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REPORT REGARDING TO THE RESEARCH DEVELOPED DURING THE 64th WORLD MILITARY PENTATHLON CHAMPIONSHIP

INTRODUCTION

In order to keep the Military Pentathlon in constant development, There was developed a research regarding to the difference between genders in Obstacle Run during the 64th World Military Pentathlon Championship, which was held in Salinas, Ecuador, from 31 Jul to 6 Ago 2017.

The aims of this research was to evaluate the power of the lower limbs, the perception from the female athletes regarding their possibilities to do obstacles which they don't do today, and the results obtained in 64th World Military Pentathlon Championship (the way how the male athletes do ladders and the power of the upper limbs).

METHODOLOGY

The sample was composed by 85 male athletes, 34 female athletes and 3 female coaches, from 18 countries, who were participating in the 64th World Military Pentathlon Championship. Thirty days before the event, it was sent a survey to all chiefs of delegations requesting anthropometric data and the value of Sargent Jump Test (acquired during July 2017). A tutorial video was recommended to ensure the evaluation of the Sargent Jump Test with the same protocol. Results were used to represent the power of the lower limbs (meters).

During the event, the Lt Col Eduardo Borba Neves did interviews with the female athletes and female coaches regarding their possibilities to do obstacles: Rope Ladder, Sloping Wall with Rope, Irish Table, Four Steps of Beams, Pit, Vertical Ladder, and Assault Wall. These interviews were based in a Survey composed by 8 questions with answers in Likert scale format.

During the event, it was obtained the power of the upper limb by the Equation 1. The option of the use the power normalized by the weight was adopted because it is what make the difference during the action of cross an obstacle in the course. In addition, there were registered the athletes who not jump directly from the top of the Rope Ladder and the Vertical Ladder, and it was evaluated the impact of jumping from the top of the ladders or not jump in the final time of the obstacle run.

$$\text{Power of the Upper Limb (m)} = \frac{TD \times WP}{BM} \quad (1)$$

Where TD = throwing distance, WP = weight of the projectiles, and BM = body mass of the athletes.

The statistical analysis was done using SPSS (version 20.0). The variables were tested regarding to the normal distribution using the Shapiro-Wilk test. For



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the variables with Gaussian distribution was used average, standard deviation and Student T test to compare the groups, and for the others were used Median, Interquartile Range and Wilcoxon signed rank test. The chi-square (χ^2) was used to evaluate the statistical significance of the difference between the proportions of positive answers and negative answer of the interview questions. The statistical significance level was set in 95% ($p < 0.05$).

RESULTS

From the total sample, 103 athletes did the Sargent Jump Test in July 2017. However, to get a fair comparison, it was used the data from athletes aged from 20 to 35 years-old and with height from 160 to 180cm. With this criterion, 84 athletes (57 male and 27 female) were analyzed regarding to the Power of the Lower and Upper Limbs (Figure 1). The Table 1 presents the gender comparison of the Power of the Limbs, from the Military Pentathlon Athletes.

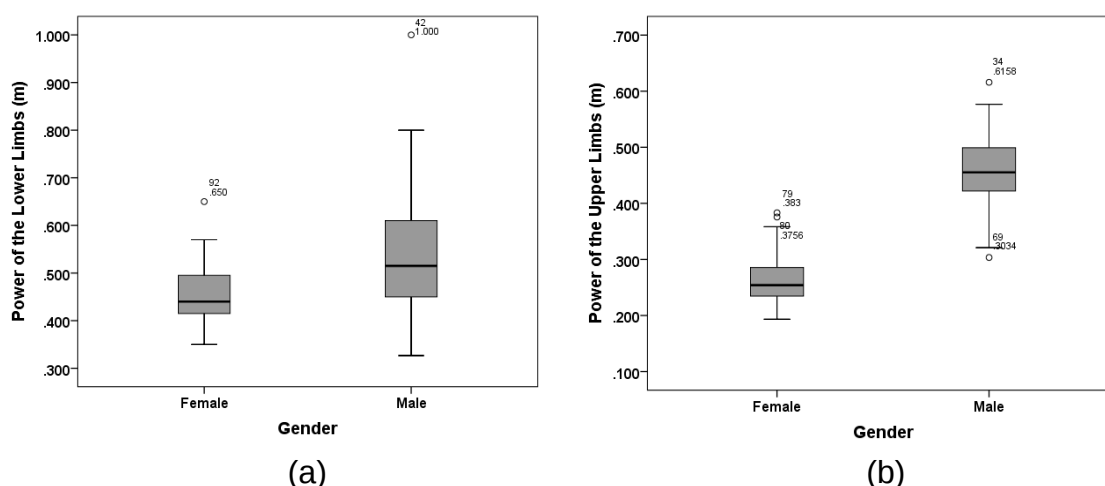


Figure 1. Boxplot to Power of the Lower (a) and Upper (b) Limbs of the Military Pentathlon Athletes, 2017.

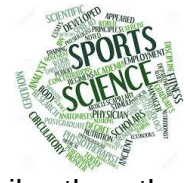
Table 1. Gender comparison of the Power of the Limbs, from the Military Pentathlon Athletes.

Variable	Gender	N	Median or Average*	Std. Deviation or Interquartile Range*	p value
Power of the Lower Limbs (m)	Male	57	0.52	0.17	0.004
	Female	27	0.44	0.10	
Power of the Upper Limbs (m)	Male	57	0.46	0.08	<0.001
	Female	27	0.25	0.06	
Obstacle Run Time (s)*	Male	57	147.40	7.76	0.014
	Female	27	152.22	9.23	

The results suggest a significant difference in terms of the Power of the Limbs between males and females athletes. Moreover, Figure 2 suggest that even with this difference, female athletes report to be possible do some adjustments in



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their Obstacle run in the sense to make their obstacle run more similar than the male one. The Table 2 presents the Chi-square values between the positive (Agree Strongly and Agree) and negative (Disagree Strongly and Disagree) answers for each question of the interview with Female Athletes and Coaches.

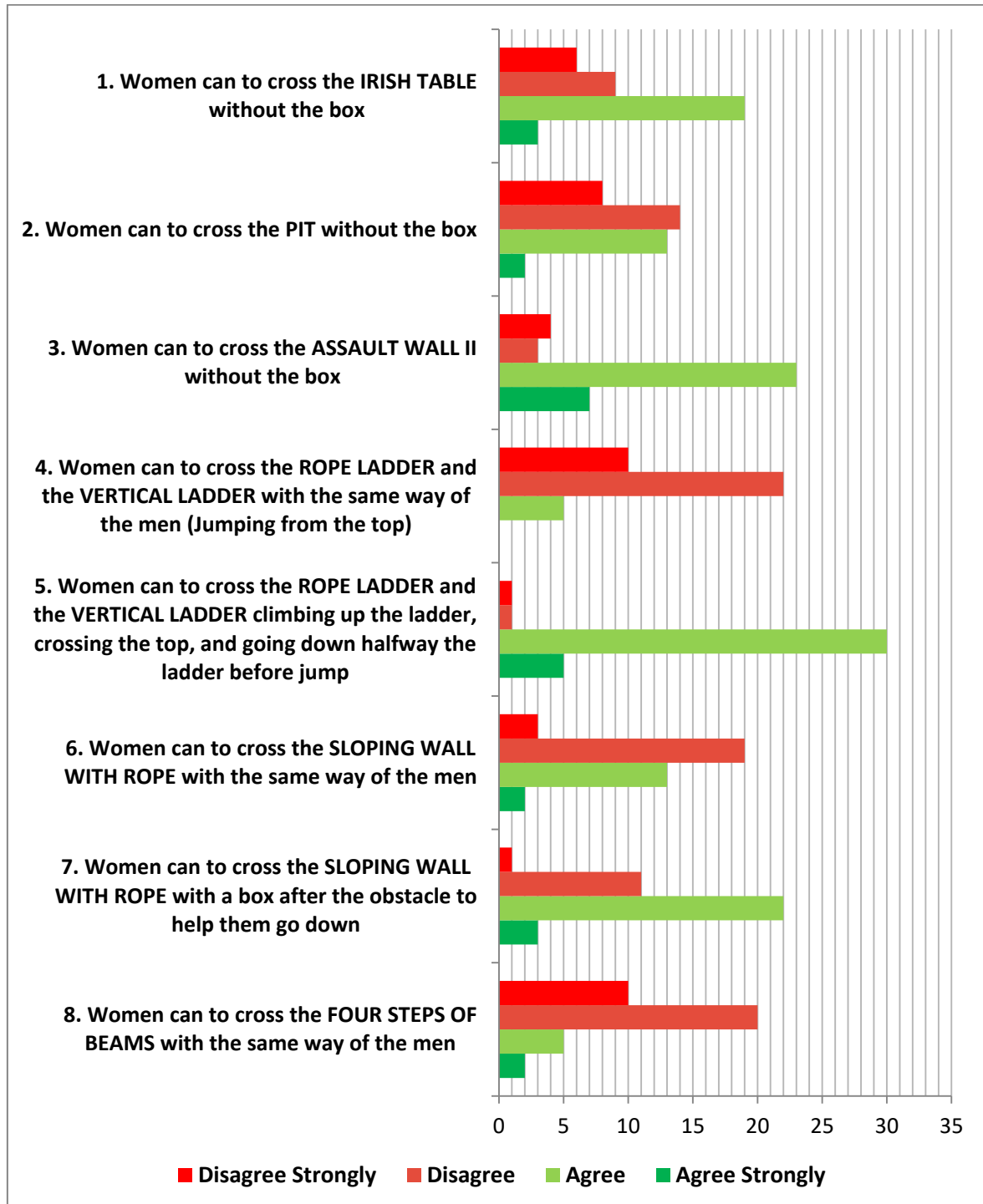


Figure 2. Interview with Female Athletes and Coaches (N=37) in 64th Military Pentathlon World Championship - Salinas, Ecuador, 2017

Table 2. Chi-square values between the positive (Agree Strongly and Agree) and negative (Disagree Strongly and Disagree) answers for each question of the interview with Female Athletes and Coaches,.

Questions	1	2	3	4	5	6	7	8
χ^2	1.32	1.32	14.3	19.7	29.43	1.32	4.57	14.3
p value	0.250	0.250	<0.001	<0.001	<0.001	0.250	0.033	<0.001

Based on Interviews, the statistical analysis suggests that there aren't a consensus among female athletes regarding to obstacles Irish Table, Pit and Sloping Wall with Rope, but regarding the others questions, there is statistical significance that:

- Female athlete and coaches think that they can do the Assault Wall without the box (Question 3);
- Female athlete and coaches think that they can't do the Rope Ladder and the Vertical Ladder with the same way of the men, Jumping from the top (Question 4);
- Female athlete and coaches think that they can do Rope Ladder and the Vertical Ladder climbing up the ladder, making the flag, and going down halfway the ladder before jumping (Question 5);
- Female athlete and coaches think that they can't do the Four Steps of Beams with the same way of the men (Question 8);

The results regarding to the evaluation of the impact in the final time of the obstacle run of who jumped from the top of the ladders or did not jump is presented in the Figure 3. In this analysis were included male athletes between 20 and 35 years-old.

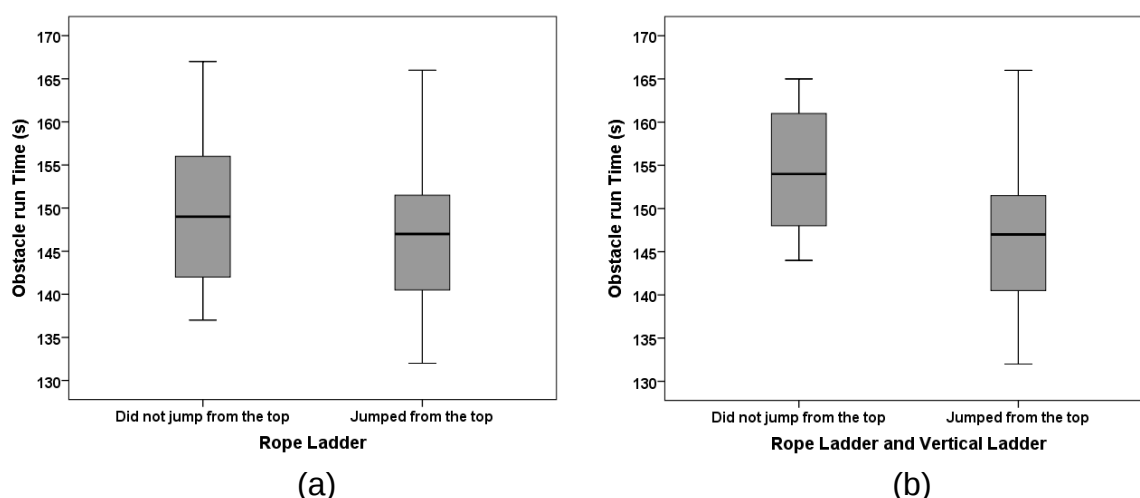


Figure 3. Boxplot to Obstacle run Time of who jumped from the top of the Rope Ladder or did not it (a), and who jumped from the top of the Rope and Vertical Ladder or did not it (b), male military pentathlon athletes, 2017.



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The Table 3 presents the comparison of the age and Obstacle run Time of who jumped from the top of the one or both ladders or did not it.

Table 3. Comparison of the age and Obstacle run Time of who jumped from the top of the one or both ladders or did not it, male military pentathlon athletes, 2017.

Variable	Rope Ladder and Vertical Ladder	N	Average	Std. Deviation	p value
Age	Did not	7	31.14	3.338	0.003
	Did	68	27.16	3.263	
	Did not	7	154.43	8.264	0.009
	Did	68	146.32	7.581	
Obstacle Run Time (s)					
Variable	Rope Ladder	N	Average	Std. Deviation	p value
Age	Did not	17	29.94	3.030	0.002
	Did	68	27.16	3.263	
Obstacle Run Time (s)	Did not	17	149.88	9.286	0.102
	Did	68	146.32	7.581	

The results presented in Figure 3 and Table 3 suggests that there is no difference in the final time of who jumped from the top of the Rope Ladder or did not it. However, there is a significant difference in the final Obstacle run Time of who jumped from the top and who did not jump from the top of both ladders. In addition, there is a significant difference in the age of these groups, i.e., the athletes who did not one or both ladders are older than who jumped from the top of both ladders.

DISCUSSION

This study aimed to discuss the gender difference in Military Pentathlon comparing variables such as: the power of the limbs and the perception from the female athletes regarding their possibilities to do obstacles which they don't do according to the rules 2017. The results show that the power of the lower limbs from males ($0.52 \pm 0.17\text{m}$) was statistically higher than females ($0.44 \pm 0.10\text{m}$). Regarding to the power of the lower limbs, these results is in agreement with the power observed by Laffaye, Wagner, and Tombleson (2014) which studied elite athletes of a range of sports, including volleyball, basketball, baseball, football and others, finding results of $0.58 \pm 0.07\text{m}$ for males and $0.43 \pm 0.06\text{m}$ for female.

In the same direction, the result of the power of the upper limbs from males ($0.46 \pm 0.08\text{m}$) also was statistically higher than females ($0.25 \pm 0.06\text{m}$). This result agree with those found by Weber, Chia, and Inbar (2006) who studied the gender differences in anaerobic power of the arms using the Wingate Anaerobic Test – Arm and found a peak power of 743 ± 37 Watts for males and 336 ± 18 Watts for female.

These results of power of the limbs and the results of the interviews reinforce the non-inclusion of the Sloping Wall with Rope and the Four Steps of Beams in the female obstacle run. On the other hands, despite the difference in



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results of the power of the limbs between gender, based on Interviews, female athlete and coaches think that they can do the Assault Wall without the box and that they can do Rope Ladder and the Vertical Ladder climbing up the ladder, crossing the top, and going down halfway the ladder before jump. These adjustments could make the female obstacle run more similar than the male obstacle run.

In addition, as a practical application for the coaches, the Figure 3a shows that there isn't difference in the final performance between who jumped from the top and who did not jump from the top of the first ladder. The group of who chose not jump from the top of the ladders have higher age than who jumped from the top. The option in not jump from the top of the ladders maybe can "save legs" to the rest of the course and compensate this time lost in this option.

On the other hands, the fact of not jump from the top of the vertical ladder suggests a fatigue and the lack of capability to have a safety landing. Regarding to gender difference for fatigue, Senefeld, Yoon, Bement, and Hunter (2013) evaluated 35 adults (16 men and 19 women) during the dynamic fatiguing task. They reported that the EMG activity decreased for men and women similarly for the knee extensors ($p=0.10$) and elbow flexors ($p=0.23$). Rating of perceived exertion, blood pressure, and heart rate increased similarly for the genders ($p>0.05$). It means that if women came to do the ladders, they will be in similar physiological conditions compared with the men.

CONCLUSION

This research produced important information regarding power of the limbs of male and female military pentathlon athletes which can be used by the Sport Committee to the review process of the rules. In addition, these data can be used by coaches to know the profile needed to be an elite athlete.

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