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## Comparison of circumferences among state losers, national losers and national medalist's wushu players

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### Abstract

The purpose of the study was to analyze the differences in certain circumferences among wushu players. The study was conducting on 105 male wushu players i.e. n=35 National Medalists, n=35 National losers and n= (35) state losers. The aim was to find out differences in certain circumferences measurements among three groups i.e. National Medalists, National losers and state losers. The data were collected in the 24<sup>th</sup> Senior National wushu championship (Men and Women) held at Punjab University Chandigarh from 25<sup>th</sup> to 30<sup>th</sup> Dec. 2015 and from H.P. state wushu championship held at ITI Mandi from 12<sup>th</sup> to 13<sup>th</sup> September 2015. Each athlete was tested for various circumferences measurements necessary for estimation of chest circumference, hip, thigh and calf circumference of wushu players. To test the significance of mean difference the data was analyzed by adopting the technique of one way analysis of variance followed by multiple comparisons for three groups of wushu players with respect to the selected variables using Fisher LSD post hoc test. From the findings, it may be interpreted that in the variables of chest circumference medalist's wushu players at national level are significantly better as compared to losers at state level and losers at national level. In the variables of thigh circumference, hip circumference and calf circumference it was observed that state losers wushu players have slightly better mean value as compared to the national medalists and national loser's wushu players.

**Keywords:** Circumferences among state losers, national losers, national medalist's wushu players

### Introduction

Anthropometry is an important technique in the field of sports and physical education. it is used to assess and predict performance, health and survival of individuals and reflect the sports and social well-being of populations. The knowledge of this science equips us with the techniques of various body measurement like height, weight, diameters, circumference and skinfolds which ultimately deal with the assessment of human physique, body composition, physical growth, maturation and gross functions of the human body. The intrer relationship of between each of these above mentioned variables with the success in sports can be regarded as a proven fact today (Hirata, *et al.* 1979) [2] Performance in sports competitions at various levels have become a sign of prosperity, development and innovations of new techniques in the field of sports. It is gaining momentum day by day and high level research in the field is going on day to explore the possibilities of investigating the ingredients responsible for the enhancement of sports performance and facilitating the talent selection for competitions. The investigator in the underline study would like to compare the circumferences among wushu players at different level.

### Objectives

To study and compare state losers and National loser's wushu players, state losers and national medalists wushu players and national losers and National Medalists wushu players in the variables of chest circumference, thigh circumference, hip and calf circumferences.

### Hypothesis

There would be no significant difference in chest circumference, thigh circumference, hip and calf circumferences among State losers and National losers wushu players, State losers and

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National Medalists wushu players and National losers and National Medalists wushu players.

### Methodology

A survey type of study had been designed to investigate the anthropometric variables i.e. circumferences of National Medalists, National loser and state losers wushu players of Himachal Pradesh. The data were collected in the 24<sup>th</sup> senior National wushu championship (Men and Women) held at Punjab University Chandigarh from 25<sup>th</sup> to 30<sup>th</sup> Dec. 2015 and from H.P. state wushu championship held at ITI Mandi from 12<sup>th</sup> to 13<sup>th</sup> September 2015.

In the present study the data was collected from 158 wushu players consisting of 37 losers at state level, 76 losers at national level and 45 medalists at national level. Further, the groups were made equal in number by selecting 35 sportsperson randomly from each group i.e. thirty Five (35) National Medalists wushu players and 35 National losers

wushu players were selected from different state of India and on the other hand thirty Five (35) male state losers wushu players were selected from different district of Himachal Pradesh. Each player was tested for various anthropometric measurements necessary for estimation of chest circumference, thigh circumference, HIP and calf circumferences. All the measurement were taken with non-stretchable steel tape. To test the significance of mean difference the data was analyzed by adopting the technique of one way analysis of variance followed by multiple comparisons for three groups of wushu players with respect to the selected variables using Fisher LSD post hoc test.

### Results and Discussion

#### Chest circumference and thigh circumference

The general statistics for three groups of Wushu players with respect to the variable of Chest Circumference and thigh circumference are shown in Table 1.

**Table 1:** General statistics for three groups of wushu players with respect to the variable of Chest Circumference and Thigh Circumference

Players	N	Chest Circumference		Thigh Circumference	
		Mean	S.D	Mean	S.D
Losers at State Level	35	88.74	5.49	51.55	5.11
Losers at National Level	35	81.71	19.89	50.19	7.74
Medalists at National Level	35	89.64	11.49	51.05	7.34
Total	105	86.69	13.97	50.93	6.79

Table 1 depicts the mean value of Chest Circumference of wushu players. It was observed that medalists at national level possess largest value for Chest Circumference (89.64) among the wushu players followed by losers at state level (88.74) whereas losers at national level possess smallest value (81.71) among the wushu players and are thus at the lower extreme. In thigh circumference of wushu players it was observed that losers at state level possess largest value for thigh

circumference (51.55) among the wushu players followed by medalists at national level (51.05) whereas losers at national level possess smallest value (50.19) among the wushu players and are thus at the lower extreme.

Table 2 presents the results of ANOVA for three groups of Wushu players with respect to the variable of Chest Circumference and Thigh Circumference.

**Table 2:** Results of Analysis of Variance (ANOVA) for Three Groups of Wushu Players with Respect to their Chest Circumference and Thigh Circumference

Source	D.F	Chest Circumference			Thigh Circumference		
		Sum of Squares	Mean Squares	F-value	Sum of Squares	Mean Squares	F-value
Between Groups	2	1321.181	660.590	*3.550	33.124	16.562	.355
Within Groups	102	18980.947	186.088		4759.210	46.659	
Total	104	20302.128			4792.334		

\* Significant at 0.05 level of confidence

It is evident from Table 2 that the 'F' value for three groups of wushu players on the variable of 'Chest Circumference' came out to be 3.550 which is significant at 0.05 level of confidence. (Table value of 'F' at 0.05 level (2,102) = 3.09) this indicates that the three groups of wushu players differ significantly on the variable of Chest Circumference. Hence the formulated hypothesis that "there would be no significant difference in Chest Circumference among state losers, national losers and national medalists wushu players" null hypothesis stand rejected.

The 'F' value for three groups of wushu players on the variable of 'Thigh Circumference' came out to be .355 which is significant at 0.05 level of confidence. (Table value of 'F'

at 0.05 level (2, 102) =3.09) this indicates that the three groups of wushu players do not differ significantly on the variable of Thigh Circumference. Hence the formulated hypothesis that "there would be no significant difference in Thigh Circumference among state losers, national losers and national medalists wushu players" null hypothesis stand accepted.

In order to find out which of the three combinations of Wushu players differ significantly with respect to their mean Chest Circumference, multiple comparison for three groups of players with respect to the variable of Chest Circumference using LSD method were conducted, the results of which are presented in Table 3

**Table 3:** Multiple Comparisons for three groups of Wushu players with respect to the variables of Chest Circumference using LSD Method

Groups	M.D	Significance level	Outcome
Losers at State level Vs Losers at National level	7.04	.033	Significant at 0.05 level
Losers at State level Vs Medalists at National level	.90	.783	Not Significant at 0.05 level
Losers at National level Vs Medalists at National level	7.94	.017	Significant at 0.05 level

Table 3 reveals that losers at state level vs losers at national level and losers at national level vs. medalists at national level differ significantly at 0.05 level of confidence with respect to their mean Chest Circumference whereas losers at state level vs. medalists at national level do not differ significantly with respect to their mean Chest Circumference. Since the mean Chest Circumference for medalists at national level is 89.64, it may be interpreted that medalists at national level are

significantly better in Chest Circumference as compared to losers at state level and losers at national level.

**HIP circumference and calf circumference**

The general statistics for three groups of Wushu players with respect to the variable of Hip Circumference and calf circumference are shown in Table 4

**Table 4:** General statistics for three groups of wushu players with respect to the variable of Hip Circumference and calf circumference

Players	N	Hip Circumference		Calf Circumference	
		Mean	S.D	Mean	S.D
Losers at State Level	35	90.38	6.70	35.77	3.98
Losers at National Level	35	85.69	12.16	33.69	4.43
Medalists at National Level	35	87.48	14.17	33.60	4.92
Total	105	87.85	11.50	34.36	4.53

Table 4 depicts the mean value of hip circumference of wushu players. It was observed that losers at state level possess largest value for hip circumference (90.38) among the wushu players followed by medalists at national level (87.48) whereas losers at national level possess smallest value (85.69) among the wushu players and are thus at the lower extreme. In calf circumference of wushu players it was observed that losers at state level possess largest value for calf

circumference (35.77) among the wushu players followed by losers at national level (33.69) whereas medalist at national level possess smallest value (33.60) among the wushu players and are thus at the lower extreme.

Table 5 presents the results of ANOVA for three groups of Wushu players with respect to the variable of Hip Circumference and calf circumference.

**Table 5:** Results of Analysis of Variance (ANOVA) for Three Groups of Wushu Players with Respect to their Hip Circumference and Calf circumference

Source	D.F.	Hip Circumference			Calf Circumference		
		Sum of Squares	Mean Squares	F-value	Sum of Squares	Mean Squares	F-value
Between Groups	2	393.200	196.600	1.498	104.583	52.292	2.627
Within Groups	102	13382.582	131.202		2030.117	19.903	
Total		13775.782	104		2134.700		

Not significant at 0.05 level of confidence

It is evident from Table 5 that the ‘F’ value for three groups of wushu players on the variable of ‘Hip Circumference’ came out to be 1.498 which is not significant at 0.05 level of confidence. (Table value of ‘F’ at 0.05 level (2,102) =3.09) this indicates that the three groups of wushu players do not differ not significantly on the variable of Hip Circumference. Hence the formulated hypothesis that “there would be no significant difference in Hip Circumference among state losers, national losers and national medalists wushu players” null hypothesis stand accepted.

The ‘F’ value for three groups of wushu players on the variable of Calf Circumference came out to be 2.627 which is not significant at 0.05 level of confidence. (Table value of ‘F’ at 0.05 level (2,102) =3.09) this indicates that the three groups of wushu players do not differ significantly on the variable of Calf Circumference. Hence the formulated hypothesis that “there would be no significant difference in Calf Circumference among state losers, national losers and national medalists wushu players” null hypothesis stand accepted.

**Discussions of findings**

In the variables of chest circumference, thigh circumference, hip circumference and calf circumference it was observed that state losers wushu players have slightly better mean value of most of the circumferences as compared to the national medalists and national loser’s wushu players. It may be due to the fact that state losers wushu players undergo certain exercises responsible for the growth of circumferences. It may

be because of specific training they got from their trainer or coaches.

**Conclusions**

- i) It was found that Chest Circumference has shown significant f value of Anova. It was investigated that medalists at national level has shown significant post hoc LSD test with losers at national level and losers at state level with losers at national level. No significant Chest Circumference differences are observed between losers at state level and medalists at national level.
- ii) Thigh Circumference has shown non-significant f value of Anova among three groups of wushu players i.e. state losers, national losers and national medalists.
- iii) Hip Circumference has shown non-significant f value of Anova among three groups of wushu players i.e. state losers, national losers and national medalists.
- iv) Calf Circumference has shown non-significant f value of Anova among three groups of wushu players i.e. state losers, national losers and national medalists.

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