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Analysis of Coordination Abilities, Balance and Reaction Times among Wrestlers from Varying Weight Categories

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Abstract

This research, conducted at the Department of Physical Education, Guru Kashi University, Talwandi Sabo, Punjab, aimed to examine the coordination abilities, balance, and reaction times among wrestlers in various weight categories. Here is a summary of the primary findings.

Sample: The study involved a total of 60 male wrestlers, randomly selected from Guru Kashi University,Talwandi Sabo, Punjab during the 2023-2024 and 2024-2025 sessions. The participants were aged between 18 and 23 years and were divided into three groups based on their weight categories: below 57 kg, 58-65 kg, and 66-74 kg, with 20 wrestlers in each group.

Data Analysis: The collected data were analyzed using appropriate statistical techniques, with a significance level set at 0.05. The ANOVA test was applied to evaluate the differences in coordination abilities, balance, and reaction times across wrestlers from different weight categories.

Hypothesis: The study hypothesized that significant differences might exist in coordination abilities, balance, and reaction times among wrestlers in varying weight categories.

Conclusion: The findings suggest that wrestlers in different weight categories may exhibit notable differences in their coordination abilities, balance, and reaction times.

Keywords: Balance, coordinative ability, Reaction time and weight categories.

Introduction

The capacity to move the body in ways that require intricate inputs and finely controlled muscle actions is known as coordination. No advanced movement (such as skills or activities) can be executed effectively without proper coordination. The ability to integrate different actions and motions into specific patterns demands neuromuscular effort and is crucial in all athletic endeavors. Coordination is not a separate entity but is the result of the combined influence of agility, balance, speed, and body awareness. The coordination of the eyes with either the feet, hands, or head is essential for mastering various sports skills, with control, precision, and steadiness as the key factors.

Balance refers to the ability to keep the body stable in a given position while adjusting to shifts in its center of gravity. Maintaining the neuromuscular system in a stable state for an efficient response or controlling it in a specific posture during movement is the fundamental principle of balance. As a result, balance can be classified as static (like holding a steady position on the Roman rings or performing a handstand) or dynamic (such as maintaining stability while executing a somersault or a giant wheel).

An aspect of timing, the ability to start movement and react to a stimulus, is known as reactiontime. It plays a significant role in many sports and everyday activities, although it is rarely quantified.

Methodology

Based on the provided data & interpretation.

The study randomly selected 60 male wrestlers from the Department of Physical Education at Guru Kashi University, Talwandi Sabo, Punjab. The participant's ages ranged from 18 to 23 years. They were assigned to three distinct weight categories: below 57 kg, 58-65 kg, and 66-74 kg, with each category consisting of 20 participants. The gathered data were analyzed using the ANOVA test to assess whether significant differences existed between the weight categories. The data analysis was performed using the SPSS (Statistical Package for the Social Sciences). The significance level for testing the hypothesis was set at 0.05.

ResultsThe results pertaining to the study are present in the following tables.

Table –I Mean value of reaction time (audio) among wrestlers in different weight categories.

Weight categories	Mean
Below 57 Kg	0.56
58-65 Kg	0.47
66-74 Kg	0.48

Table I presents the audio reaction times of wrestlers in different weight categories. The results show that wrestlers in the below 57 kg category exhibit the quickest audio reaction time, as their mean score is higher than those in the other two weight groups. The differences in audio reaction times among the various weight categories are illustrated in the following graph. A distinct variation in the average audio reaction times is observed between wrestlers from different weight groups. To determine if this variation is statistically significant, the 'F' test (ANOVA) can be applied.

Graphical representation of reaction time (audio) among wrestlers.

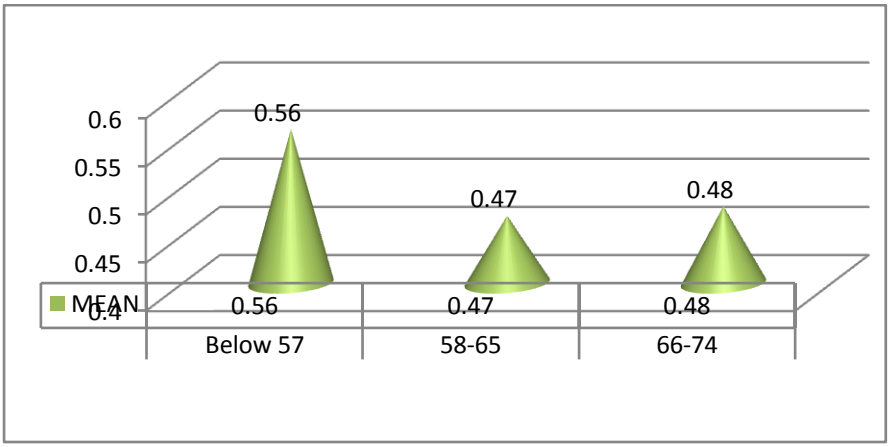

Table-2 ANOVAin reaction time in audio among wrestlers in different weight categories

Source of Variation	Sum of Squares	DF	Mean variance	F Calculated	F Tabulated
Between Groups	0.093	K-1 3-1=2	0.046	2.38	3.15
Within Groups	1.109	N-K	0.019		

		60-3= 57			

Table 2 illustrates that the degree of freedom between groups (DFB) is determined using the formula K-1, where 'K' signifies the number of groups, which in this case is 3. Thus, DFB is calculated as 3-1=2. Similarly, the degree of freedom within groups (DFW) is computed using the formula N-K, where 'N' represents the total number of participants, and 'K' denotes the number of groups. Here, DFW is calculated as 60-3=57. Consequently, the critical 'F' value for 2and 57 degrees of freedom is 3.15, known as the tabulated 'F' value.

In the given table, the tabulated 'F' value stands at 3.15, whereas the obtained 'F' value is 2.38. Since the calculated 'F' value is lower than the tabulated value at the 0.05 level of significance, it suggests that there is no statistically significant difference in the audio reaction times among wrestlers of different weight divisions. Therefore, the researchers' proposed hypothesis is not supported.

Table- 3 Mean value of reaction time in visual among wrestlers in different weight categories

Weight categories	Mean
Below 57 Kg	0.41
58-65 Kg	0.36
66-74 Kg	0.42

Table 3 presents the Visual reaction times of wrestlers in different weight categories. The results show that wrestlers in the 66-74 kg category exhibit the quickest Visual reaction time, as their mean score is higher than those in the other two weight groups. The differences in Visual reaction times among the various weight categories are illustrated in the following graph. A distinct variation in the average Visual reaction times is observed between wrestlers from different weight groups. To determine if this variation is statistically significant, the 'F' test (ANOVA) can be applied.

Graphical representation of reaction time in visual among wrestlers in different weight

Table 4 One-Way Analysis of Variance of Reaction Time in Visual Stimuli among Wrestlers across Different Weight Categories

Source of variance	DF	Sum of squares	Mean variance	F calculated	F tabulated
Between groups	K-1 3-1=2	0.04	0.02	2.75	3.15

Within groups	N-K 60-3=57	0.43	0.007		

Table- 4 illustrates that the degree of freedom between groups (DFB) is determined using the formula K-1, where 'K' signifies the number of groups, which in this case is 3. Thus, DFB is calculated as 3-1=2. Similarly, the degree of freedom within groups (DFW) is computed using the formula N-K, where 'N' represents the total number of participants, and 'K' denotes the number of groups. Here, DFW is calculated as 60-3=57. Consequently, the critical 'F' value for 2 and 57 degrees of freedom is 3.15, known as the tabulated 'F' value.

In the given table, the tabulated 'F' value stands at 3.15, whereas the obtained 'F' value is 2.75. Since the calculated 'F' value is lower than the tabulated value at the 0.05 level of significance, it suggests that there is no statistically significant difference in the visual reaction times among wrestlers of different weight divisions. Therefore, the researchers' proposed hypothesis is not supported.

Table- 5 Mean value of coordination ability among wrestlers in different weight categories

Weight categories	Mean
Below 57Kg	26.9
58-65 Kg	26.3
66-74 Kg	26.55

Table 5 There is mean difference in coordinative ability among wrestlers in different weight categories. Whether it is significant or not it can be shown by using specialstatistical technique ‘F’ test (ANOVA).

Graphical representation of coordinative ability among wrestlers in different weight

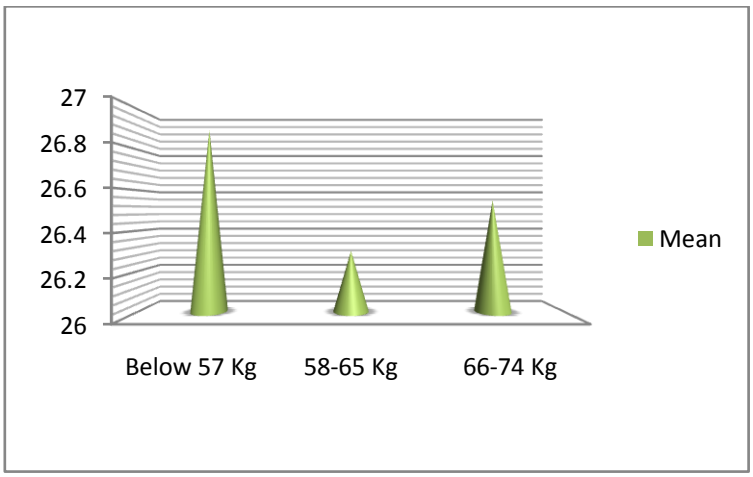

Table- 6One-way analysis of variance in coordination among wrestlers in different weight categories

Source of variance	Df	Sum of squares	Mean variance	F calculated	F tabulated
Between groups	K-1 3-1=2	3.63	1.81	0.34	3.15
Within groups	N-K 60-3=57	302.95	5.31		

In the given table 6, the tabulated 'F' value stands at 3.15, whereas the obtained 'F' value is 0.34. Since the calculated 'F' value is lower than the tabulated value at the 0.05 level of significance, it suggests that there is no statistically significant difference in the coordinative ability among wrestlers of different weight divisions. Therefore, the researcher's proposed hypothesis is not supported.

Table- 7 Mean value of Balance among wrestlers in different weight categories

Weight categories	Mean
Below 57 kg	135.3
58-65 Kg	138.3
66-74 Kg	134.65

Table- 7 presents the balance of wrestlers in different weight categories. The results show that wrestlers in the 58-65 kg category have better balance, as their mean score is higher than those in the other two weight groups. The differences in balance among the various weight categories are illustrated in the following graph. A distinct variation in the average balance is observed between wrestlers from different weight groups. To determine if this variation is statistically significant, the 'F' test (ANOVA) can be applied.

Graphical representation of balance among wrestlers in different weight

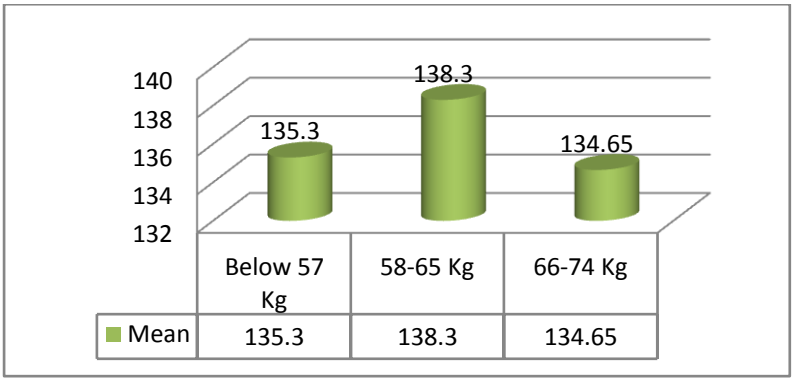

Table- 8One way analysis of variance in Balance among wrestlers in different weight categories

Source of variance	Df	Sum of squares	Mean variance	F calculated	F tabulated
Between groups	K-1 3-1=2	151.63	75.82	0.18	3.15
Within groups	N-K 60-3=57	22986.95	403.28		

In the given table 8, the tabulated 'F' value stands at 3.15, whereas the obtained 'F' value is 0.18. Since the calculated 'F' value is lower than the tabulated value at the 0.05 level of significance, it suggests that there is no statistically significant difference in the audio reaction times among wrestlers of different weight divisions. Therefore, the researcher's proposed hypothesis is not supported.

Findings

The results revealed that there is no significant variation in coordinative ability, balance, and reaction time among wrestlers across different weight categories. This suggests that the researcher's hypothesis is not supported, as the initial expectation was that notable differences would exist in these abilities among wrestlers from different weight groups.

Conclusion

The researcher initially predicted that significant differences would be found in coordination, reaction time, and balance among wrestlers in different weight categories from the department of physical educationGuru Kashi UniversityTalwandi Sabo, Punjab. However, following the statistical analysis and data interpretation, it was concluded that there is no significant difference in coordination, reaction time, and balance among wrestlers from different weight categories. The calculated 'F' value was higher than the tabulated 'F', at the 0.05 level of significance. As a result, the researcher's original hypothesis has been rejected.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Declaration

I declare that the work in this paper titled "analysis of physical fitness components among athletes and non-athletes", has been carried out by me and is my original work and no part of it has been published anywhere else in the past. I take full responsibility that if in future the paper is found invalid according to basic rules, the last decision will be of the authorities concerned.

References

1. Ahmad Qureshi (2019), Physical Fitness Among Sports and Non-sports Persons A Comparative Study. Research Review International Journal of Multidisciplinary, Volume 04, Issue 02
2. Amandeep Singh and Neeru Malik (2021), Comparison of health related physical fitness between urban and rural preadolescents in Punjab. International Journal of Physical Education, Sports and Health, 8 (6), 143-145
3. ChouhanSav Singh (2019), Comparative Study of Health Status, Mental Health Status, Anthropometric Measurements and Physical Fitness of Rural and Urban Girls Of Madhya Pradesh",Ph.D. Thesis, Devi AhilyaVishwavidyalaya, Indore.
4. Deborah Wuest A, Charles Bucher A.(1992), Foundations of Physical Education and Sport, B.I. Publications. New Delhi
5. DevinderKansal K. (1996), Test and Measurement in Sports and Physical Education, DVS Publication, Delhi
6. Dhirendre Singh Chauhn (2018), Comparative Study of Physical Fitness Variables of Urban and Rural Area Players. International Journal of Physical Education and Sports Science, volume 13, Issue No. 04
7. Harneet Singh (2015), Comparative Study on Selected Physical Fitness and Physiological Variables between Volleyball and Handball Players, European Journal of Physical Education and Sports, 10 (4):206-211.
8. J Samuel Jesuudoss (2019), Analysis of physical fitness variables of Kho-Kho and Kabaddi players. International Journal of Physiology, Nutrition and Physical Education, 4 (1), p.p. 1250-1251
9. Kamlesh. M. L (2012) UGC- Net physical education New Delhi friend's publication co. of India.
10. KohilKeshav (2014), A Comparative Study of Physical Fitness Variables of Male Volleyball Players and Football Players. Research Journal of Physical Education Sciences, Vol.2, No. 1.
11. Kumar Anuj and Kumar Sandeep (2019), Comparison of Anthropometric Measurements among the Students of Education and Physical Education. International Journal of Physical Education and Sports Sciences, Vol. 14, Issue 2.

12. MallikArjunaSwamy K and Kavithej V R (2019), A Comparative Study on Health Related Fitness of Tribal'sand Non- Tribal's of Kodagu District, Karnataka. International Journal of Health, Physical Education and Computer Science in Sports, Volume 34, No. 1, p.p. 74-79.

13. MajeedAarif&Sayar P.S. (2022), A comparative study of Jammu and Kashmir college students regarding physiological components and physical fitness variables, International Journal of Physiology, Nutrition and Physical Education; 7(1), 354-357

14. MajeedAarif (2021), Effect of selected Plyometric training on Arm and leg strength of volleyball players. International Journal of Health, Physical Education and Computer Science in Sports, Volume 43 (1), 34-36.

15. MajeedAarif and BhatMuzammil Ahmad (2019), Effect of Circuit training on Motor fitness components and skill ability of Kabaddi Players, International Journal of Psychosocial Rehabilitation, Vol 23 (06), 1896-1902.

16. MajeedAarif (2020),Effect of selected exercise on reaction time and agility of Athlete and non-athlete A comparative study. Ajanta, Vol IX (IV), 95-102.

17. MajeedAarif&Sayar P.S. (2022), Comparative study of selected anthropometric measurements & physical fitness variables of college students of Jammu and Kashmir, B. Aadhar,Issue NO, 346 (CCCXLVI), 1-5.

18. MajeedAarif&Sayar P.S. (2022), Comparison of selected physiological parameters and anthropometric measurements between college level students of two regions of Jammu and Kashmir, International Journal of Yoga, Physiotherapy and Physical Education, Volume 7, Issue 1, p.p 1-4

19. MandrekarSahadev (2017), A Comparative Study on Physical Fitness Variables of Inter Collegiate Cricket and Football Players of Goa. International Journal of Physiology, Nutrition and Physical Education, 2(1).

20. ManjappanS and Alagesan S (2019), Comparative Study of Health Related Physical Fitness Components among the Athletes and Non-athletes. International Journal of Physiology, Nutrition and Physical Education, 4(1).

21. MogheVijay (2018), Comparison of the Anthropometric Measurements among Swimmers and Sprinters. International Journal of Physical Education, Health and Social Science, Vol. 7, Issue 1.

22. MondalChiranjit et.al; (2016), Comparative Analysis on Selected Anthropometric and Motor Fitness Variables between Secondary and Higher Secondary Students. Indian Journal of Applied Research, Volume 6, Issue 10.

23. Muhammad ZiaulHaq et.al; (2019), Anthropometric Characteristics and Physical Fitness of Urban and Rural 8-10 Years Old School Girls of Bahawalpur, Pakistan. International Journal of Physiotherapy, Volume 6(2), pp. 46-51

24. Muniraju S and C Santhosha (2019), A comparative study on selected anthropometric variables among college level male Kabaddi and Kho-Kho players. International Journal of Physiology, Nutrition and Physical Education, Vol. 4, No. 1.

25. Smt. Bhavya, et al. (2021), Comparative Study on Selected Physical Fitness and Physiological Variables between Kabaddi and Kho-Kho Players, International Journal of Research and Analytical Reviews, 8(2):40-44.

26. ShahadevMandrekar (2017), A Comparative Study On Selected Physical Fitness Variables of Inter Collegiate Cricket and Football Players Of Goa. International Journal of Physiology, Nutrition & Physical Education, 2(1): 430-433.

27. Reet Howell, et al. (1994), Foundations of Physical Education, Friends Publications, Delhi