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REVIEW ARTICLE

COMPARATIVE ANALYSIS OF SELECTED SOMATOTYPE COMPONENTS BETWEEN NATIONAL AND INTERNATIONAL WRESTLERS OF INDIA

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Comparative Analysis of Selected Somatotype Components between National and International Wrestlers of India

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INTRODUCTION:-

The image of professional sports in the leading countries in the Olympic cycle 2004-2008 shows that the development of national competitive sport has been run for many years and in many countries, very intense. Nations like the United States, Russia, United Kingdom, France, Japan or Australia, have for decades been at the forefront of international competitive sport. The Olympic Games became a major sports media event not only to the 10,000 athletes from more than 200 countries involved, but also nearly 20,000 media representatives to report every day of the competitions, the lucky winners, or the tragic failures. The identification of a country with competitive sports and his representatives is meanwhile global. Through this sustained interest in a successful competitive sports between the sports and other social sectors in many developing countries have grown very close and complex relationships. This is also necessary, since not a few of the national competitive development activities regarded as significant only in the direct interaction of the sports organizations with politics, education, business and / or media can be. It turns out that, overall, the willingness of governments, national Olympic committees to invest of the leading bodies and the industry in the national competitive development, remains high. Lord Sebastian Coe expressed it in connection with the preparation of the Olympic Games in London like this: "Excellence is not a cheap product. In order to climb the podium to have three things together: the responsible national organizations have their duties to meet, the coaching must have world-class workforce and it must be hungry, motivated athletes. "The coaches are considered in these processes as a key "player". Increasingly complex, interdisciplinary teams will be set up to secure the provision of top performances at just the right time. These include a very wide extent, the massive development and expansion of training of scientific research institutes such as the AIS in Canberra, the JISS in Tokyo, the HIS in Seoul, or the EIS, with its nine institutes in the UK, where complex, sport-specific projects can realized in an interdisciplinary way. Investment in science have continued in the past Olympic cycle, and often extended. The availability of modern training centers, which are often closely associated with these research capabilities, are now belonging to a standard of basic eligibility requirements. Training control on the basis of a scientific coaching counseling system for an optimal organization of competition performance. There is no doubt about the leading role of the coach in the development of performance. He is mother and father for the athletes, he has to develop general and individual training concepts and has to put them into training actions. He has to cooperate with the authorities of the federations, with the parents, media etc. and he has to put the questions to the scientist and has to work together with the scientists. In general there are the following reasons for the development of the performance in wrestling: Structures of Federations oriented toward elite sport; Experienced coaches; Training concept oriented toward world's elite, Infrastructure which promotes performance, Performance-motivated athletes / team spirit, Concentration of the athletes and acceptance of training camps.

PROCEDURE:

The present study was conducted on 80 wrestlers who were categorized in two groups, i.e. national (N=50) and International (N=30). The players, who had participated at various international competitions and were selected for national wrestling coaching camp being conducted for the Asian Senior Wrestling Championship held at Doha from 5th to 10th May, 2015. The coaching camp was held at Sports

Authority of India, Sonepat Centre, Haryana. Fifty players who had participated at various senior national wrestling competitions and never played at international level were considered as National Players as subjects for this study. The subjects were selected on purposive sampling method.

The following Physique characteristics variables were selected as criterion variables for this study:

1. Endomorphy component
2. Mesomorphy component
3. Ectomorphy component

In order to find out significance of mean difference between national and international wrestlers of India, independent 't' test has been employed. Before employing independent 't' test, the outliers in the data and the normality of the data has been checked through box plots and Kolmogorov-Smirnov test respectively. The level of significance was set at 0.05.

RESULTS AND DISCUSSION OF FINDINGS:

To understand the nature of the data various statistics such as mean, standard deviation, standard error of mean, coefficient of variation, skewness and kurtosis have been calculated. Mean is a statistic which describes the aggregate of all the scores in the distribution while, standard deviation measures the variability of scores about the mean value in the distribution. The standard error of mean is the standard deviation of the sampling distribution of mean. Coefficient of variation is the percentage variation in the group adjusted with mean. Skewness is a measure of symmetry, or more precisely, the lack of symmetry. Kurtosis is a measure of whether the data are peaked or flat relative to a normal distribution.

Descriptive statistics pertaining to the endomorphy component has been presented in the table 1.

TABLE 1

DESCRIPTIVE STATISTICS FOR THE SCORES OF INTERNATIONAL AND NATIONAL LEVEL WRESTLERS ON ENDOMORPHY COMPONENT

Endomorphy	N	Mean		Std. Dev.	C.V. %	Skewness	Kurtosis
	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Statistic
ILW	30	2.13	.05	.30	14.08	.14	-1.66
NLW	50	2.18	.04	.32	14.67	.18	-1.69

Where ILR= International Level Wrestlers, NLR = National Level Wrestlers

Table 1 shows the descriptive statistics related to endomorphy component of international and national level Indian wrestlers. The mean, standard error of mean, standard deviation, coefficient of variation, skewness and kurtosis of the international level wrestlers on endomorphy component was found to be 2.13, 0.05, 0.30, 14.08%, 0.14 and -1.66 respectively. Whereas, the mean, standard error of mean, standard deviation, coefficient of variation, skewness and kurtosis of the national level wrestlers on endomophy component was found to be 2.18, 0.04, 0.32, 14.67%, 0.18 and -1.69 respectively.

The respective values of skewness and kurtosis reveals that the curve for the data on endomorphy component was nearly symmetric but platykurtic for both the groups, which shows that the spread among the data was more than the expected.

Coefficient of variation (C.V.) of international and national level wrestlers on endomorphy component is imprinted in the above table. This is an index which measures the extent of variability in the data set in relation to its mean value.[1] Greater the value of coefficient of variability more will be the variability in the particular set of scores and vice versa. From the above table, it is evident that the variation among both the groups was nearly equal (i.e. 14% approx.) as far as the endomorphy component was concerned.

Test of assumptions: The assumption of normality of the data was tested by applying Kolmogorov-Smirnov test. To check the outliers, box plots were used.

Independent t-test is particularly susceptible to the violation of the assumption of equality of variances. When the variances of the two groups are not equal, this assumption is considered to have been violated. This violation causes the test to become too liberal i.e. an increase in type 1 error occurs. Levene's Test helps in testing this assumption. If the calculated P-value is significant then it is considered to have violated the assumption of equality of variances. In case of violation of this assumption the independent 't' test can be employed but, with a slight change in the degree of freedom.

Kolmogorov-Smirnov test for the data of international and national level wrestlers has been presented in the table 2.

[1] J. P. Verma& Mohammad Ghufran (2012). *Statistics for Psychology*. New Delhi: Tata McGraw Hill Education Private Limited, p-80.

TABLE 2

KOLMOGOROV-SMIRNOV TEST OF NORMALITY FOR THE DATA ON ENDOMORPHY COMPONENT

Endomorphy Component	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
ILW	.191	30	.007
NLW	.182	30	.012

a. Lilliefors Significance Correction

Where ILR= International Level Wrestlers, and NLR = National Level Wrestlers

It is evident that the Kolmogorov-Smirnov statistic (0.191 and 0.182) for the data of international and national level Indian wrestlers was found to be significant as the respective sig. values are less than 0.05. This shows that the data of international and national level wrestlers on endomorphy component was not normal. This abnormality in the data may increase the type 1 error, which may affect the further results.

Further, Box Plots were employed for checking the outliers in the data. Outliers are the scores which may severely affect the values of different descriptive statistics.

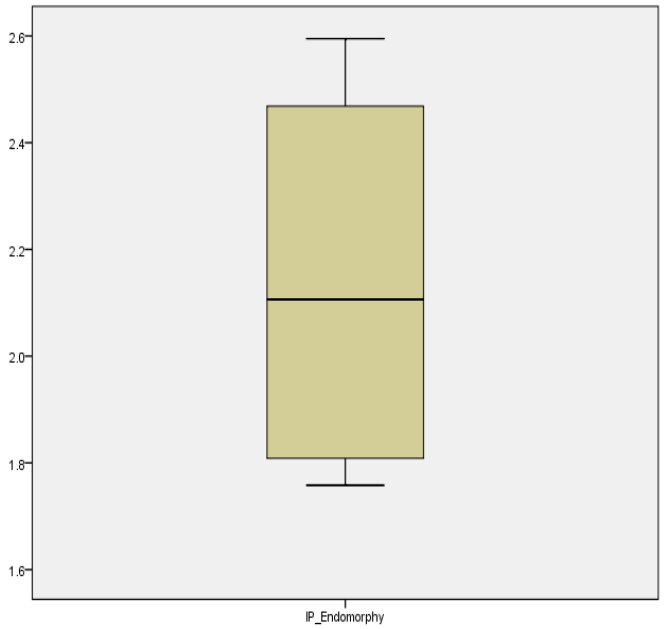

FIG. 1: BOXPLOT FOR THE DATA OF INTERNATIONAL LEVEL INDIAN WRESTLERS ON ENDOMORPHY COMPONENT

It is evident from the figure 1 that no outliers were present in the data of international level Indian wrestlers on endomorphy component. It is also clear from the above figure that the data is nearly symmetric and the spread in the data was more but uniform around the mean.

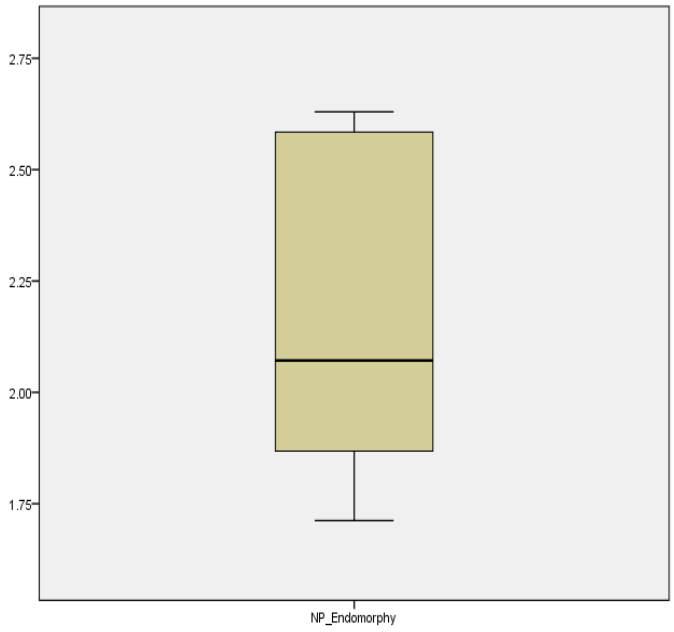

FIG. 2: BOXPLOT FOR THE DATA OF NATIONAL LEVEL INDIAN WRESTLERS ON ENDOMORPHY COMPONENT

It is evident from the figure 2 that no outliers were present in the data of national level Indian wrestlers

on endomorphy component. It is also clear from the above figure that the spread in the data was more and concentration of the scores is more in the lower side.

The levene's test for testing the equality of variances has been employed before applying independent t-test and the table for the same has been presented in the table 3.

TABLE 3

LEVENE's TEST FOR TESTING THE EQUALITY OF VARIANCES OF INTERNATIONAL AND NATIONAL LEVEL WRESTLERS ON ENDOMORPHY COMPONENT

	Levene's Test for Equality of Variances	
	F	Sig.
Endomorphy	.744	.391

It is clear from the table 3 that the F-value (0.744) for Levene's Test for Equality of Variances was insignificant as its respective sig. value was more than 0.05. This shows that the assumption of equality of variances has been met between the data of international and national level wrestlers on endomorphy component.

Independent t-test has been employed to compare the means of international and national level Indian wrestlers on endomorphy component and has been presented in the table 4.

TABLE 4

INDEPENDENT SAMPLES TEST FOR THE DATA OF INTERNATIONAL AND NATIONAL LEVEL WRESTLERS ON ENDOMORPHY COMPONENT

	t-test for Equality of Means						
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Endomorphy	-.62	78	.536	-.04	.073	-.19	.10

Table 4 clearly revels that the value of independent 't' (= - 0.62) was found to be insignificant as its respective sig. value is more than 0.05. The insignificance of the independent 't' shows that the international and national level Indian wrestlers were found same as far as the endomorphy component was concerned. The difference among the means of the selected groups was found to be -0.04 with a standard error difference of 0.073.

For the clear and easy understanding, the graphical representation of the mean scores of international and national level Indian wrestlers on endomorphy component has been presented in the figure 3.

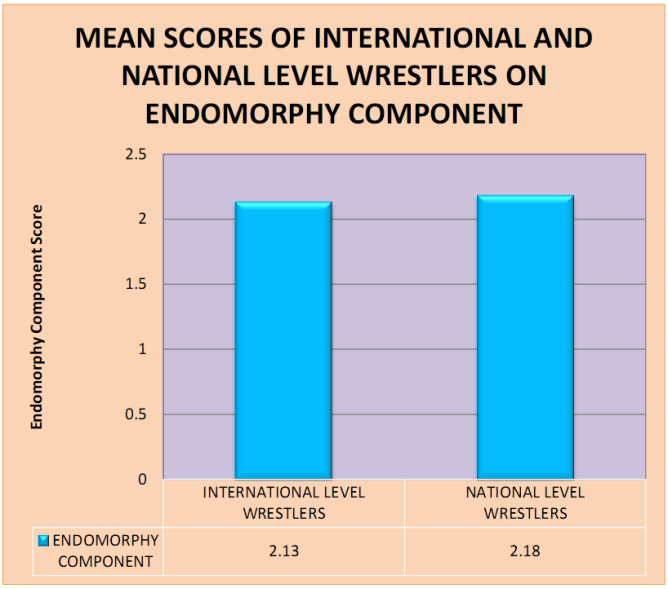

FIG. 3: GRAPHICAL REPRESENTATION OF THE MEAN SCORES OF INTERNATIONAL AND NATIONAL LEVEL INDIAN WRESTLERS ON ENDOMORPHY COMPONENT

Figure 3 shows the mean scores of international and national level wrestlers on endomorphy component. It is evitable from the figure that the international and national level wrestlers were approximately same on endomorphy component but, the mean of national level wrestlers is little more i.e. 0.05 from international level wrestlers.

To understand the nature of the data various statistics such as mean, standard deviation, standard error of mean, coefficient of variation, skewness and kurtosis have been calculated.

Descriptive statistics pertaining to the mesomorphy component has been presented in the table 5.

TABLE 5

DESCRIPTIVE STATISTICS FOR THE SCORES OF INTERNATIONAL AND NATIONAL LEVEL WRESTLERS ON MESOMORPHY COMPONENT

Mesomorphy	N	Mean		Std. Deviation	C.V. %	Skewness	Kurtosis
	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Statistic
ILW	30	3.29	.07	.42	12.76	.04	-.36
NLW	50	3.26	.08	.61	18.71	-.80	.30

Where ILR= International Level Wrestlers, NLR = National Level Wrestlers

Table 5 shows the descriptive statistics related to mesomorphy component of international and national level wrestlers. The mean, standard error of mean, standard deviation, coefficient of variation, skewness and kurtosis of the International level wrestlers on mesomorphy component was found to be 3.29, 0.07, 0.42, 12.76%, 0.04 and -0.36 respectively. Whereas, the mean, standard error of mean, standard deviation, coefficient of variation, skewness and kurtosis of the national level wrestlers on endomophy component was found to be 3.26, 0.08, 0.61, 18.71%, -0.8 and 0.30 respectively.

The respective values of skewness and kurtosis reveal that the curve for the data was nearly symmetric as the statistic of skewness and kurtosis are not more than one in any case.

Coefficient of variation (C.V.) of international and national level wrestlers on mesomorphy component is imprinted in the above table. From the above table, it is evident that the data of national level wrestlers on mesomorphy component was having more spread in comparison to the international level wrestlers' data.

Test of assumptions: The assumption of normality of the data was tested by applying Kolmogorov-Smirnov test. To check the outliers, box plots were used.

Kolmogorov-Smirnov test for the data of international and national level wrestlers has been presented in the table 6.

TABLE 6

KOLMOGOROV-SMIRNOV TEST OF NORMALITY FOR THE DATA ON MESOMORPHY COMPONENT

Mesomorphy Component	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
ILW	.102	30	.200
NLW	.175	30	.020

a. Lilliefors Significance Correction

Where ILR= International Level Wrestlers, and NLR = National Level Wrestlers

It is evident that the Kolmogorov-Smirnov statistic 0.102 for the data of international level wrestlers was found to be insignificant as the respective sig. value is more than 0.05. This shows that the data of international level wrestlers on mesomorphy component was nearly normally distributed. But, Kolmogorov-Smirnov statistic 0.175 for the data of national level wrestlers was found to be significant as the respective sig. value is less than 0.05. This shows that the data of national level wrestlers on mesomorphy component was not normally distributed. This abnormality in the data may increase the type 1 error, which may affect the further results.

Further, Box Plots were employed for checking the outliers in the data. Outliers are the scores which may severely affect the values of different descriptive statistics.

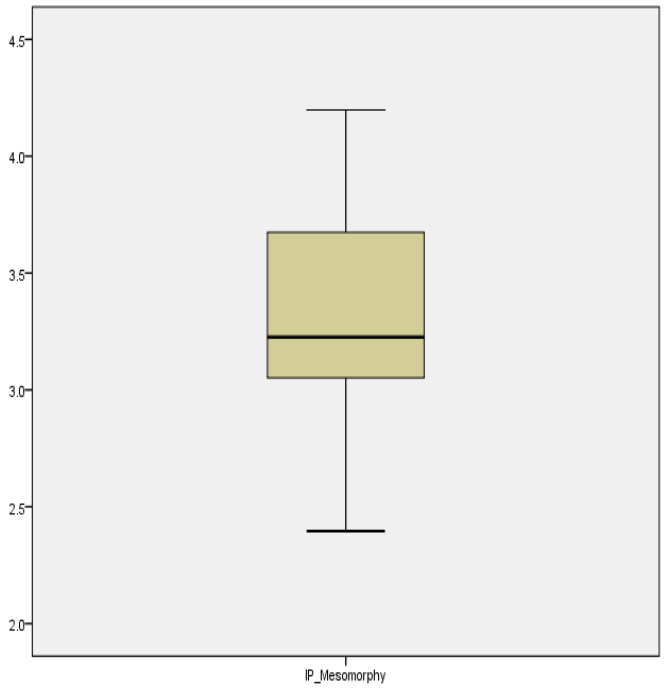

FIG. 4: BOXPLOT FOR THE DATA OF INTERNATIONAL LEVEL INDIAN WRESTLERS ON MESOMORPHY COMPONENT

It is evident from the figure 4 that no outliers were present in the data of international level Indian wrestlers on mesomorphy component. It is also clear from the above figure that the spread in the data was normal but uniformity of data around the mean is missing.

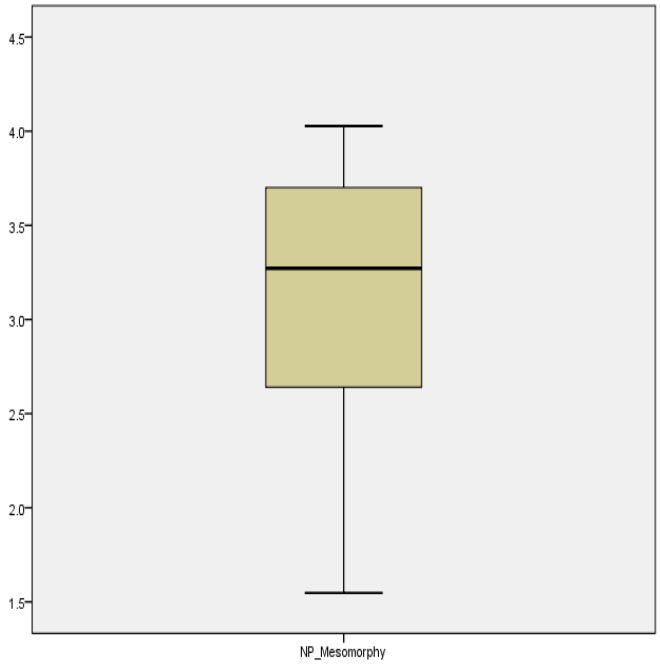

FIG. 5: BOXPLOT FOR THE DATA OF NATIONAL LEVEL INDIAN WRESTLERS ON MESOMORPHY COMPONENT

It is evident from the figure 4 that no outliers were present in the data of national level Indian wrestlers on mesomorphy component. It is also clear from the above figure that the spread in the data was normal but uniformity around the mean was missing.

The levene's test for testing the equality of variances has been employed before applying independent t-test and the table for the same has been presented in the table 7.

TABLE 7

LEVENE's TEST FOR TESTING THE EQUALITY OF VARIANCES OF INTERNATIONAL AND NATIONAL LEVEL WRESTLERS ON MESOMORPHY COMPONENT

	Levene's Test for Equality of Variances	
	F	Sig.
Mesomorphy	3.476	.066

It is clear from the table 7 that the F-value (3.47) for Levene's Test for Equality of Variances was insignificant as its respective sig. value was more than 0.05. This shows that the assumption of equality of variances has been met for the data of international and national level wrestlers on mesomorphy component.

Independent t-test has been employed to compare the means of international and national level wrestlers on mesomorphy component and has been presented in the table 8.

TABLE 8

INDEPENDENT SAMPLES TEST FOR THE DATA OF INTERNATIONAL AND NATIONAL LEVEL WRESTLERS ON MESOMORPHY COMPONENT

	t-test for Equality of Means						
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Mesomorphy	.23	78	.813	.030	.12	-.22	.28

Table 8 clearly revels that the value of independent 't' (= 0.23) was found to be insignificant as its

respective sig. value is more than 0.05. The insignificance of the independent 't' shows that the international and national level Indian wrestlers were found same as far as the mesomorphy component was concerned. The difference among the means of the selected groups was found to be 0.03 with a standard error difference of 0.12.

For the clear and easy understanding, the graphical representation of the mean scores of international and national level wrestlers on mesomorphy component has been presented in the figure 6.

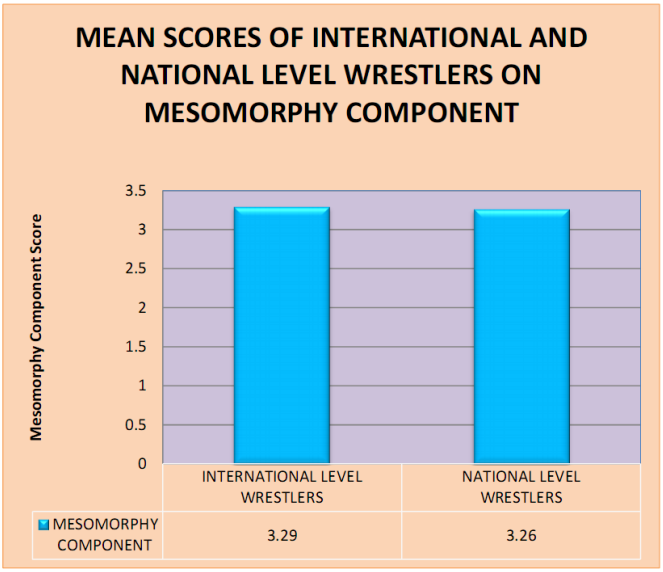

FIG. 6: GRAPHICAL REPRESENTATION OF THE MEAN SCORES OF INTERNATIONAL AND NATIONAL LEVEL WRESTLERS ON MESOMORPHY COMPONENT

Figure 4 shows the means scores of international and national level wrestlers on mesomorphy component. It is evitable from the figure that the international and national level wrestlers were approximately same on mesomorphy component but, the mean of international level wrestlers is little more i.e. 0.03 from national level wrestlers.

To understand the nature of the data various statistics such as mean, standard deviation, standard error of mean, coefficient of variation, skewness and kurtosis have been calculated.

Descriptive statistics pertaining to the ectomorphy component has been presented in the table 8.

TABLE 8

DESCRIPTIVE STATISTICS FOR THE SCORES OF INTERNATIONAL AND NATIONAL LEVEL WRESTLERS ON ECTOMORPHY COMPONENT

Mesomorphy	N	Mean		Std. Deviation	C.V. %	Skewness	Kurtosis
	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Statistic
ILW	30	1.05	.15	.85	80.9	.85	-0.06
NLW	50	.97	.12	.85	87.0	1.08	0.74

Where ILR= International Level Wrestlers, NLR = National Level Wrestlers

Table 8 shows the descriptive statistics related to ectomorphy component of international and national level wrestlers. The mean, standard error of mean, standard deviation, coefficient of variation, skewness and kurtosis of the International level wrestlers on ectomorphy component was found to be 1.05, 0.15, 0.85, 80.9%, 0.85 and -0.06 respectively. Whereas, the mean, standard error of mean, standard deviation, coefficient of variation, skewness and kurtosis of the national level wrestlers on ectomophy component was found to be 0.97, 0.12, 0.85, 87.0%, 1.08 and 0.74 respectively.

The respective values of skewness reveal that the curve for the data was nearly positively skewed as the statistic of skewnesswas positive and nearly close to one. The distribution of data about the mean was also normal as the value of kurtosis was less than one.

Coefficient of variation (C.V.) of international and national level wrestlers on ectomorphy component is imprinted in the above table. From the above table, it is evident that the data of national level wrestlers on ectomorphy component was having more spread in comparison to the international level wrestlers' data.

Test of assumptions: The assumption of normality of the data was tested by applying Kolmogorov-Smirnov test. To check the outliers, box plots were used.

Kolmogorov-Smirnov test for the data of international and national level wrestlers has been presented in the table 9.

TABLE 9

KOLMOGOROV-SMIRNOV TEST OF NORMALITY FOR THE DATA ON ECTOMORPHY COMPONENT

Ectomorphy Component	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
ILW	.152	30	.075
NLW	.167	30	.033

a. Lilliefors Significance Correction

Where ILR= International Level Wrestlers, and NLR = National Level Wrestlers

It is evident that the Kolmogorov-Smirnov statistic 0.152 for the data of international level wrestlers was found insignificant as the respective sig. values are more than 0.05. This shows that the data of international level wrestlers on ectomorphy component was nearly normally distributed. But, Kolmogorov-Smirnov statistic 0.167 for the data of national level wrestlers was found significant as the respective sig. values are less than 0.05. This shows that the data of national level wrestlers on ectomorphy component was not normally distributed. This abnormality in the data may increase the type 1 error, which may affect the further results.

Further, Box Plots were employed for checking the outliers in the data. Outliers are the scores which may severely affect the values of different descriptive statistics.

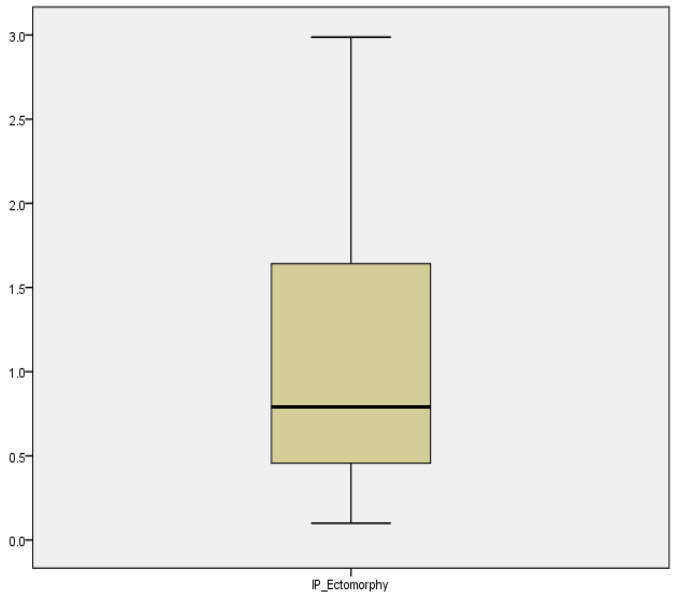

FIG. 7: BOXPLOT FOR THE DATA OF INTERNATIONAL LEVEL INDIAN WRESTLERS ON ECTOMORPHY COMPONENT

It is evident from the figure 7 that no outliers were present in the data of international level Indian wrestlers on ectomorphy component. It is also clear from the above figure that the concentration of the scores was more towards negative side of the mean value.

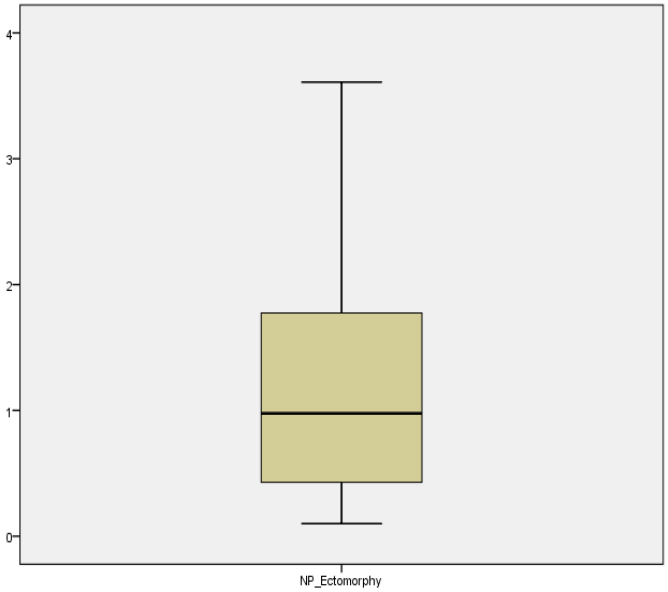

FIG. 8: BOXPLOT FOR THE DATA OF NATIONAL LEVEL INDIAN WRESTLERS ON ECTOMORPHY COMPONENT

It is evident from the figure 8 that no outliers were present in the data of national level Indian wrestlers on ectomorphy component. It is also clear from the above figure that the spread in the data was normal but the scores are more concentrated towards lower side and the upper level data is more spreaded.

The levene's test for testing the equality of variances has been employed before applying independent t-test and the table for the same has been presented in the table 10.

TABLE 10

LEVENE's TEST FOR TESTING THE EQUALITY OF VARIANCES OF INTERNATIONAL AND NATIONAL LEVEL WRESTLERS ON ECTOMORPHY COMPONENT

	Levene's Test for Equality of Variances	
	F	Sig.
Ectomorphy	0.003	0.953

It is clear from the table 10 that the F-value (0.003) for Levene's Test for Equality of Variances was insignificant as its respective sig. value was more than 0.05. This shows that the assumption of equality of variances has been met for the data of international and national level wrestlers on ectomorphy component.

Independent t-test has been employed to compare the means of international and national level wrestlers on ectomorphy component and has been presented in the table 11.

TABLE 11

INDEPENDENT SAMPLES TEST FOR THE DATA OF INTERNATIONAL AND NATIONAL LEVEL WRESTLERS ON ECTOMORPHY COMPONENT

	t-test for Equality of Means						
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Ectomorphy	.382	78	.704	.075	.19	-.31	.46

Table 11 clearly revels that the value of independent 't' (= 0.382) was found to be insignificant as its respective sig. value is more than 0.05. The insignificance of the independent 't' shows that the international and national level Indian wrestlers were found same as far as the ectomorphy component was concerned. The difference among the means of the selected groups was found to be 0.075 with a standard error difference of 0.19.

For the clear and easy understanding, the graphical representation of the mean scores of international and national level wrestlers on ectomorphy component has been presented in the figure 9.

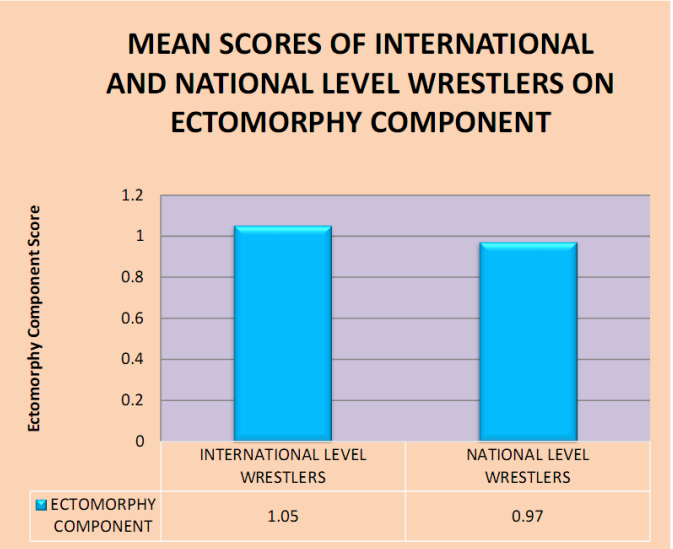

FIG. 9: GRAPHICAL REPRESENTATION OF THE MEAN SCORES OF INTERNATIONAL AND NATIONAL LEVEL WRESTLERS ON ECTOMORPHY COMPONENT

Figure 9 shows the means scores of international and national level wrestlers on ectomorphy component. It is evitable from the figure that the international and national level wrestlers were approximately same on ectomorphy component but, the mean of international level wrestlers is little more i.e. 0.08 from national level wrestlers.

DISCUSSION OF FINDINGS:

The endomorphy component of the national and international level Indian wrestlers has been calculated with the help of their height and measuring three skinfold sites (Triceps. Subscpular and Supra-Iliac). The participants were measured with the modified somatotype method of Heath-Carter. The descriptive statistics for both the groups has been calculated after that and with the help of the descriptive statistic, the researcher got to know that the endomorphy component for the international level Indian wrestlers was 2.13 and for national level Indian wrestlers it was 2.18. The normality of the data was checked through Kolmogorov-Smirnov test and it has shown that the data belongs to both the groups was not normal. No outliers were found in both the cases which show that the means of both the groups were a representative score of the groups. Before applying the independent 't' test, the researcher have employed Levene's test for equality of variances and it was found insignificant. The insignificance of the Levene's test shows that the assumption for independent 't' test has been fulfilled. The independent 't' test was found insignificant as its respective sig. value was found more than 0.05. This shows that the international level Indian wrestlers as well as national level Indian wrestlers were same on

this variable. The graphical representation of the scores has also been done after employing independent 't' test.

The analysis of data pertaining to the endomorph component shows that both the groups were equal on this component. The mean values of both the groups shows that the wrestlers were little endomorph as the values of endomorph component was found to be 2.13 and 2.18 for international and national level wrestlers respectively. The value of endomorphy component depends on the height and the sum of skinfolds. The height of the wrestlers used to be less in comparison to the others. This may be a reason that the wrestlers were found at this level on endomorphy component.

Katarzyna L. et. al. (2011) conducted a study on somatotype, body composition and proportionality in polish top greco-roman wrestlers and they have stated that the wrestlers belong to higher weight categories were more endomorph whereas, the wrestlers in lower weight categories were more mesomorph. Robinson et. al. (2014) also conducted a study on anthropometric characteristics and physical performance of Colombian elite male wrestlers. They had also concluded that the endomorph component of their wrestlers was more than 3. Similar type of studies has been done by many researchers and they have also reached to the same type of results.

In the present study, the researcher has selected the wrestlers from almost all the weight categories. This may be also a reason that the endomorphy component has come up to this level, otherwise, if the researcher would have been selected the wrestlers from lighter weight categories only, the results would have been different as far as the endomorphy component is concerned.

After employing the independent 't' test, the researcher got to know that there was no difference in endomorphy component between international and national level Indian wrestlers. This may be due to the demand of the game and same type of trainings & practices.

The mesomorphy component of the national and international level Indian wrestlers has been calculated with the help of their height, humerous diameter, femur diameter, corrected arm girth and corrected calf girth. The participants were measured with the modified somatotype method of Heath-Carter. The descriptive statistics for both the groups has been calculated after that and with the help of the descriptive statistic, the researcher got to know that the mesomorphy component for the international level Indian wrestlers was 3.29 and for national level Indian wrestlers it was 3.2. The normality of the data was checked through Kolmogorov-Smirnov test and it has shown that the data belongs to international level wrestlers was normally distributed but, in case of national level wrestlers it was found to be abnormal. No outliers were found in both the cases which show that the means of both the groups were a representative score of the groups. Before applying the independent 't' test, the researcher have employed Levene's test for equality of variances and it was found insignificant. The insignificance of the Levene's test shows that the assumption for independent 't' test has been fulfilled. The independent 't' test was found insignificant as its respective sig. value was found more than 0.05. This shows that the international level Indian wrestlers as well as national level Indian wrestlers were same on mesomorphy component. The graphical representation of the scores has also been done after employing independent 't' test.

The analysis of data pertaining to the mesomorph component shows that both the groups were equal on this component. The mean values of both the groups show that the wrestlers were more mesomorph as its value is more than other components in both the cases. The value of mesomorphy component depends on the height, humerous diameter, femur diameter, corrected arm girth and corrected calf girth.

Katarzyna L. et. al. (2011) conducted a study on somatotype, body composition and proportionality in polish top greco-roman wrestlers and they have stated that the wrestlers were more on this particular component.

Nohji Woong. et. al. (2014) compared the somatotype analysis of freestyle wrestlers compared with nonathletes and have stated that wrestlers had higher weight, body mass index, and mesomorphic component values than did nonathletes. However, the wrestlers' endomorphic and ectomorphic component values were lower than in the nonathletes. Furthermore, wrestlers in the heavy class tended to have higher endomorphic, very high mesomorphic, and lower ectomorphic component values. Mesomorph is present in almost all weight categories.

However, the insignificant difference between both the groups in context to mesomorphy might be attributed to the level of performance demands and training.

The ectomorphy component of the national and international level Indian wrestlers has been calculated by obtained height divided by cube root of weight (HWR). The participants were measured with the modified somatotype method of Heath-Carter. The descriptive statistics for both the groups has been calculated after that and with the help of the descriptive statistic, the researcher got to know that the ectomorphy component for the international level Indian wrestlers was 1.05 and for national level Indian wrestlers it was 0.97. The normality of the data was checked through Kolmogorov-Smirnov test and it has shown that the data belongs to international level wrestlers was normally distributed but, in case of national level wrestlers it was found to be abnormal.

No outliers were found in both the cases which show that the means of both the groups were a representative score of the groups. Before applying the independent 't' test, the researcher have employed Levene's test for equality of variances and it was found insignificant. The insignificance of the Levene's test shows that the assumption for independent 't' test has been fulfilled. The independent 't' test was found insignificant as its respective sig. value was found more than 0.05. This shows that the international level Indian wrestlers as well as national level Indian wrestlers were same on ectomorphy component. The graphical representation of the scores has also been done after employing independent 't' test.

The analysis of data pertaining to the ectomorph component shows that both the groups were equal on this component. The mean values of both the groups shows that the wrestlers were less ectomorphic as its value is lesser than other components in both the cases.

Katarzyna L. et. al. (2011) conducted a study on somatotype, body composition and proportionality in polish top greco-roman wrestlers and they have stated that the wrestlers were not much of ectomorphic type. Nohji Woong. et. al. (2014) compared the somatotype analysis of freestyle wrestlers compared with nonathletes and have stated that wrestlers had lower ectomorphy component. The lesser prevalence of ectomorphic body types in wrestling may be because of the less heights of the wrestlers facilitating more stability and due to well built up physique.

The insignificant value between both the categories in case of ectomorphy may be attributed to the similar practices, goals and demands of the sport.

CONCLUSIONS:

On the basis of the results, the following conclusions may be drawn from the study:

1. The National and International Indian wrestlers are similar on endomorphy of physique components on Health and Carter scale.

2. The National and International Indian wrestlers do not differ from each other on mesomorphy component of physique.

3. The National and International Indian wrestlers are similar to each other on ectomorphy component of physique as rated by Heath and Carter method of Somatotype. .

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