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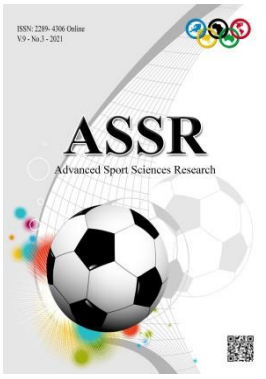

"Analysis of Para Powerlifting Mixed Teams Results Using Adjusted Arbitration (AH) Formula"

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Abstract

The rules of Para Powerlifting have a kind of privacy being dealing with a class of athletes with lower limbs disabilities. These rules depend on the application of the AH formula System in cases where the number of participants in a specified weight is less than three or when the total number of athletes is small and in mixed team championships to determine the ranking of athletes and teams in the championship and medals award.

Through the experience of researchers and the continuous follow-up and participation in many internal and external Para Powerlifting championships, they noted that there is a disparity in the achievement and logging of the records between weight categories and the events, which may have a negative impact on the athletes of high weights when applying the AH formula in the category of a particular weight or in the championship .Therefore, the researchers aimed at identifying the points of strength and weakness when applying AH formula to the results achieved in the Noor Sultan Mixed Teams Championship and to modify the AH formula according to an equation based on the world recorded number of body weight category, and compare when applied with the AH formula used.

The researchers used the descriptive method in a survey method that is consistent with the objectives of the study and research procedures. The researchers chose a sample of their research from the said community by 10 mixed teams of men and women at the Nur sultan Championship in Kazakhstan. The researchers also relied on data published on the official website of the World Para Powerlifting. In addition to the regulations and rules of World Para Powerlifting, and after the statistical treatment, it was found that there were real significant differences when applying the adjusted AH formula to the final results of the participating teams. Therefore, the researchers recommend that the adjusted AH formula should be adopted and applied in the future championships.

Keywords : Para Powerlifting , Mixed, (AH) Formula.

1. Introduction

Analytical studies in the field of sports are one of the foundations used by researchers and trainers to evaluate the technical and refereeing performance, especially after the developed level reached by sports teams in all disciplines on the physical, technical, and psychological levels.

These studies are playing an active role in detecting the points of strength and weakness and identifying most of the aspects surrounding the phenomena to be studied. This is because the analysis is one of the key elements of the effectiveness of the study and the main task in the analysis process is to be identified through distinguishing the differences and to estimate differences in performance. The purpose of refereeing in all sports is to achieve justice between athletes and determine the winner, so to observe the commitment of the athletes to the rules of the game and not to violate them, as well as contribute to the beauty of the game and to provoke the spirit of competition and suspense to show the competition in the most elegant while maintaining the athletes' safety as much as possible .The rules of Para Powerlifting has some kind of privacy as it deals with a class of athletes with lower limbs disabilities, therefore, they are divided into ten weight categories for men and ten for women with the following disabilities:(1: 384)

Amputation: They are a class of athletes who have lost one or more joints of their lower limbs.

Cerebral palsy: They are the category of athletes who have lower paralysis in one or two limbs.

Spinal cord injuries: This class has a total or partial cut in the spinal cord that affects their lower limbs.

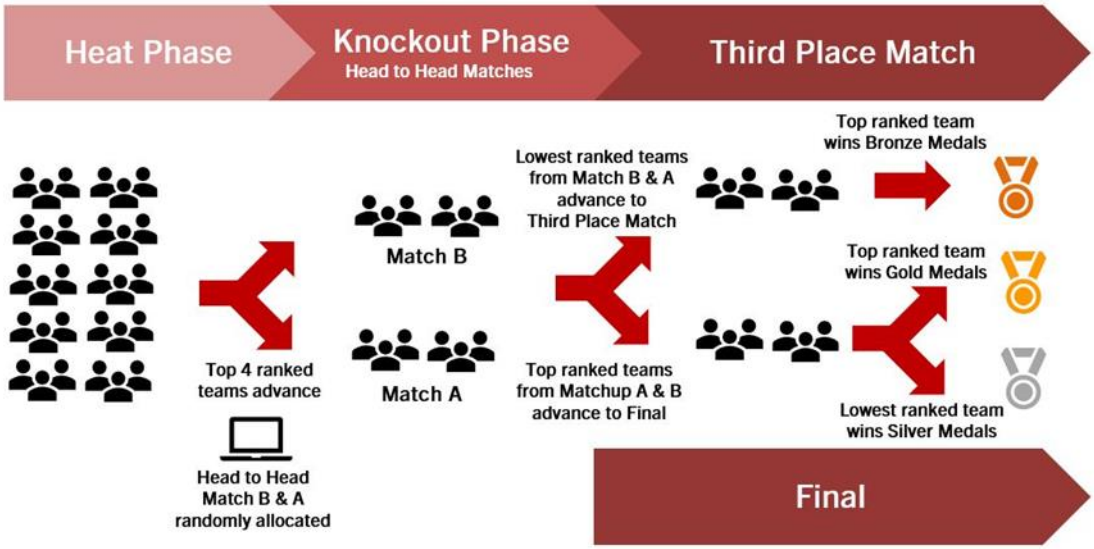
Short State : They are a class of short stature athletes with a maximum length of 145 for men and 137 for women.

Other categories: This class has different motor disabilities other than the classifications mentioned above.

In cases where the number of participants in a specified weight is less than three or when the total number of athletes is small, then the formation of the combined classes for each gender and the application of the AH system become mandatory to determine the ranking of athletes in the tournament and the award of medals. (2: 33)

The AH formula is also used in the recently created mixed team event at the 2019 Noor Sultan World Championship, an additional event in which athletes complete a maximum of 3 additional lifts in 3 different stages (one lift per athlete at a maximum of 3 lifts in the event of the team progressing to the final or third place match).Results are calculated using the AH formula by total AH points per athlete. (3)

Figure (1) Illustrating the Stages of Mixed Team Competitions



Through the researchers' experience as international referees and their participation in the refereeing of internal and external championships of Para Powerlifting, they noted that there is a disparity in the achievement and recording of numbers between the ten weights of the event, and many athletes outperform other athletes of higher weight, which may reflect negatively on the weight of the athletes when applying the AH formula in a certain weight category or in the championship as a whole, which affects the final ranking of athletes. [(4)]

The research aims at:

- Learn about the difference in the mixed teams achieved at the 2019 Noor Sultan World Championship in Kazakhstan
- Learn about the differences between weight categories and the same weight.
- Modify the application of the AH formula according to an innovative formula
- Compare the results achieved by applying the AH formula used and the adjusted AH formula.

Research questions:

- What are the records achieved in each weight category?
- What are the records achieved among the three positions in the single weight category?
- Is there a gradual superiority in the numbers recorded between weight classes and in favors of the most weight category?

2. Research procedures

2.1 Research methodology

Research is "the means to generalize the phenomenon as a general fact, it is the instrument of science and the path that the walkers take towards the truth"[(5: 7)]

Accordingly, the researchers used the descriptive approach in a survey method that is consistent with the objectives of the study and the research procedures.

2.2 Population and Sample Research

The researchers identified the research population of athletes participating in the 2019 Noor Sultan-Kazakhstan Mixed Team Event with 10 teams.

The researchers selected a sample of their research from the said community by 10 teams in a comprehensive inventory.

2.3 Research Instrument

The researchers relied on data published on the official website of the World Para Powerlifting Federation. [(6)]

In addition to the 2016-2012World Para Powerlifting rules and regulations.

2.4 Field Procedures

2.4.1 Data Collection: Includes

Obtaining data from the Official Website of the World Para Powerlifting includes:

- Athlete weight
- Lift weight
- World records for all weight categories

1. Data filled in special forms

Extraction values of AH according to athletes' weights

2.4.2 Application of the adjusted AH equation

The researchers counted on the AH formula used and the corresponding relative numbers of athletes' weights, with the adoption of the world numbers recorded for each weight category so that the following equation emerges:

$$\frac{\text{Lift weight}}{\text{World Record}} \times \text{the weight of the lift} \times \text{the AH value corresponding to the athlete's weight}$$

2.5 Statistical Means

The researchers used the statistical SPSS program for statistical processing.

3. Presenting, analyzing and discussing the results:

3.1 Draw mixed teams results using AH formula values used in the qualifying phase:

Table (1) Shows the athletes' weights, the lift and the AH formula value used according to the weight and total results of mixed teams - the qualifying stage

No	Wight Category	Athlete's Wight	Lift's Wight	(AH) Value	(AH) Used Value Result	Total
BRA (A)	59	57.55	170	1.086154	184.646	468.967
	88	85.62	190	0.904815	171.914	
	67	65.47	110	1.021886	112.407	
BRA (B)	107	105.65	195	0.827011	161.267	426.439
	49	48.53	140	1.180970	165.335	
	86	85.03	110	0.907611	99.837	
COL	88	83.91	210	0.912822	191.692	500.16
	50	48.91	102	1.176112	119.963	
	97	97.11	220	0.856845	188.505	
EGY	50	48.91	110	1.176112	129.372	529.104
	80	80.51	210	0.929678	195.232	
	59	58.64	190	1.076316	204.500	
IRQ	+107	125.84	210	0.769631	161.622	420.829
	86	80.61	100	0.929165	92.916	
	72	71.97	170	0.978187	166.291	
KAZ (A)	49	48.74	160	1.178532	188.565	441.508
	88	86.94	190	0.898868	170.784	
	67	49.12	70	1.173709	82.159	
KAZ (B)	54	52.48	85	1.136397	96.593	266.023
	41	40.87	57	1.290695	73.569	
	72	67.28	95	1.009067	95.861	

No	Wight Category	Athlete's Wight	Lift's Wight	(AH) Value	(AH) Used Value Result	Total
MEX	+86	96.88	125	0.857976	107.247	398.192
	107	104.05	200	0.832321	164.642	
	55	54.23	113	1.117728	126.303	
URK (A)	80	80.45	180	0.930191	167.434	456.92
	54	53.62	150	1.123829	168.574	
	50	49.03	103	1.173908	120.912	
URK (B)	45	42.72	90	1.260356	113.432	395.175
	97	92.83	170	0.873629	148.516	
	54	50.49	115	1.158500	133.227	

2-3 Ranking of mixed teams results according to the AH formula used - qualifying stage:

Table (2) Shows the order of team results in total in accordance with the AH formula used.

No.	Country	Total	Ranking
1	EGY	529.104	1st
2	COL	500.16	2nd
3	BRA (A)	468.967	3rd
4	URK (A)	456.92	4th
5	KAZ (A)	441.508	5th
6	BRA (B)	426.439	6th
7	IRQ	420.829	7th
8	MEX	398.192	8th
9	UKR (B)	395.175	9th
10	KAZ (B)	266.023	10th

3.3 Drawing mixed teams' results using the adjusted AH formula in the qualifying stage:

Table (3) Shows the athletes' weights, the lift and the value of the AH adjusted by weight and total effectiveness of mixed teams - the qualifying stage

No	Wight Category	World Record	Athlete Wight	Lift Weight	(AH) Value	(AH) Modified Total Result	Total
BRA (A)	59	211	57.55	170	1.086154	148.767	376.36
	88	234	85.62	190	0.904815	139.588	
	67	140.5	65.47	110	1.021886	88.005	
BRA (B)	107	244	105.65	195	0.827011	128.881	330.241
	49	183.5	48.53	140	1.180970	126.141	
	86	146	80.03	110	0.907611	75.219	
COL	88	234	83.91	210	0.912822	172.031	436.100
	50	131	48.91	102	1.176112	93.406	
	97	243	97.11	220	0.856845	170.663	
EGY	50	131	48.91	110	1.176112	108.633	467.987
	88	234	80.51	210	0.929687	175.208	
	59	211	58.64	190	1.076316	184.146	
IRQ	+107	310	125.84	210	0.769631	109.486	296.575
	86	146	80.61	100	0.929165	63.641	
	72	229	71.97	170	0.978187	123.448	
KAZ (A)	49	483.5	48.74	160	1.178532	164.416	244.02
	88	234	86.94	190	0.898868	138.671	

No	Wight Category	World Record	Athlete Wight	Lift Weight	(AH) Value	(AH) Modified Total Result	Total
	67	140.5	49.12	70	1.173709	40.923	
KAZ (B)	54	205	52.48	85	1.136397	40.050	120.138
	41	104	40.87	57	1.290695	40.321	
	72	229	67.28	95	1.009067	39.767	
MEX	+86	160	96.88	125	0.857976	83.786	289.852
	107	244	104.05	200	0.832321	136.446	
	54	205	54.23	113	1.117728	79.620	
URK (A)	88	234	180	180	0.930191	128.795	347.21
	54	53.62	150	150	1.123829	123.347	
	50	131	49.03	103	1.173908	95.068	
URK (B)	45	115.5	42.72	90	1.260356	88.388	267.025
	97	243	92.83	170	0.873629	103.900	
	54	205	50.49	115	1.158500	74.737	

3-4 Ranking of mixed teams results according to the adjusted AH formula - qualifying stage:

Table (4) Shows the order of team results in total in accordance with the AH formula used.

No.	Country	Total	Presenting	Ranking
1	EGY	467.987	88.44%	1st
2	COL	436.100	87.19%	2nd
3	BRA (A)	376.36	80.25%	3rd
4	URK (A)	347.21	75.98%	4t
5	KAZ (A)	344.02	77.91%	5th
6	BRA (B)	330.241	77.44%	6th
7	IRQ	296.575	70.47%	7th
8	MEX	289.852	72.79%	8th
9	UKR (B)	267.025	67.57%	9th
10	KAZ (B)	120.138	40.16%	10th

3.5 Comparing the results of mixed teams using the AH formula used and adjusted in the qualifying phase:

Table (5) Shows the values of the arithmetic averages, standard deviations and the calculated T value of the results achieved using the adjusted AH formula.

Statistical indicators	Median	Std. deviation	T	Significance Level	Significance Type
Mixed teams' results using the adjusted AH formula	430.33	71.74	2.705	0.014	moral
Mixed teams' results using the adjusted AH formula	327.55	96.38			

The results illustrated in the table above, the values of the arithmetic values, the standard deviations, the calculated (T) and the level of indication of the results of the difference using the AH formula used and adjusted, and to extract the results for the variables researched, the researchers used a test (T test) and the results were significant at the indication level (0.014) so the statistical indication is significant.

The researchers attribute this to the use of the adjusted AH formula, which adopted the world record edited number for the same body weight category, which led to the reduction of the differences between the body category and other categories

where the weight of the body class must be achieved and then compete with other categories, in other words, the more the athlete achieves a number close to the world registered record number the better his chances of winning,

This was confirmed by the study (Mohammad Ali Ahmed and Deger Mahdi) (average weights in the final ranking generally surpass after the use of the AH formula for men and women). [(7: 648)]

In addition, the adoption of the world record makes the competition fairer and gives teams preference in the weights by which advanced positions are achieved regardless of body weight, which leads the teams to reach and break the world record.

4. Conclusions and recommendations

4.1 Conclusions

- The study showed a disparity in the numbers recorded between the weight classes for men and women.
- The study showed that light and middle weights are higher in the final ranking in general after using the AH formula for men and women
- The study showed that there are real significant differences when applying the adjusted AH formula to the final result.

4.2 Recommendations:

- The researchers recommend that the weight category should be considered in the light, medium and heavy categories
- The specificity of each weight category should be considered in order so that a certain weight does not dominate at the expense of other weights.
- Apply the adjusted AH formula in upcoming tournaments.

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