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## Comparison of psychomotor abilities among handball players: A comparative study

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### Abstract

**Aim:** This study was aimed to find out the differences of Psychomotor Abilities among District, State and National level men Handball Players.

**Material and Methods:** Eighty eight, Men subjects between the age group of 14 - 19 years volunteered to participate in the study. The subjects were purposively assigned into three groups: Group-A: (District;  $N_1 = 40$ ); Group-B: (State;  $N_2 = 32$ ); Group-C: (National;  $N_3 = 16$ ). The study was delimited to the following selected Psychomotor Abilities: "Kinesthetic Perception", "Speed of Movement" and "Response Time".

**Sampling:** Convenience sampling (also known as availability sampling) is a specific type of non-probability sampling method that relies on data collection from population members who are conveniently available to participate in study were utilized for the purpose of this study.

**Statistical Analysis:** The Statistical Package for the Social Sciences (SPSS) version 26 was used for all analyses. The differences in the mean of each group for selected variable were tested for the significance of difference by One-way Analysis of Variance (ANOVA). For further analysis Post-Hoc Test (Scheffe's Test) was applied. For testing the hypotheses, the level of significance was set at 0.05.

**Results:** It is evident from the results of Analysis of Variance (ANOVA) among District, State and National level Handball Players with regards to variables, "Kinesthetic Perception", "Speed of Movement" and "Response Time" were found statistically significant ( $P < .05$ ).

**Keywords:** Handball, kinesthetic perception, speed of movement, response time

### Introduction

In sport, physical and psychological factors that affect the athlete's performance. While motivational factors play an important protector role in the long-term effects of regular sport practice on the psychosocial development of the athlete, the emotional responses provoked by anxiety can affect athletic performance<sup>[1]</sup>, and a state of permanent anxiety can even become a determining factor in the relative or total abandonment of sports practice<sup>[2]</sup>. Anxiety is a psychological response produced as a consequence of differences between the self-assessment of a person's ability to respond to a specific situation (e.g., challenge, action) and that person's actual ability to respond<sup>[3]</sup>. Understood as a neurotic personality feature<sup>[4]</sup>, anxiety is associated with the tendency to show poor emotional adjustment in the form of high levels of reactivity and emotional sensitivity (e.g., fear, worry or anger)<sup>[5]</sup>. Despite this, anxiety also exerts a self-regulatory influence against low levels of coping or motivation<sup>[6]</sup>, which can set up adaptive effects which are suitable for short-term performance improvements<sup>[7]</sup>.

In a context of skill and achievement, in which athletes try to reach a goal and in which proving competence and ability is important<sup>[8]</sup>, Roberts and Treasure<sup>[9]</sup> claim that physical and psychological well-being depends on the contexts where sports practice is carried out. More specifically, in the case of a team sport, such as handball, and at the height of adolescence, peers and coaches are the main social agents in a team<sup>[10,11]</sup> in terms of the motivational climate perceived during training<sup>[12,13,14,15,16]</sup>. As result of that self-evaluation cognitive process, and mediated for other psychological skills (e.g., perceived control or coping resources), it is not the perceived situations that directly cause the anxiety response, but certain situations of pressure or potential conflict that become stressful when they are assessed as threatening<sup>[17]</sup>.

Despite the sport's popularity, scientific publications on handball have been scarce<sup>[18]</sup>.

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## Variables

**Table 1:** The study was delimited to the following selected coordinative abilities

Variables	Criterion Measures	Administration of Test
Kinesthetic Perception	Centimeter	Horizontal Space Test
Speed of Movement	Centimeter	Nelson Speed of Movement Test
Response Time	Seconds	Four-Way Alternate Response Test

## Sampling

Convenience sampling (also known as availability sampling)

is a specific type of non-probability sampling method that relies on data collection from population members who are conveniently available to participate in study were utilized for the purpose of this study.

## Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) version 26 was used for all analyses. The differences in the mean of each group for selected variable were tested for the significance of difference by One-way Analysis of Variance (ANOVA). For further analysis Post-Hoc Test (Scheffe's Test) was applied. For testing the hypotheses, the level of significance was set at 0.05.

## Results

**Table 2:** Descriptive statistics results among District, State and National level Handball Players with regards to variable, "Kinesthetic Perception".

Descriptive								
Group	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
District	40	1.9825	.17958	.02839	1.9251	2.0399	1.70	2.30
State	32	1.6250	.14368	.02540	1.5732	1.6768	1.40	1.90
National	16	1.2625	.13102	.03276	1.1927	1.3323	1.10	1.50
Total	88	1.7216	.31347	.03342	1.6552	1.7880	1.10	2.30

Statistical analysis of Table-2 represents that the Mean and SD values with regards to variable "Kinesthetic Perception" of District, State and National level Handball Players were

1.9825±.17958, 1.6250±.14368 and 1.2625±.13102 respectively. The graphical representation of responses has been exhibited in figure-1.

**Table 3:** Analysis of Variance (ANOVA) results among District, State and National level Handball Players with regards to variable, "Kinesthetic Perception".

ANOVA					
Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.394	2	3.197	126.080	.000
Within Groups	2.155	85	.025		
Total	8.549	87			

It is evident from Table-3 that results of Analysis of Variance (ANOVA) among District, State and National level Handball Players with regards to variable, "Kinesthetic Perception"

were found statistically significant ( $P < .05$ ). Since the obtained F-value (126.080) was found significant.

**Table 4:** Analysis of post-hoc test results among District, State and National level Handball Players with regards to variable, "Kinesthetic Perception".

Multiple Comparisons						
Group (A)	Group (B)	Mean Difference	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
District (1.9825)	State	.35750*	.03777	.000	.2634	.4516
	National	.72000*	.04710	.000	.6026	.8374
State (1.6250)	District	-.35750*	.03777	.000	-.4516	-.2634
	National	-.36250*	.04876	.000	-.2410	.4840
National (1.2625)	District	.72000*	.04710	.000	-.8374	-.6026
	State	.36250*	.04876	.000	-.4840	-.2410

- Result indicates in Table-4 that the mean value of District level handball players was 1.9825 whereas State level handball players had mean value as 1.6250 and the mean difference between both the groups was found .35750. This shows that the State level handball players had demonstrated significantly better on Kinesthetic Perception than their counterpart's District level handball players.
- The mean value of District level handball players was 1.9825 whereas National level handball players had mean value as 1.2625 and the mean difference between both the groups was found .72000. This shows that the

- National level handball players had demonstrated significantly better on Kinesthetic Perception than their counterpart's District level handball players.
- The mean value of State level handball players was 1.6250 whereas National level handball players had mean value as 1.2625 and the mean difference between both the groups was found .36250. This shows that the National level handball players had demonstrated significantly better on Kinesthetic Perception than their counterpart's State level handball players.

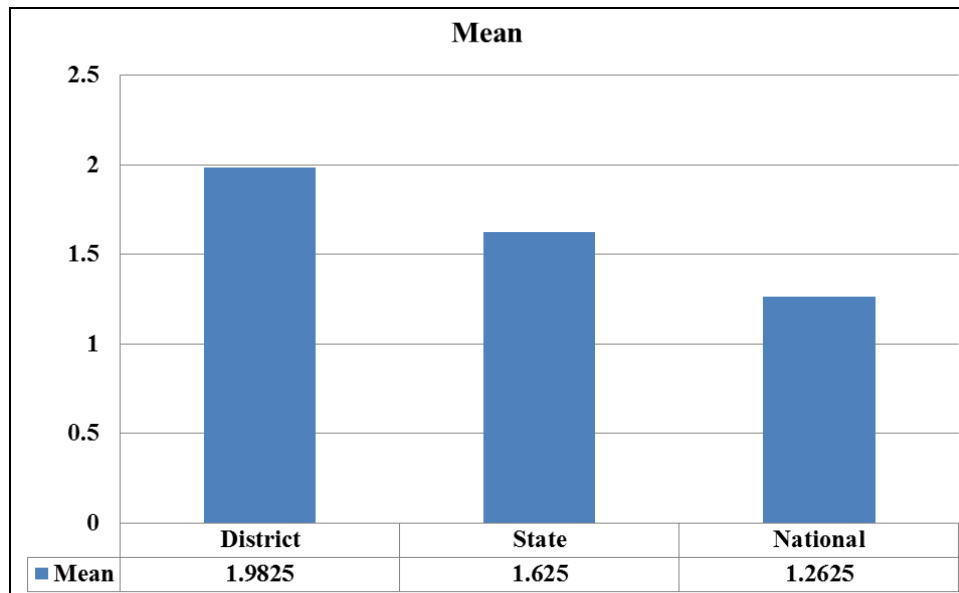


Fig 1: Mean of District, State and National level Handball Players with regards to variable, "Kinesthetic Perception".

Table 5: Descriptive statistics results among District, State and National level Handball Players with regards to variable, "Speed of Movement".

Descriptives								
Group	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
District	40	8.9825	.39281	.06211	8.8569	9.1081	8.10	9.70
State	32	9.8969	.20711	.03661	9.8222	9.9715	9.50	10.20
National	16	11.7250	.84420	.21105	11.2752	12.1748	10.50	12.90
Total	88	9.8136	1.09515	.11674	9.5816	10.0457	8.10	12.90

Statistical analysis of Table-5 represents that the Mean and SD values with regards to variable "Speed of Movement" of District, State and National level Handball Players were

8.9825±.39281, 9.8969±.20711 and 11.7250±.84420 respectively. The graphical representation of responses has been exhibited in figure-2.

Table 6: Analysis of Variance (ANOVA) results among District, State and National level Handball Players with regards to variable, "Speed of Movement".

ANOVA					
Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	86.306	2	43.153	203.356	.000
Within Groups	18.037	85	.212		
Total	104.344	87			

It is evident from Table-6 that results of Analysis of Variance (ANOVA) among District, State and National level Handball Players with regards to variable, "Speed of Movement" were

found statistically significant (P<.05). Since the obtained F-value (203.356) was found significant.

Table 7: Analysis of post-hoc test results among District, State and National level Handball Players with regards to variable, "Speed of Movement".

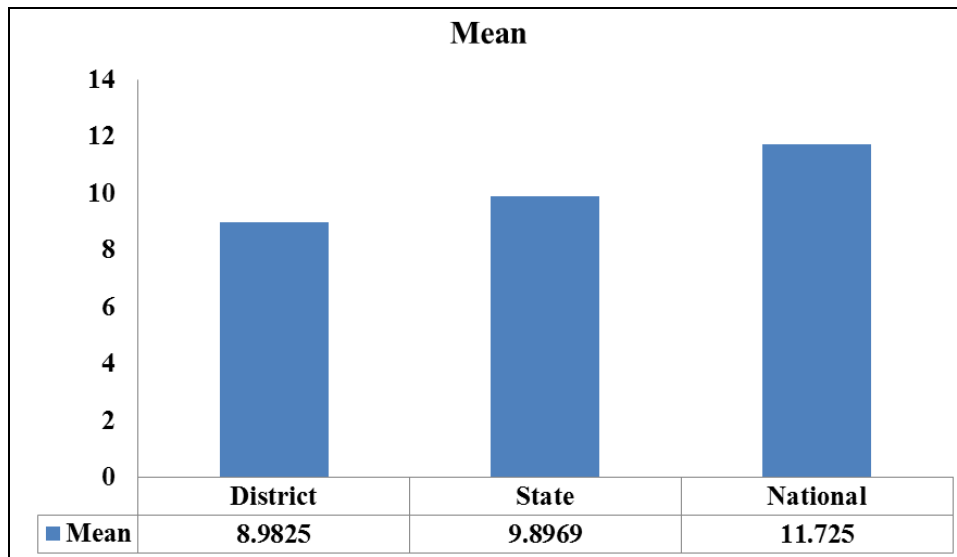
Multiple Comparisons						
(Group A)	Group (B)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
District (8.9825)	State	.91438*	.10925	.000	-1.1866	-.6422
	National	2.74250*	.13626	.000	-3.0820	-2.4030
State (9.8969)	District	-.91438*	.10925	.000	.6422	1.1866
	National	1.82812*	.14105	.000	-2.1795	-1.4767
National (11.7250)	District	-2.74250*	.13626	.000	2.4030	3.0820
	State	-1.82812*	.14105	.000	1.4767	2.1795

- Result indicates in Table-7 that the mean value of District level handball players was 8.9825 whereas State level handball players had mean value as 9.8969 and the mean difference between both the groups was found .91438. This shows that the State level handball players had demonstrated significantly better on Speed of Movement than their counterpart's District level handball players.
- The mean value of District level handball players was

- 8.9825 whereas National level handball players had mean value as 11.7250 and the mean difference between both the groups was found 2.74250. This shows that the National level handball players had demonstrated significantly better on Speed of Movement than their counterpart's District level handball players.
- The mean value of State level handball players was 9.8969 whereas National level handball players had mean

value as 11.7250 and the mean difference between both the groups was found 1.82812. This shows that the National level handball players had demonstrated

significantly better on Speed of Movement than their counterpart's State level handball players.



**Fig 2:** Mean of District, State and National level Handball Players with regards to variable, "Speed of Movement".

**Table 8:** Descriptive statistics results among District, State and National level Handball Players with regards to variable, "Response Time".

Descriptives								
Group	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
District	40	3.8750	.13451	.02127	3.8320	3.9180	3.65	4.15
State	32	3.3634	.25791	.04559	3.2704	3.4564	3.15	3.98
National	16	3.2544	.25646	.06412	3.1177	3.3910	3.03	3.90
Total	88	3.5761	.34627	.03691	3.5028	3.6495	3.03	4.15

Statistical analysis of Table-8 represents that the Mean and SD values with regards to variable "Response Time" of District, State and National level Handball Players were

3.8750±.13451, 3.3634±.25791 and 3.2544±.25646 respectively. The graphical representation of responses has been exhibited in figure-3.

**Table 9:** Analysis of Variance (ANOVA) results among District, State and National level Handball Players with regards to variable, "Response Time".

ANOVA					
Source of Variation	Sum of squares	df	Mean square	F	Sig.
Between Groups	6.677	2	3.338	75.585	.000
Within Groups	3.754	85	.044		
Total	10.431	87			

It is evident from Table-9 that results of Analysis of Variance (ANOVA) among District, State and National level Handball Players with regards to variable, "Response Time" were found

statistically significant (P<.05). Since the obtained F-value (75.585) was found significant.

**Table 10:** Analysis of post-hoc test results among District, State and National level Handball Players with regards to variable, "Response Time".

Multiple Comparisons						
Group (A)	Group (B)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
District (3.8750)	State	.51156*	.04984	.000	.3874	.6358
	National	.62063*	.06217	.000	.4657	.7755
State (3.3634)	District	.51156*	.04984	.000	-.6358	-.3874
	National	.10906	.06435	.244	-.0513	.2694
National (3.2544)	District	.62063*	.06217	.000	-.7755	-.4657
	State	.10906	.06435	.244	-.2694	.0513

- Result indicates in Table-10 that the mean value of District level handball players was 3.8750 whereas State level handball players had mean value as 3.3634 and the mean difference between both the groups was found .51156. This shows that the State level handball players had demonstrated significantly better on Response Time than their counterpart's District level handball players.

- The mean value of District level handball players was 3.8750 whereas National level handball players had mean value as 3.2544 and the mean difference between both the groups was found .62063. This shows that the National level handball players had demonstrated significantly better on Response Time than their counterpart's District level handball players.

- The mean value of State level handball players was 3.3634 whereas National level handball players had mean value as 3.2544 and the mean difference between both the groups was found .10906. This shows that the

National level handball players had demonstrated insignificantly better on Response Time than their counterpart's State level handball players.

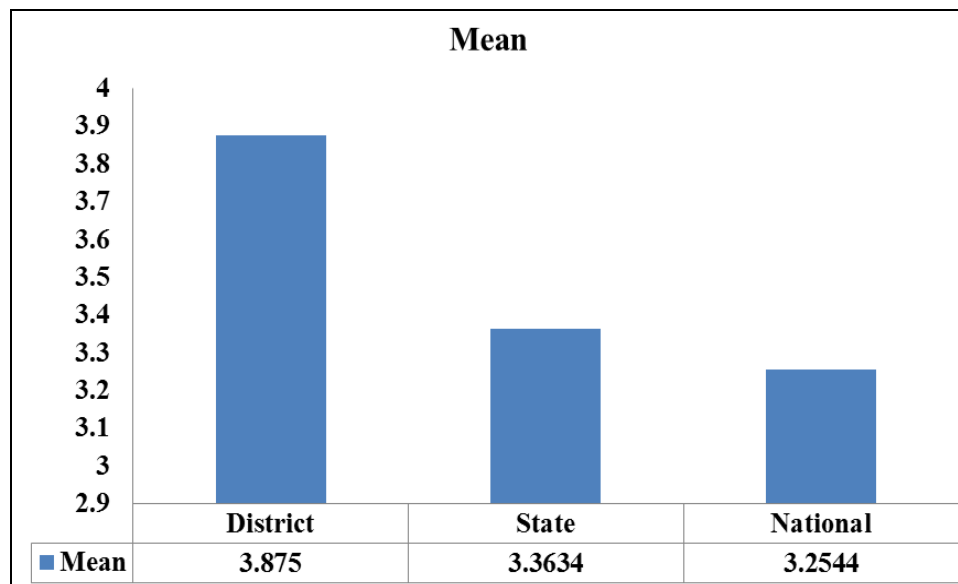


Fig 3: Mean of District, State and National level Handball Players with regards to variable, "Response Time".

### Conclusions

- **Kinesthetic Perception:** It is evident from the results of Analysis of Variance (ANOVA) among District, State and National level Handball Players with regards to variable, "Kinesthetic Perception" were found statistically significant ( $P < .05$ ).
- **Speed of Movement:** It is evident from the results of Analysis of Variance (ANOVA) among District, State and National level Handball Players with regards to variable, "Speed of Movement" were found statistically significant ( $P < .05$ ).
- **Response Time:** It is evident from the results of Analysis of Variance (ANOVA) among District, State and National level Handball Players with regards to variable, "Response Time" were found statistically significant ( $P < .05$ ).

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### Conflict of interests

The authors declare no conflict of interest.

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