Kinematic Profile of Ashwa Sanchalana Asana

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Abstract - The present study was initiated with the aim of developing a kinematic profile of Ashwasanchalana Asana on the basis of selected kinematic variables. 50 Subjects of Gwalior district took part in this study voluntarily. A written consent form was signed by them to be the part of research work. They all were asked to perform Ashwasanchalana Asana thrice & their performance was filmed using Akaso V50 pro action camera at 60 fps. 6 Angular kinematic variables (Ankle, knee, hip, shoulder, elbow, wrist) with 1 linear kinematic variable (Height of center of gravity) were selected for the purpose of the study. As a result of the study a profile chart was developed using selected kinematic variables.

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INTRODUCTION

The word Yoga is derived from the Sanskrit word ''YUJ'' meaning to union or unity. Yoga is the art and science of improving physical and mental wellbeing that has its origin in India. Yoga enhances the quality of our lives at so many levels. One aspect of yoga's benefits is to explore the bond between health and beauty. The practice of yoga is about creating balance in the body by developing both strength and flexibility. This is accomplished by performing a series of posture or poses which are designed for specific benefits to each part of the body .The main aim of yoga is control over the mind and all round development of the body. The primary aim of yoga is to gain balance and control in one's life and free from confusion and distress. With the help of these yogic exercises the mind and organic system of the body remains fit and work properly and efficiently. The aim of yoga is to keep the individual healthy and to cure the disease of the individual. Practice of Yoga not only help to improve the health condition of the human being but it also makes them psychologically, physiologically and emotionally strong.

Developing profile of kinematic variables of yoga would facilitate yoga practitioners to evaluate relative importance of each joint angle along with height of centre of gravity. The present study will also highlight the mean angles of ankle, knee, hip, shoulder, elbow, & wrist joint so that a reference value can be obtained around which individual scores would be considered as correct. The study would also provide the idea about mean height of centre of gravity while performance of Ashwasanchalana Asana amongst school going children of age 10-14 years.

METHODOLOGY

To achieve the goals of the study 50 male subjects of KVS no. 1 school aged 10-14 years were recruited in the study. They all were told about the goal of the study. Kinematic data on selected independent variables were gathered using standard filming protocol. AkasoV50 pro special edition camera was used for filming of performance. Camera lens height was set at 1.0meter, while it was placed 2 meter away from the place of performance. Camera was placed in sagittal plane. Angles at different joints of the body were drawn using Kinovea 2D motion analysis software. Recorded angles were noted down and processed in SPSS software. Development of profile chart was completed in three steps: 1- Preparation of profile specific descriptive statistics i.e. mean, SD, minimum, & maximum, 2- conversion of raw scores in standard scores, 3- conversion of standard scores into transformed scores.

FINDINGS

Table 1: Descriptive statistics Ashwa Sanchalana Asana, Girls

Test statistics		Right Ankle	Right Knee	Right Hip	Right Shoulder	Right Elbow	Right Wrist	Centre of Gravity
N	Valid	50	50	50	50	50	50	50
	Missing	0	0	0	0	0	0	0
Mean		93.50	146.56	212.86	174.84	72.44	193.62	48.70
Std. Deviation		9.28	16.55	11.17	3.71	6.75	6.86	7.53
Skewness		-0.08	-0.15	-0.18	-0.64	0.03	0.11	0.24
Std. Error of Skewness		0.34	0.34	0.34	0.34	0.34	0.34	0.34
Kurtosis		0.07	-1.74	-0.95	-0.67	-1.63	-1.36	-1.50
Std. Error of Kurtosis		0.66	0.66	0.66	0.66	0.66	0.66	0.66
Minimum		73.00	122.00	194.00	168.00	63.00	184.00	39.00
Maximum		110.00	166.00	230.00	179.00	82.00	204.00	59.00

In table 1 It Is clearly visible that mean angle of right ankle was noticed as 93.50^0 with standard deviation 9.28 The minimum score for right ankle angle was noted as 73.00^0 while maximum holds at 110^0. In the same way the mean angle at right knee joint was find to be 146.56^0 with standard deviation 16.55 with a minimum of 122^0 and maximum of 166^0. The mean angle of right hip joint was found to be 212.86^0 with S.D. 11.17^0 with a minimum of 194^0 and maximum 230^0. The mean angle at right shoulder joint was noticed as 174.84^0, SD 3.71^0 degrees with a minimum of 168^0 and maximum of 179^0. The mean angle of right elbow was found to be 72.44^0, SD 6.75^0 with a minimum of 63^0 and maximum of 82^0. The mean score of Right wrist joint angle was found to be 193.62^0, SD 6.86^0 with a minimum of 184^0 and maximum 204^0. The mean height of centre of gravity was located at 48.70 centimetres, SD 7.53 cm with a minimum of 39 cm and maximum 59 cm.

Table 2: Profile specific Descriptive statistics AshwaSanchalana Asana, Girls

Variable	N	Mean	S.D.	Min.	Max.
Ankle	50	93.5	9.28	73	110
Knee	50	146.56	16.55	122	166
Hip	50	212.86	11.16	194	230
Shoulder	50	174.84	3.71	168	179
Elbow	50	72.44	6.75	63	82
Wrist	50	193.62	6.86	184	204
C.G.	50	48.7	7.53	39	59

It is essential to go through with profile specific descriptive statistics when developing profile is desired. To develop profile of variables of interest one need to calculate mean, S.D. Minimum, & maximum scores for desired set of data. Except C.G. all other variables have "degree" as common unit of measurement, while center of gravity have been reported in centimeters. In order to present findings of profile in a synchronized way, all the outputs were generated in SPSS and later copied from their original source. To reach out to final conclusion one need to follow three steps, they are as follows: 1- Computing profile specific descriptive statistics, 2- Conversion of raw scores into standard scores, 3- transformation of standard scores into weighted relative observations.

Table 3: Standard scoresAshwaSanchalana Asana, Girls

Variable	Minimum	Mean	Maximum
Ankle	-2.21	50	1.78
Knee	-1.48	50	1.17
Hip	-1.69	50	1.54
Shoulder	-1.84	50	1.12
Elbow	-1.40	50	1.42
Wrist	-1.40	50	1.51
C.G.	-1.29	50	1.37

For conversion of raw score into standard scores following equation have been utilized Z=Individual score-Mean/SD. Standard scores are free from unit and utilised in developing profile when one or more variables have uncommon unit of measurement.

Table 4: Transformed scoresAshwaSanchalana Asana, Girls

Variable	Minimum	Mean	Maximum
Ankle	27.91	50	67.78
Knee	35.16	50	61.75
Hip	33.10	50	65.36
Shoulder	31.56	50	61.21
Elbow	36.01	50	64.16
Wrist	35.98	50	65.13
C.G.	37.12	50	63.68

The formula for converting standard scores to transformed scores author has used $Z_1=50 + 10 \times Z$. Where Z_1 = Transformed score, Z= Individual score. These transformed scores are plotted directly on to the profile chart. Transformed scores reflects relative score of each variable which is irrespective of measurement unit.

Figure 1

Figure-1 shows the profile chart developed for Ashwa-Sanchalanaasana. The figure shows the transformed values of said independent and dependent variables. The mean 50 was taken as

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constant for all the variables it presents relative performance at each independent variable.

CONCLUSION

When value 50 was taken as constant to make all the variables unit free, following scores were opted:

➤ The maximum deviation from mean was observed in case of ankle angle.

➤ The minimum and maximum scores for ankle angle was found to be 27.91 & 67.68.

➤ The minimum and maximum scores for knee angle was found to be 35.16 & 61.75.

➤ The minimum and maximum scores for hip angle was found to be 31.10 & 65.36.

➤ The minimum and maximum scores for shoulder angle was found to be 31.56 & 61.21.

➤ The minimum and maximum scores for elbow was found to be 36.01 & 64.16.

➤ The minimum and maximum scores for wrist was found to be 35.98 & 65.13.

➤ The minimum and maximum scores for height of center of gravity was found to be 37.12 & 63.68.

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