

# Periodic Research

## Comparison of Anthropometric Measurements of Elite Indian Senior and Junior Women Hockey Players

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### Abstract

The present study is conducted on anthropometric measurements of national level girls of Hockey. Standardised techniques of Weiner and Laurie (1969) were used to take anthropometric measurements on the subjects to measure height, weight and to assess fat mass. Decimal age is calculated from their age proof (10<sup>th</sup> certificate). On comparison with international players it has been found that height, weight and subcutaneous fat of international players showed significant difference of t-test values, The senior players are heavier in weight, less in height, having high % Body Fat.

**Keywords:** Anthropometry, Height, Subcutaneous Fat, Skinfolds.

### Introduction

Body size, shape and structure is greatly related to performance in sports. Better the physique more are the chances to excel in the field of sports. Thus study of relationships of anthropometric measurements to sports performance, between and within the sports, have resulted in the great success Carter (1990) also supported the relationship of anthropometric data to success.

### Review of Literature

According to Hebbinck (1985) Excellency in sports, can't be achieved unless anthropometric measurements are not are not meeting the conditions required for particular sport. Review of literature, from 1929 to 1986 (Kohlrausch, 1929); Astand 1956; Correnti and Zauli; 1960, Tanner 1964; Hirata 1966 and 1979, Eiben 1972; De Garry et al; -1974; Mass, 1974; Wolanski, 1979 and 1986; Borms et al, 1980; Sodhi and Sidhu 1984; Soarma & Dixit, 1985 and Carroll, 1986), revealed that to get success in sports suitable physique plays a predominant role. Singh and Kaur (2014) and Sandeep (2019) also studied female hockey players for their kinanthropometric measurements, and confirmed that kinanthropometry plays important role in success of hockey.

Hockey is the national game of India, thus It's of great significance to study anthropometric characteristics especially somatotype distribution of elite female Hockey players of India so that all those selective factors of anthropometric characteristics can be brought into notice. Hirata, (1966) suggested that a nation with people whose general physique was limited to the characteristics of champions, in certain events, should concentrate on those events. The variation has been reported in physique and body composition of Indian women Hockey players too. Now, question arises, what should be our approach so that Indian team can bring laurels to the Country, in Hockey.

In this study, efforts have been made to investigate all those specific characteristics of anthropometric variables which are important rather prerequisite for success in Hockey.

### Methodology

For the present study somatometric measurement date of national level female Hockey players (Senior, N 10, Junior, N=40) were taken at National Institute Of Sports, Patiala, anthropometric measurements (height, weight skinfolds) were taken on each subject, using standard technique of Weiner and Laurie (1969), All measurements were taken on left side of the subjects. Harpenden skinfold caliper, of Tanner and Whitehouse (1955), was used to calculate subcutaneous fat, Siri's equation (1956) was used to calculate % body fat. Somatotypes were determined by Heath Carter Anthropometric Method (Carter, 1980)



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## Inclusion Criteria

Only female hockey players were included in the study. The data of the present Hockey players were compared within and also with other countries. Statistical analysis i.e. means, s.d. and T test were employed to study the level of significance between different parameters.

## Results and Discussion

Table No. 1(a) shows that the mean age of the studied senior female Hockey players is 22.40 years with s.d.± 1.98 years. The mean age of the female Hockey players of other national and

international studies has been approximately equal to the present study. The t-test has shown insignificant differences as evident from table 1 (c), However, the present Junior level players have depicted the value of mean age, as  $17.98 \pm 1.74$  years standard deviation which is observed to be lower than the other national study conducted by Ghosh and Mukhopadhy (2001), Table 1 (b). But, non-significant differences were observed in the mean ages of the Junior Hockey players and that of the player studied by Ghosh and Mukhopadhy (2001).

### Comparison of Age among Senior Indian and International Hockey Women Players

Table 1 (a)

Param eter	1	2	3	4	5	6	7	8	9
	Present Study (N =18)	Liver Pool (Reilly And 1986) (N = 24)	Brighton Polytech nic (Bate,19 86) (N =11)	South Australia (Wither,Et ,Al) 1987 (N=17)	Candia n Olympic (A.E. Reddy) 1936 ( N =16)	State Level (S. Sidhu, K.P. Herm And H.S. Sodhi 1989 (N = 10)	Nationa l Players P. Singal, D.P Bhatna gar And S. Dhillon 1993) (N =35)	National Hockey Players G.L. Khanna Et.Al. 1995 (N=13)	National Hockey Player A.K. Ghosh Et. Al 1991 (N =32)
Age	22.40	23.4	-	22.6	23.4	21.11	18 to 25	21.68	21.2
	1.98	3.3		2.3	2.7	1.13		2.88	

### Comparison of Age between Junior Indian Hockey Women Players (Present Study Vs Ghosh's 2001)

Table 1 (b)

Parameter	1	2
	Presentstudy (N =38)	A.K. Ghosh and S. Mukhopadhya 2001 (N = 22)
Age	17.98	23.4
	1.70	3.3

### t-test Value of Age with Other Studies (Senior)

Table 1 (c)

Param eter	1	2	3	4	5	6	7	8	9	10
Age	Senior Present Study V/S Liverpool	V/S Brighton	V/S South Australia	V/S Canadian Olympic	V/S Herm And Sodhi	V/S P.Singa Et.Al. 1989	V/S G.L. Khanna Et.Al. 1995	V/S A.K. Ghosh	V/S Junior Present Study	Present Junior Study V/S Ghosh And Mukhopadh ya
	1.16	-	0.29	1.28	1.88	-	0.82	1.5	10.62	0.696

### t-test Value of Age with Other Studies (Junior)

Table 1 d

Parameter	1	2
Age	V/S Junior Present Study	Present Junior Study V/S Ghosh and Mukhopadhya
	10.62	0.696

Table 2(a) compares the height (cm) of senior woman players participated in the study with other related studies of national and international levels. The mean height of the, studied senior female players was  $158.01 \pm 5.04$  which is less than the height of other international players, but do not differ from national level studies. t-test has shown significant differences with international studies (table 2(c)), but insignificant difference with national studies. Junior

level players of study have depicted mean height as  $159.45 \pm 4.6$ cm as s.d. which is more as compared to study conducted by Ghosh and Mukhopadhy (2001),

Table 2(b). However, non-significant differences, were observed in the mean height of the Junior female Hockey players and that of the players studied by Ghosh and Mukhopadhy (2001).

Table 3(a) compares the weight (kg) of presently studied senior female players with other

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related studies of national and international levels The mean weight of the presently studied senior players has been observed as  $54.05 \pm 5.76$ kg which than other international player's body weight, by 4 Kg to 8Kg but is more than the other national level studies.

The t-test has shown significant differences with international studies as evident from table 3(c), but insignificant differences with national studies. The present junior level player; have depicted the mean weight as 53.35 kg with standard deviation 6.40 which is found to be less as compared to the study conducted by Ghosh and Mukhopadhaya (2001) Table 3 (b), However, non-significant differences shown by t-test, were observed in the mean weight of

the present Junior Hockey players and that of studied by Gosh and Mukhopadhya (2002).

Table 5 (a) compare the % body fat and fat mass (in kg,) of presently studied senior female players with other studies of national and international level. The mean % body fat and fat mass of the presently studied senior players is  $22.27 \pm 4.15\%$  and  $12.26 \pm 3.23$  kg,, respectively, which is higher than the other the national studies. The t-test has also shown insignificant differences as evident from Table 5 (c), The present Junior level players have depicted the mean body fat and fat mass (in k.g.), as  $21.77 \pm 4.39\%$  and  $11.77 \pm 3.55$  Kg respectively.

**Comparison of Height among Senior Indian and International Hockey Women Players**

**Table 2 (A)**

	1	2	3	4	5	6	7	8	9
Parameter	Present Study (N =18)	Liver Pool (Reilly And 1986) (N = 24)	Brighton Polytechnic (Bate,1986) (N =11)	South Australia (Wither,Et,Al) 1987 (N=17)	Canadian Olympic (A.E. Reddy) 1936 (N =16)	State Level (S. Sidhu, K.P. Hermand And H.S. Sodhi 1989 (N = 10)	National Players P. Singal, D.P Bhatnagar And S. Dhillon 1993) (N =35)	National Hockey Players G.L. Khanna Et.Al. 1995 (N=13)	National Hockey Player A.K. Ghosh Et. Al 1991 (N =32)
Height	158.01	162.8	162.7	166.5	161.7	156.79	156	157.78	155.5
Cm	5.04	5.8	4.6	7.5	6.3	4.19	15.66	5.25	5.3

**Comparison of Height among Junior Indian Hockey Women Players (Present Study Vs Ghosh's 2001)**

**Table 2 (b)**

	1	2
Parameter	Present Study (N =38)	A.K. Ghosh and S. Mukhopadhaya 2001(N = 22)
Height	159.45	158.7
(Cm)	4.6	4.6

**t-test Value Of Height With Other Studies (Senior)**

**Table 2 (c)**

	1	2	3	4	5	6	7	8
Parameter	Senior President Study V/S Liverpool	V/S Brighton	V/S South Australia	V/S Canadian Olympic	V/S Hermand And Sodhi	V/S P.Singal Et.Al. 1989	V/S G.L. Khanna Et.Al. 1995	V/S A.K. Ghosh
Height (Cm)	3.01	2.95	3.36	1.93	0.65	0.54	0.13	1.51

**t-test Value Of Height With Other Studies (Junior)**

**Table 2 d**

	1	2
Parameter	V/S Junior Present Study	Present Junior Study V/S Ghosh And Mukhopadhaya
Height (Cm)	0.82	0.61

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## Comparison of Weight among Senior Indian and International Hockey Women Players

Table 3 (a)

	1	2	3	4	5	6	7	8	9
Parameter	Present Study (N=18)	Liver Pool (Reilly and 1986) (N = 24)	Brighton Polytechnic (Bate,1986) (N =11)	South Australia (Wither,Et,A l) 1987 (N=17)	Candian Olympic (A.E. Reddy) 1936 ( N =16)	State Level (S. Sidhu, K.P. Herm And H.S. Sodhi 1989 (N = 10)	National Players P. Singal, D.P Bhatnagar And S. Dhillon 1993) (N =35)	National Hockey Players G.L. Khanna Et.Al. 1995 (N=13)	National Hockey Player A.K. Ghosh Et. Al 1991 (N =32)
Weight Kg	54.05 5.76	60 4.5	59.4 7.5	62.3 7.3	58 4.5	52.25 2.91	50.25 3.1	51.67 4.37	52.5 3.9

## Comparison of Weight among Junior Indian Hockey Women Players (Present Study Vs Ghosh's 2001)

Table 3 (b)

Parameter	1	2
Parameter	Present Study (N =38)	A.K. Ghosh And S. Mukhopadhaya 2001 (N = 22)
Weight (KG)	53.35 6.40	53.00 5.89

## t-test Value of Weight With Other Studies (Senior)

Table 3(c)

Parameter	1	2	3	4	5	6	7	8
Parameter	Senior President Study V/S Liverpool	V/S Brighton	V/S South Australia	V/S Canadian Olympic	V/S Herm And Sodhi	V/S P.Singa Et.Al. 1989	V/S G.L. Khanna Et.Al. 1995	V/S A.K. Ghosh
Weight (kg)	3.81	2.44	3.78	2.29	1.25	3.17	1.26	1.15

## t-test Value of Weight With Other Studies (Junior)

(Present Study Vs Ghosh's 2001)

Parameter	9	10
Weight	V/S Junior Present Study	Present Junior Study V/S Ghosh and Mukhopadhya
	0.42	0.53

Table 4 (a)

## Comparison of % Lean Body Mass (Lbm) and Lean Body Mass (In Kg.) among Senior Indian and International Hockey Women Players

	1	2	3	4	5	6	7	8	9
Parameter	Present Study (N =18)	Liver Pool (Reilly and 1986) (N = 24)	Bright on Polyte chnic (Bate, 1986) (N =11)	South Austr alia (With er,et, al) 1987 (N=17)	Candian Olympic (A.E. Reddy) ( N =16)	State Level (S. Sidhu, K.P. Herm and H.S. Sodhi 1989 (N = 10)	National Players P. Singal, D.P Bhatnagar and S. Dhillon 1993) (N =35)	National Hockey Players G.L. KHANNA Et.al. 1995 (N=13)	National Hockey Player A.K. GHOSH et. AL 1991 (N =32)
% LBM	77.63 4.15	-	-	-	-	-	75.89 4.11	78.66 3.12	-
Mean (Kg) Body Mass (LBM)	41.79 4.05	-	-	-	-	-	37 4.6	42.22 2.99	-

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## Comparison of % Lean Body Mass (Lbm) and Lean Body Mass (In Kg.) Between Junior Indian Hockey Players (Present Study Vs Ghosh's 2001)

**Table 4 (b)**

	1	2
Parameter	Present Study (N =38)	A.K. Ghosh And S. Mukhopadhaya 2001 (N = 22)
% lean body mass	78.23 3.55	-
Lean body mass (Cm)	41.54 4.05	-

### t-test Value of %Lbm and Lbm(Kg) with Other Studies (Senior)

**Table 4 (c)**

	1	2	3	4	5	6	7	8
Parameter	Senior President Study V/S Liverpool	V/S Brighton	V/S South Australia	V/S Canadian Olympic	V/S Herm And Sodhi	V/S P.Singa Et.Al. 1989	V/S G.L. Khanna Et.Al. 1995	V/S A.K. Ghosh
% lean body mass	-	-	-	-	-	1.22	-	-
Lean Body Mass (LBM)	-	-	-	-	-	3.80	1.22	-

**Table 5 (a)**

### Comparison of % Fat and Fat Mass among Senior Indian and International Hokcey Women Players

	1	2	3	4	5	6	7	8	9
Parameter	Present Study (N =18)	Liver Pool (Reilly And 1986) (N = 24)	Brighton Polytechnic (Bate,1986) (N =11)	South Australia (Wither,Et, Al) 1987 (N=17)	Candian Olympic (A.E. Reddy) 1936 ( N =16)	State Level (S. Sidhu, K.P. Herm And H.S. Sodhi 1989 (N = 10)	National Players P. Singal, D.P Bhatnagar And S. Dhillon 1993) (N =35)	National Hockey Players G.L. Khanna Et.Al. 1995 (N=13)	National Hockey Player A.K. Ghosh Et. AL 1991 (N =32)
% Fat Mass	22.37 4.15	-	-	-	-	-	24.20 % 5.8	21.98% 2.1	-
Fat Mass (Kg)	12.26 3.23	-	-	-	-	-	11.2 3.8	11.35 3.1	-

### Comparison of % Fat and Fat Mass (In Kg.) between Junior Indian Hockey Players (Present Study Vs Ghosh's 2001)

**Table 5 (b)**

	1	2
Parameter	Present Study (N =38)	A.K. Ghosh And S. Mukhopadhaya 2001 (N = 22)
% fat	21.77 % 4.39	-
Fat Mass (in kgs.)	11.77 3.55	-

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## % Fat and Fat Mass (in kgs)

### Values of t-test

Table 5(c)

	1	2	3	4	5	6	7	8	9	10
Parameter	Senior President Study V/S Liverpool	V/S Brighton	V/S South Australia	V/S Canadian Olympic	V/S Herm And Sodhi	V/S P.Singh Et.Al. 1989	V/S G.L. Khanna Et.Al. 1995	V/S A.K. Ghosh	V/S Junior Present Study	Present Junior Study V/S Ghosh And Mukhopadhyaya
% fat						0.51	0.23		0.5	
fat Mass						1.03	1.22		0.53	

Table 4(a) compares the % LBM and LBM (in kg.) of studied senior female players, with the other studies of national level. the mean % LBM and LBM (in kg.) of the senior players WAS 77.6344.15% and 41.794 ± 4.05 kg, respectively, which is found to be high as compared to the study of Sing et al (1993) and lesser as compared to the all national level studies (Table 6(c)), The present junior level players have depleted the mean % LBM and LBM (in kg.) as 78.23 ± 4.39 and 41.54 ± 4.05 kg., respectively.

### Aim of the Study

Present study has been conducted with an aim to investigate relationship of anthropometric variables to success in hockey players.

### Conclusion

The women field Hockey players (senior and junior) of India are found to be lighter in weight and smaller in height, as compared to the international players. % LBM of the present senior women Hockey players has been found to be less as compared to junior women Hockey players. The present senior players are found to be fatter as compared to junior players and other national level players.

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