International Journal of Physical Education & Sports Sciences
Vol. 16, Issue No. 2, October-2021, ISSN 2231-3745

DOI: https://doi.org/10.29070/tqx84c78

Relationship of Kinematic Variables with the Performance of uprise on rings in Men's Artistic Gymnastics

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Abstract: An investigationwas done to find the relation between selected kinematic variables and theperformance of uprise on rings in men's artistic gymnastics.The study was conducted on national-levelgymnasts. The data on angular kinematic variables were collected on four different phases of uprise onrings. Linear kinematic variables were identifiedon two different phases of uprise on rings.The angular kinematic variables did not show any significant relationship at the 0.05 level at theDislocation Phase.Duringthe Vertical Line Cross Phasea significant relationship was found between angle atthe ankle andthe hipangle. InKicking and Pulling Phase angle at the left hip joint and the performance of Uprisehasshown a significant relationship.During the Supporting phase angle at the neck and the performance ofUprisewas showing a significant relationship, and also the angle of the left Wrist correlated significantlywith the angle of the Hip.Results also reveal that none of the linear kinematic variables at different Phases of Uprise showed anysignificant relationship at 0.05 level

Keywords: kinematic variables, performance, uprise, rings, men's artistic gymnastics, angular kinematic variables, linear kinematic variables, dislocation phase, vertical line cross phase, kicking and pulling phase, supporting phase, neck angle, wrist angle, hip angle, ankle angle

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INTRODUCTION

Artistic gymnastics is regulated by the rules framed by FIG (federation international de gymnastics). It is divided into men's and women's gymnastics. Each group has to do different events. Floor, pommel horse, rings, vaulting parallel bars, and high bar are men's events and vault, uneven bar, balancing beam and floor are women's events. The rings are also known as still rings and it is an artistic gymnastics apparatus it is used only by men, due to their extreme upper body strength requirements, gymnasts wear ring grips while performing on the ring. The event is conducted of two rings that hang freely from a metal frame. Each ring is supported by a strap, which has a steel cable, suspended from the metal frame. The gymnast when gripping the ring must control the movement of the ring an exercise on rings consist of swing, strength, and hold elements generally gymnasts arerequired to fulfil various requirements, and more experienced gymnasts will often perform more than are strength element.

The objective was to investigate the relationship of the selected kinematic variablesand the performance of an uprise techniqueon the rings.

PROCEDURE

A purposive sampling technique was used for choosing highly skilled 5 national male gymnasts from Bhilwara Sports Council Gymnastics Center Rajasthan. Since the gymnast had been trained for a considerable period of time, they were considered skilled and their technique was treated as technically sound on the stated skill and stabilized. The purpose of the study was explained to all the subjects and were

requested to put in their best during each attempt or trial. To achieve the objective of the study following variables were selected

(A) Angular kinematic variables of Uprise on rings.

1. Angle of neck
2. Left shoulder angle
3. Left wrist angle
4. Left hip angle
5. Left ankle angle

(B) Linear kinematic variables Uprise on rings.

i) Height of C.G. at the opening of dislocation phase.

ii) Height of C.G. at supporting phase

The criterion measures for this study were the performanceand the skill was evaluated by qualified judges on the basis of FIG Code of Points, Angles were measured at selected joints and were recorded in the nearest degree, and the height of the center of gravity was recorded to the nearest centimeter.

The test was administered to 5 male gymnast subjects of Bhilwara Rajasthan. Each subject was given 15 minutes time to perform their typical warm-ups and stretch routines. Once the subject was able to perform several upraise (forward to support) and comfortable in performing them in the provided setting, the data was recorded.

The center of gravity of each body segment and the whole body andThe angle of various jointswere determined and analyzed by kinovea software.

For the study, descriptive statistics and Pearson'sproduct-moment correlation method were used. SPSS software was usedto finda correlation at 0.05 level.

FINDINGS AND DISCUSSION

Independent correlation was used to find out the relationship with the performance and the collected score of each selected angular and linear kinematic variable.

The selected linear and angular kinematics variables with dependent variables are presented separately. Obtained values have been presented in table 1.

Table-1: Correlation of Angular Kinematic Variables During Dislocation Phase

Performance		Angle of Neck	Angle of Shoulder	Angle of Wrist	Angle of Hip	Angle of Ankle
Performance	1	-.306	-.327	-.577	.490	.000
Angle of Neck	-.306	1	.726	-.596	.305	.662
Angle of left Shoulder	-.327	.726	1	-.378	-.046	.189
Angle of left Wrist	-.577	-.596	-.378	1	-.606	-.500
Angle of left Hip	.490	.305	-.046	-.606	1	.849
Angle of left Ankle	.000	.662	.189	-.500	.849	1

r.05 n-2= **.878**

Results of the above reveal that all of the angular kinematic variables**atthe Dislocation Phase**has shownan insignificant relationship at 0.05 level.

Table-2: Correlation of Angular Kinematic Variables DuringVertical Line Cross Phase

	Performance	Angle of Neck	Angle of Shoulder	Angle of Wrist	Angle of Hip	Angle ofAnkle
Performance	1	-.320	-.176	.210	.323	.000
Angle of Neck	-.320	1	-.508	-.235	.155	.662
Angle of Shoulder	-.176	-.508	1	.425	-.852	.662
Angle of Wrist	.210	-.235	.425	1	.000	-.226
Angle of Hip	.323	.155	-.852	.000	1	-.901*
Angle ofAnkle	.000	.662	.662	-.226	-.901*	1

r.05(N-2)=0.878

Results of the above tablereveal thatthe angle of the ankle has shown a significant relationship with lefthipangleDuring**the** Vertical Line Cross Phaseas the correlated value**-.901** is more than the tabulated value.No other angular kinematic variable has shown any significant relationship at 0.05 level.

Table-3: Correlation Of Angular Kinematic Variables DuringKicking And Pulling Phase

Performance		Angle of Neck	Angle of Shoulder	Angle of Wrist	Angle of Hip	Angle of Ankle
Overall Performance	1	.560	-.764	-.764	.919*	-.667
Angle of Neck	.560	1	-.733	-.504	.514	-.840
Angle of left Shoulder	-.764	-.733	1	.286	-.536	.873
Angle of left Wrist	-.764	-.504	.286	1	-.869	.327
Angle of left Hip	.919*	.514	-.536	-.869	1	-.612
Angle of left Ankle	-.667	-.840	.873	.327	-.612	1

Results of the above tablereveal thatangle at the left hip joint shows a significant relationship with performanceduring**the** Kicking and Pulling Phase as the coefficient correlation**.919**wasgreater than the tabulated value at 0.05 level.

Table-4: Correlation of Angular Kinematic Variables duringSupporting Phase

Performance		Angle of Neck	Angle of Shoulder	Angle of Wrist	Angle of Hip	Angle of Ankle
Overall Performance	1	-.913*	-.721	-.227	.088	-.480
Angle of Neck	-.913*	1	.439	.415	.000	.439
Angle of left Shoulder	-.721	.439	1	-.473	-.591	-.038
Angle of left Wrist	-.227	.415	-.473	1	.880*	.838
Angle of left Hip	.088	.000	-.591	.880*	1	.803
Angle of left Ankle	-.480	.439	-.038	.838*	.803	1
CG	.000	.184	.065	-.352	-.497	-.614

Results of the above tablerevealthat angle at neckjoint shows a significant relationship with performance as the coefficient correlation of the angles**-.913** isgreater than tabulated value (0.878)Angle of left Wrist correlated significantly with Angle of Hip at Supporting phase**.880 at 0.05 level.**

Table-5: Correlation of Liner Kinematic Variables at Different Phases

Performance		CG at Opening of Dislocation	CG at Supporting Phase
Overall Performance	1	.737	.000
CG at Opening of Dislocation	.737	1	-.530
CG at Supporting Phase	.000	-.530	1

Results of the above tablerevealthat none of the linear kinematic variablesat Different Phasesshowed any significant relationship at the 0.05 level.

DISCUSSIONS OF FINDINGS

The findingsrevealed, that the chosen linear kinematic variables failed toshow asignificant relationship withuprise techniquein all theselected phases. The major reason forsuch findingscould be that the performance of any games and sports depends uponso many other factors such as physiological ,physical , psychological factors,so it is multidimensional .

Few chosen angular kinematic variables at all the four phases have not shownany significant relationship with the Uprise performance in men's artistic gymnastics. Though in gymnastics, these linear and angular kinematic variables are associated with the techniques but the whole performance regarding the skills and techniques consists of a variety of other dominating factors that influence the gymnast's performance to the extent.

Smaller sample size, unavailability of sophisticated types of equipmentand level of performancecould also be one of the reasons forthe insignificant relationship.

CONCLUSION

On the basis of the findings following conclusions were drawn:

- During the Dislocation Phase, the angular kinematic variablesfailedto depict any significant relationship.
- DuringVertical Line Cross Phasethe angle of the ankle was found to havea significant relationship with the left hipangle. The attained correlation value was**-.901 which**was more than the tabulated value.Other than this none of the angular kinematic variables had any significant relationship at 0.05 level.
- DuringKicking and Pulling Phasea significant relationship was attainedbetween performance of Upriseleft hip angle. The coefficient correlation **.919**. was greater than the tabulated value (0.878)at 0.05 level of significance.
- During Supporting phaseangle at the neckhada significant relationship with performanceof Uprise. The coefficient correlation value**-.913** isgreater than tabulated value (0.878). The angle of left Wrist correlated significantly with the angle of Hip **(.880) at 0.05 level.**
- Results alsorevealed an insignificant relationshipbetween the linear kinematic variables and performance.

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