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A comparative study of reaction ability and balance ability among players belonging to contact, semi-contact and non-contact sports

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Abstract
The purpose of the study was to compare Reaction ability and Balance ability of 135 female sportsperson from Contact sports (Judo, Taekwondo and kabaddi), Semi-contact sports (football, kho-kho and hockey) and Non-contact sports (archery, volleyball and ball-badminton) who participated in Inter-university level competitions from Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur. Purposive sampling method was used to select the samples. There ages ranged from 20-25 years. Data was collected by administering test for measuring reaction and balance ability as suggested by Peter Hirtz. Statics group design was used as a design for this study. ANOVA was applied to compare the different group followed by post-hoc test. The level of significance was set at 0.05. The result of the study showed that, in Reaction Ability no significant difference is found between contact and semi-contact sports. On the other hand significant difference is found between contact and non-contact sports as well as semi-contact and non-contact sports. No significant difference found in Balance Ability among the sportspersons of Contact, Semi-contact and Non-contact Sports.

Keywords: Female, contact sports, semi-contact sports, non-contact sports.

Introduction
Coordinative abilities are an expression of motor coordination which is of crucial importance in sports movements. The movement quality depends to a great extent on coordinative abilities. The rhythm, flow, accuracy, consistency, amplitude etc. of a movement are expression of motor coordination and hence highly dependent on the level of various coordinative abilities. So in every sport, whether it is contact, semi-contact and non-contact sports requires some type of coordination but it is very difficult to find out, in which sports, which type of coordinative ability is required. As Judo, Taekwondo and kabaddi (contact sports), football, kho-kho and hockey (semi-contact sports), archery, volleyball and ball-badminton (non-contact sports) are very popular in our country, hence the scholar in the form of present study has modest effort in this direction to compare reaction and balance ability of sportsmen belonging to contact, semi-contact and non-contact sports. Balance ability is the ability to maintain balance during whole body movements and to regain balance quickly after the balance disturbing movements. Reaction ability is the ability to react quickly and effectively to a signal. Both the abilities play an important role in several games and sports but it is very difficult to find out, in which sports, which type of ability is required. Therefore, scholar has attempted to compare the reaction and balance abilities among contact, semi-contact and non-contact sportsperson.
Das (2016) [11] conducted a comparative study on various coordinative abilities among the Striker and Defender Soccer players of Tripura. A total of forty (N=40), 20 strikers and 20 defenders of National level Soccer players were selected as subjects for the study. After analysed the data the result showed no significant difference between striker and defender soccer players on various selected coordinative abilities namely orientation, differentiation, balance, reaction, rhythm abilities. The reason for that may be due to the fact that the striker and defender players movement of actions upto some extent are identical, thus require same amount of selected coordinative abilities. Singh, Tiwari (2015) [26] conducted a comparative study on Balance and Rhythm abilities of Indian Soccer players at different levels of participations.

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The subjects were selected from national football camp held at U.P state. To analyse the data one way analysis of variance (ANOVA) was used and the level of significance was set to 0.05. After analysed the data and post-hoc test was applied it was observed that in relation to Rhythm ability and Reaction ability significant difference was found between three age group levels i.e. Sub-Juniors, Juniors and Seniors. In each case of Balance and Rhythm abilities the sequence of performance between three age group was seniors>juniors>sub-juniors. The reason for this is may be due to that the senior players developed coordinative abilities by long duration of participation and they improve additional means for motor sense organs too. conducted a comparative study on athletes, boxers and hockey players on reaction time and agility. The result of the study showed that athletes and boxers, hockey players and boxers differ significantly in agility and right hand reaction time. The reason may be because all the three games differ in their skills. Secondly, no significant difference was found with respect to agility and right hand reaction time in hockey players and athletes. Lastly, no significant difference was found in hockey players, athletes and boxers in case of left hand reaction time. The reason for this is may be due to the fact that most of the players are Right-handed and their strong hand is Right, so for all the players who are right-handed their left hand capacity works equally.

Methodology
Selection of Subjects: The subjects for this study were selected from Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur who has participated in Inter-University competitions in selected games and sports i.e. (contact, semi-contact and non-contact sports). A total of 135 subjects were selected, 45 from each category i.e. contact, semi-contact and non-contact sports. In contact sports out of 45 subjects 15 subjects was selected from judo, 15 from taekwondo and 15 from kabaddi. In semi-contact sports out of 45 subjects 15 subjects were selected from football, 15 from kho-kho and 15 from hockey. In non-contact sports out of 45 subjects 15 subjects were selected from ball-badminton, 15 from archery and 15 from volleyball. The age of subjects ranges from 20 to 25 years.

Selection of variables: Reaction ability and Balance ability

Criterion Measures:
1. Reaction ability was measured by the ball reaction exercise test and was recorded in centimetres.
2. Balance ability was measured by using long nose test and recorded in seconds.

The data was collected during various inter university camps from University Ground after obtaining permission from the managers and coaches of selected games and sports from Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur. Necessary information and instruction were given to the subjects before administration of the tests of selected coordinative ability as suggested by Hirtz.

Findings

Table 1: Descriptive Statistics of Reaction Ability of the Sportspersons of Contact, Semi-contact and Non-contact Sports

Group	N	Mean (Centimeters)	Std. Deviation	Minimum	Maximum
Contact sport	45	143.37	25.23	110.00	198.00
Semi-contact sport	45	144.42	20.35	120.00	190.00
Non-contact sport	45	161.77	19.62	120.00	195.00

Table 1 indicates that the Mean values of Reaction Ability of the Sportspersons of Contact, Semi-contact and Non-contact Sports are 143±25 cm, 144.4±20.35 cm and 161±19.62 cm respectively. The Lower the distance measured in centimeters is better the Reaction ability, thus the maximum Reaction Ability is 143.37 cm has been found among the sportspersons of Contact sport and minimum is 161.77 cm reported for Non-contact sports. The standard deviation a value of Reaction Ability among sportspersons indicates that there is high variability among contact sports and lowest variability is recorded among Non-contact sports, as magnitude of standard deviation indicates the variability within the group.

Table 2: Analysis of Variance of the Reaction Ability among Sportspersons of Contact, Semi-contact and Non-contact Sports

Groups	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	9612.993	2	4806.496	10.04*	.000
Within Groups	63189.333	132	478.707		
Total	72802.326	134			

*Significant at 0.05 Level, Tab $F_{.05}(2,132) = 3.07$

Since the computed value of F (10.04) is significantly greater than Tab $F_{.05}$ (Table No. 4.6), thus, the null hypothesis is rejected at 0.05 level, and it is concluded that there is significant difference in Reaction Ability among the sportspersons of Contact, Semi-contact and Non-contact Sports. To further analysis as to which programme is better, pair-wise mean comparison (Post-hoc Test) is done by using Scheffe's Test.

Table 3: Pair-wise Comparison (Scheffe's Test) of the Mean values of Reaction Ability among Sportspersons of Contact, Semi-contact and Non-contact Sports

Contact Sport	Semi-Contact Sports	Non-contact sport	Mean Difference	Std. Error	Sig.
143.37	144.42	--	1.04444	4.61258	.975
143.37	--	161.77	18.40000*	4.61258	.001
--	144.42	161.77	17.35556*	4.61258	.001

*Significant at 0.05 Level

Comparing the pair-wise difference of means (Table No. 3) with the help of Scheffe's Test (Post-hoc Test), it is found that in Reaction Ability no significant difference is found between contact and semi-contact sports. On the other hand significant difference is found between contact and non-contact sports as well as semi-contact and non-contact sports. Thus, it is concluded that reaction ability of contact sports is significantly more than semi-contact and non-contact sports.
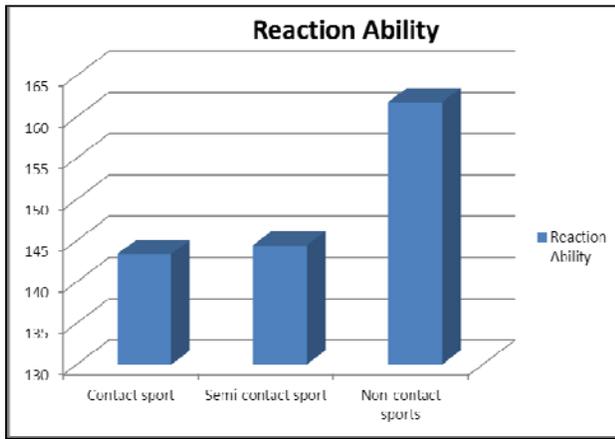
Fig 1: Bar Graph showing magnitude of difference in "*Reaction Ability*" among Sportspersons of Contact, Semi-contact and Non-contact Sports
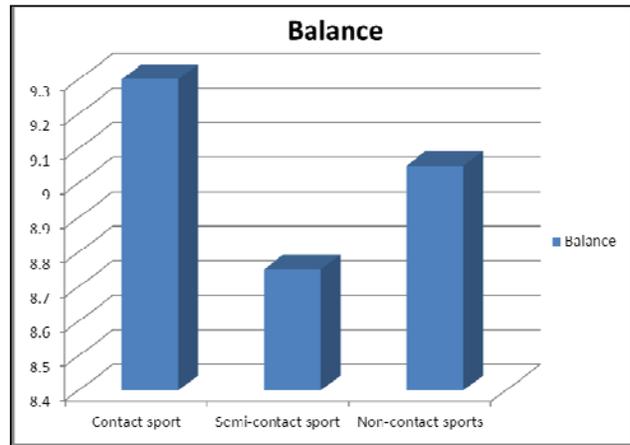
Table 4: Descriptive Statistics of Balance of the Sportspersons of Contact, Semi-contact and Non-contact Sports

Group	N	Mean (Seconds)	Std. Deviation	Minimum	Maximum
Contact sport	45	9.30	4.36	.00	14.17
Semi Contact sport	45	8.75	4.00	.00	13.52
Non contact sport	45	9.05	4.49	.00	14.98

Table 4 indicates that the Mean values of Balance among the Sportspersons of Contact, Semi-contact and Non-contact Sports are 9.30±4.36 Seconds, 8.75±.4.00 Seconds and 9.05±4.49 Seconds respectively. The lesser the time taken to complete the task would be considered better in the Balance, thus the maximum Balance is 8.75 Seconds which has been found among the sportspersons of Semi-contact sport and minimum is 9.30, reported for Contact sports. The magnitude of standard deviation indicates the variability within the group. Thus the standard deviation value of Balance indicates that, there is high variability in Balance among Non-contact sports and low variability is recorded among Semi-contact sports.

Table 5: Analysis of Variance of the Balance among Sportspersons of Contact, Semi-contact and Non-contact Sports

Groups	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.999	2	3.499	.190	.827
Within Groups	2433.027	132	18.432		
Total	2440.026	134			

*Significant at 0.05 Level, Tab $F_{.05}(2,132) =3.07$

Since the computed value of F (1.90) is less than Tab $F_{.05}$ (Table No. 4.11), thus, the null hypothesis is accepted at 0.05 level, and it is concluded that there is no significant difference in Balance Ability among the sportspersons of Contact, Semi-contact and Non-contact Sports. Since, ANOVA was not found significant at 0.05 level, further analysis was not carried using Scheffe's Test.

Fig 2: Bar Graph showing magnitude of difference in *"Balance Ability"* among Sportspersons of Contact, Semi-contact and Non-contact Sports

Discussion of findings:
In Reaction Ability no significant difference is found between contact and semi-contact sports. On the other hand significant difference is found between contact and non-contact sports as well as semi-contact and non-contact sports. Thus, it is concluded that reaction ability of contact sports is significantly more than semi-contact and non-contact sports. The no significant difference between contact and semi-contact sports in reaction ability may be due to clubbing of various games in each category, thus the nullifying effect must have contributed towards the no significant difference. It can be assumed that in certain games and sports faster reaction ability is needed whereas in others slow reaction ability is needed hence no significant difference was obtained. The significant difference between contact and non-contact sports as well as semi-contact and non-contact sports is may be due the fact that these sports differ in their skills. The reaction ability of contact sports is significantly more than semi-contact and non-contact sports because of small area of play in contact sports and is needed to be quick as the time is too short to respond to the actions during the game.

Balance ability
No significant difference in Balance Ability among the sportspersons of Contact, Semi-contact and Non-contact Sports. The no significant difference may be due to the fact that, as balance ability is necessary and pre-requisite for all types of movements in all three sports categories (contact, semi-contact and non-contact sports). Thus, it can be stated that movement cannot be performed without balance ability. Balance ability is required for the execution of all movements weather slow or fast, part body movement or whole body movement. Thus, all the three categories of sports require similar demands in terms of maintenance of balance.

Conclusion
1. In Reaction Ability no significant difference is found between contact and semi-contact sports. On the other hand significant difference is found between contact and non-contact sports as well as semi-contact and non-contact sports. Thus, it is concluded that reaction ability of contact sports is significantly more than semi-contact and non-contact sports.
2. No significant difference found in Balance Ability among the sportspersons of Contact, Semi-contact and Non-contact Sports.

References

1. Barrow HM. Man and Movement: Principles of Physical Education. Lea and figigel. Philadelph. 1977, 220.
2. Dr. Srivastava AK. How to Coach Football, (New Delhi: Sports Publication). 2006, 1.
3. Dr. Biru Mal, Dr. Kapri BC. A To Z Soccer, (New Delhi: Friends Publications).2.
4. Prasad Rao E. The Complete Handbook on Kabaddi, (Andhra Pradesh: Jagadamba Publication). 2002, 1-2.
5. Hardayal S. Science of Sports Training. D. V. S. Publications. New Delhi. 1997, 85-95.
6. Hardayal Singh. Sports Training – General Theory and Technique (Patiala: NSNIS Publication). 1984.
7. Johnson B, Nelson jack K. Practical measurement for evaluation in physical education. surjeet publication. New Delhi. 1988.
8. Kansal DK. Test and Measurement in Sports and Physical Education. D.V.S. Publication. New Delhi 1996, 219-220.
9. Mukesh kumar. Judo, (Delhi: sports publication). 1994; 17-18.
10. Singh A, Bains J, Singh GJ. Essential of Physical Education. Kalyani Publisher. 2008, 13-19.
11. Dr. Sudip Das. International Journal of Informative & Futuristic research, 2016; 3(7):2619-2622. http://www.ijifr.com/pdfsave/03-04-2016576V3-E7-096.pdf(R-45)
12. Bowen R, Hodkinson HM, Judo, (William Collins Sons & co. Ltd: Great Britain) 1963, 85.
13. Mukeshkumar Judo, (Delhi: sports publication) 1994, 17-18.
14. http://en.wikipedia.org/wiki/taekwondo
15. Taekwondo-Korean Martial Art for Self Defence, 53-54.
16. Prasad Rao E. The Complete Handbook on Kabaddi, (Andhra Pradesh: Jagadamba Publication). 2002, 1-2.
17. Rao CV, Kabaddi, (Patiala: NIS Publication) 1971, 10.
18. Prasad Rao E. Modern Coaching in Kabaddi,(New Delhi:D.V.S Publication). 1994, 11.
19. Schmid S, Alejo B. Complete Conditioning For Soccer,(America: United Graphics) 2002, 1-2.
20. Samuel Jhon, Sports Fitness & Training, (New Delhi: Rajat Publications) 2010, 175.
21. http://757fieldhockeyclub.com/Page.asp?n=88450&org= 757FIELDHOCKEYCLUB.COM
22. Wilbur H, Peck Volleyball. (Canada: Collier-Macmillam). 1970, 88.
23. Jain D, Volleyball Skills, Rules, (New Delhi: KhelSahitya Kendra) 2003, 115.
24. Schmid S, Alejo B. Complete Conditioning For Soccer, (America: United Graphics) 2002, 1-2.
25. Jain D. Play and Learn Achery, (New Delhi: Khel Sahitya Kendra) 2003, 6.
26. Singh Tiwari, AK., D.U. *Dewsnetin*. c2013, Retrieved 21 July, 2016, from http://dews.net.in/ijmess/wp-content/uploads/2015/02/2-Amit-DEWS.pdf
27. http://connection.ebscohost.com/c/articles/86652814/imp ortance-coordinative-abilities-development-optimizing-selection-process-elite-athletes
28. Mukesh. *Ijnietorg*. 2013, Retrieved 18 July, 2015, from http://ijniet.org/wp-content/uploads/2013/06/6.pdf