjects of different age groups, level of participation and bigger size of the samples.

2. Studies may be carried out in other throwing events also.
3. The variables other than those used in this study may also be included in further research projects.

4. The result of this study may be used by physical education teachers and coaches as a model of technique for Javelin throwers.

5. The results of this study may also be helpful in talent identification.