

**Linear Kinematical Analysis of Horizontal Poses of Suryanamaskar of
Students of Banaras Hindu University
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Abstract

Purpose:- The purpose of the study was to compare the height of C.G between B.P.Ed and M.P.Ed students at the time of contact phase in horizontal poses of suryanamaskar. **Methodology:-** for the present study the sample consisted of Six Male students of B.P.Ed and M.P.Ed from BHU. The age of the subjects ranged Between 20 to 28 years. Height of C.G of the body measured by kinovea (0.8.27 v) in centimeter. For analysis of data t-test was used. The level of significance was set at 0.05 levels. **Conclusion:** - by the help of study it is conclude that there is no significant difference was found in ashwasanchalanasana, parvatasana, ashtanagamasakar and bhujangasana. at the of contact phase in these different steps of Suryanamaskar. **Keywords:** Kinematical, Suryanamaskar, linear, analysis, horizontal.

INTRODUCTION

The millennium old system of yoga has developed a great variety of procedures and techniques which at times are quite complicated and hard to master. Many of these techniques are still known through oral tradition and are taught only to initiates. Even the better known practices often vary greatly from school to school and there is an obvious need for a proper, unified description and classification of them. One well known and important technique within the yogic curriculum is Suryanamaskar. Suryanamaskar is of ancient origin and serves as the cornerstone upon which the science of yoga rests. Through the unique combination of asana, pranayama and meditation, Suryanamaskar, or sun salutation, is necessary to the practice of yoga as it helps gather the strength of the mind in one direction and aids in the attainment of mental focus. Suryanamaskar is a sequential combination of yogic postures performed dynamically in synchrony with the breath. Suryanamaskar is one such form of yogic practice. Saraswati (1983) defines it as a series of 12 physical postures. Suryanamaskar includes various asanas like—Pranamasana, hastautthanasana, padahastanasana, ashwasanchalanasana, ashtanagamasakar, bhujangasana, and parvatasana. Different authors has reported regarding the benefits of suryanamaskar, but none has reported any kinematical characteristics of suryanamaskar. Biomechanical analysis plays a vital role for correction of posture because the whole body act as a lever and muscle plays a vital role for production of force. Thus, the scholar wish to make a modest effort to find out the kinematical characteristic of suryanamaskar.

Objective of the Study: The purpose of the present study was to compare the Linear Kinematical Analysis of Horizontal poses of Suryanamaskar between B.P.Ed and M.P.Ed students of Banaras Hindu University.

METHODOLOGY: For the present study the sample consisted of six male student of B.P.Ed and M.P.Ed from department of physical education , BHU. The age of the subjects ranged Between 20 to 28 years. The study was confined to suryanamaskar technique only, Height of C.G at the time of contact phase in suryanamaskar.

Procedure of Data Collection: According to availability of two Casio EX-F1 high speed cameras were used, which have frequency from 60 to 300 frames per second (f/s). The data were recorded from sagittal plane and frontal plane. The data was analyzed by kinovea (0.8.27 v) motion analysis software.

Statistical Technique: The statistical analysis of data pertaining to the study were collected on 6 male students. To compute the analysis of data the 't' test and descriptive statistics was used. The level of significance was set at 0.05. All statistical functions were performed with the SPSS (v.22) software.

FINDING AND RESULTS: Result was made on the basis of the finding of the present study. The researcher reached at the result of this empirical investigation which is presented by the respective Table -1, table -2, table-3, table-4, table-5.

Table 1: Descriptive Statistics of Male Students in Relation to Linear Kinematical Variables in Final Poses of Four Steps of Suryanamaskar

Variables	Range	Minimum	Maximum	Sum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
FI_CG_ASHWA SANCHALANA SANA	16.65	33.57	50.22	245.88	40.9800	2.30288	5.64089
FI_CG_PARVAT ASANA	13.18	38.89	52.07	272.10	45.3500	2.43993	5.97658
FI_CG_ASHTAN GANAMASKAR A	9.20	17.82	27.02	138.40	23.0667	1.67533	4.10371
FI_CG_BHUJAN GASANA	19.05	14.95	34.00	161.00	26.8333	2.88112	7.05726

It is evident from table -1 that mean, standard deviation, scores of linear kinematics variables in centimeter during Final poses of four steps of suryanamaskar have been found as follow : Centre of Gravity in Final poses of Ashwasanchalanasana (40.9800 ± 5.64089) , Centre of Gravity in Final poses of parvatasana (45.3500 ± 5.97658) , Centre of Gravity in Final poses of Ashtanganamaskara (23.0667 ± 4.10371) , Centre of Gravity in Final poses of Bhujangasana (26.8333± 7.05726) respectively . whereas Standard Error and Range of Scores was found as follow:- Centre of Gravity in Final poses of Ashwasanchalanasana (2.30288 & 16.65) , Centre of Gravity in Final poses of parvatasana (2.43993 & 13.18) , Centre of Gravity in Final poses of

Ashtanganamaskara (1.67533 & 9.20) , Centre of Gravity in Final poses of Bhujangasana (2.88112 & 19.05) respectively.

Table 2 Comparison of Height of Centre of Gravity (Linear Kinematical Variable) in Final Ashwasanchalanasana Pose of Suryanamaskar between B.P.Ed & M.P.Ed Group

GROUP	Mean	Std. Deviation	T – ratio	Sig.
BPED	37.3700	4.07898	-1.966	0.121
MPED	44.5900	4.88003		

It is evident that **insignificant** difference was found between the mean scores of B.P.Ed Group and M.P.Ed Group in relation to Height of centre of gravity in Ashwasanchalanasana , since t- ratio was found -1.966 (P value = 0.121) which was more value than the required value at 0.05 level of significance . Further the comparison of mean and Standard deviation of Height of C.G between B.P.Ed group and M.P.E.d group in Ashwasanchalanasana is 37.3700 ± 4.07898 cm and 44.5900 ± 4.88003 cm respectively.

Table 3 Comparison of Height of Centre of Gravity (Linear Kinematical Variable) in Final Parvatasana Pose of Suryanamaskar between B.P.Ed Group and M.P.Ed Group

GROUP	Mean	Std. Deviation	T – ratio	Sig.
BPED	46.5767	6.03912	0.461	0.688
MPED	44.1233	6.95081		

It is evident that **insignificant** difference was found between the mean scores of B.P.Ed Group and M.P.Ed Group in relation to Height of centre of gravity in Parvatasana , since t- ratio was found 0.461 (p value = 0.688) which was more value than the required value at 0.05 level of significance . Further the comparison of mean and Standard deviation of Height of C.G between B.P.Ed group and M.P.E.d group in Parvatasana is 46.5767 ± 6.03912 cm and 44.1233 ± 6.95081 cm respectively

Table 4 Comparison of Height of Centre of Gravity (Linear Kinematical Variable) in Final Ashtanganamaskara Pose of Suryanamaskar between B.P.Ed & M.P.Ed Group

GROUP	Mean	Std. Deviation	T – ratio	Sig.
BPED	22.7100	4.6273	-0.191	0.858
MPED	23.4233	4.50635		

It is evident that **insignificant** difference was found between the mean scores of B.P.Ed Group and M.P.Ed Group in relation to Height of centre of gravity in Ashtanganamaskara , since t- ratio was found -0.191 (p value = 0.858) which was more value than the required value at 0.05 level of significance . Further the comparison of mean and Standard deviation of Height of

C.G between B.P.Ed group and M.P.E.d group in Ashtanganamaskara is 22.7100 ± 4.6273 cm and 23.4233 ± 4.50635 cm respectively

Table 5 Comparison of Height of Centre of Gravity (Linear Kinematical Variable) in Final Bhujangasana Pose of Suryanamaskar between B.P.Ed & M.P.Ed Group

GROUP	Mean	Std. Deviation	T – ratio	Sig.
BPED	24.9633	9.11880	-0.607	0.577
MPED	28.7033	5.55601		

It is evident that **insignificant** difference was found between the mean scores of B.P.Ed Group and M.P.Ed Group in relation to Height of centre of gravity in Bhujangasana , since t- ratio was found -0.607 (p value = 0.577) which was more value than the required value at 0.05 level of significance . Further the comparison of mean and Standard deviation of Height of C.G between B.P.Ed group and M.P.E.d group in Bhujangasana is 24.9633 ± 9.11880 cm and 28.7033 ± 5.55601 cm respectively.

CONCLUSION: There is kinematical insignificant difference found in almost all horizontal poses of suryanamaskar it may be due to horizontal position of body the location of center of gravity lie almost around the same point.

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