



## Difference Between Male and Female in Landing Mechanics

### KEYWORDS

Gender difference, Spiking, Landing mechanics

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### ABSTRACT

Landing is a process of coming down to the Earth surface or rigid surface after remaining in air for sometime. This is a natural consequence of Earth attraction to an object. For games and sports landing is the important phase in many situations. Landing mechanics are extremely important for maintaining balance and injury prevention during sports. In volleyball landing is involved for spiking and blocking. There are structural differences between male and female. This structural difference influences the landing pattern. The purpose of the present study was to analyse the difference in some selected mechanical parameters between male and female players during landing in spiking in volleyball, if any. Ten male national volleyball players and seven female national volleyball players were selected as subjects. The selected mechanical parameters were distance between two knees, distance between two ankles, lowering of Cg during landing; angle at hip, knee and ankle; horizontal distance between position of Cg and point of touch; duration of landing and work done during landing. Video graphic technique was used to record the movement. Analysis of technique for the selected parameters was done by freeze frame technique. Results revealed that there were significant differences in distance between two knees ( $P=0.05$ ) and angle of ankle ( $P=0.01$ ) between male and female volleyball players.

### INTRODUCTION:

Landing is a natural consequence of a body moving through air, as a result of force of attraction exerted by the Earth towards its own centre. This is evident when a body is thrown up, when a fruit comes down from the force after the detached from its attachment with the main body. Mechanics of landing was initiated by great scientist Isaac Newton. While sitting under an apple tree an apple fell down on his head and this phenomenon was analysed by Isaac Newton to find out the answer regarding why the apple fell down and not went up. Gradually Newton discovered on the basis of understanding the law of gravitation. According to this law even two bodies of this universe attract each other with a force directly proportional to their masses and inversely with the distance between their centre of masses.

In volleyball landing is so important for spiking and blocking. After executing these skills players land to maintain balance and absorb shock to avoid injury. The purposes of the study was to find the landing technique difference between male and female volleyball players in selected mechanical parameters (distance between two knees, distance between two ankles, lowering of Cg during landing, angle of hip, angle of knee, angle of ankle, horizontal distance between position of Cg and point of touch, duration of landing, work done during landing).

### Methodology:

Ten (10) male and seven (7) female national level volleyball players represented West Bengal in national championship were selected as subjects. Distance between two knees, distance between two ankles, lowering of Cg during landing, angle of hip, angle of knee, angle of ankle, horizontal distance between position of Cg and point of touch, duration of landing, work done during landing were considered as measuring criteria for the present study. Data were collected in two phases. At first, two video cameras were used to record the movements of landing technique of the subjects. Subsequently, these recorded movements were analysed using the freeze frame technique with the help of appropriate software (FinalCutPro-7).

### Result and Discussion :

The recorded movement was subsequently projected in three freeze frame conditions and necessary kinegram was

developed. Information regarding selected kinematic parameters have been presented in Table -1.

**Table-1 "t" value for different parameters**

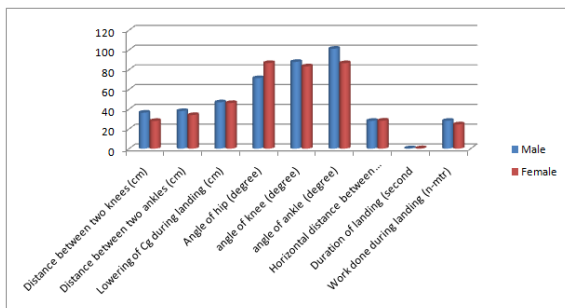
Parameters	Male	Female	t-value	Remarks
Distance between two knees (cm)	36.44±7.57	28.03±7.63	2.24	Significant at 0.05 level
Distance between two ankles (cm)	38.08±8.60	34.04±4.84	1.23	N.S
Lowering of Cg during landing (cm)	46.94±9.26	46.18±11.39	0.15	N.S
Angle of hip (degree)	71.40±10.30	86.71±17.95	2.03	N.S
Angle of knee (degree)	87.85±10.06	83.29±14.71	0.71	N.S
Angle of ankle (degree)	101.2±6.49	86.57±6.90	4.43	Significant at 0.01 level
Horizontal distance between position of Cg and point of touch (cm)	28.14±4.11	28.36±2.08	0.14	N.S
Duration of landing (second)	0.33±0.06	0.42±0.16	1.15	N.S
Work done during landing (n-mtr)	28.23±6.23	24.56±6.89	1.12	N.S

**Table value at 0.05=2.13, 0.01=2.95**

It is seen from the table that at the time of landing mean value of distance between two knees for male volleyball players was 36.44±7.57 cm. but this value for female volleyball players was 28.03±7.63 cm. The "t"-ratio for mean distances between two knees of male and female volleyball players was 2.24 which was statistically significant at 0.05 level. This confirms that the inter-knee distance for male volleyball players was significantly higher than that of their female counterpart. This has been supported by the results reported by Watkins, H.G., & Owen, N. (2008). For distance between two ankles of male and female volleyball players 't'-ratio was 1.23 which was below the required value. The "t"-ratio of lowering of

cg during landing for male and female volleyball players was 0.15 which was also statistically not significant. For angle of hip the "t"-value for male and female volleyball players was 2.03 which was not significant statistically. The "t"-value of knee angle for male and female volleyball players was 0.71 which was not significant statistically. The ankle angle for male volleyball players was  $101.2^{\circ} \pm 6.49^{\circ}$  and for female players was  $86.57^{\circ} \pm 6.90^{\circ}$ . The "t"-value of ankle angle for male and female was 4.43 which was statistically significant at 0.01 level. It means the means angle of ankle at final phase of landing for male was greater than female players. It might be happened due to short height and weight of the female athlete. The 't'-ratio of horizontal distance between position of Cg and point of touch for male and female volleyball players was 0.14 which was statistically not significant. For duration of landing the "t"-ratio for male and female volleyball players was 1.15 which was not significant statistically. The 't'-value of work done during landing for male and female was 1.12 which was not significant statistically.

The mean values of selected parameters have been presented in Fig-1.



**Fig.1: Mean values of selected parameters for male and female volleyball players**

### Conclusion:

On the basis of results obtained, the following conclusions were drawn:

During landing the knee distance for male volleyball players appears to be greater than that of female.

Distance between two ankles appears to be greater for male volleyball players than female ones.

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