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Analysis the Kinematic and Muscular Activities in Arm Wrestling

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Abstract – The objective of this study was to facilitate a concrete review of the kinematic characteristics & muscular activities performed in arm wrestling. In this analysis, 12 healthy male volunteers were recruited. Pectoralis major (PMJ) displayed slightly greater muscle activation in winning condition than in losing position (p=.039), had a substantial effect on the arm wrestling result (p<.01), but did not effect on the other three muscles. The flexixor carpi ulnaris (FCU) of the winners displayed higher muscle activation than the losers. Our research found that PMJ was an essential muscle in arm wrestling, & FCU may play a crucial role in arm wrestling in order to obtain an advantageous place.

Key Words – Wrestling, Kinematic, Muscular Activities, Physiological

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INTRODUCTION

Wrestling is among the oldest combat sports practises that date back to 708 BC in the ancient Greek Olympic Games (6, 35, 80). Nowadays, Greco-Roman type & freestyle are the two internationally accepted styles of professional wrestling (19). Greco-Roman wrestlers are only allowed to strike & utilize their upper body & are therefore prevented from keeping under the knee, although in freestyle they are allowed to utilize their entire body during action (19). The main goal of each wrestler is to physically overpower the opponent & gain direct physical influence over the opponent. Wrestlers perform in a demanding setting requiring repeated cycles of high-intensity behaviour (e.g. assaults and counterattacks) alternated with sub-maximum work with low-intensity operation and/or delay (28, 78). The physiological specifications of Wrestler are complex , requiring athletes to have highly defined capacities of full weight, control, muscle capacity, maximum aerobic efficiency & anaerobic capability (28, 78). The brief fast bursts of the full strength movements throughout the match are maintained by the anaerobic system, while the aerobic mechanism controls the wrestler's capacity to sustain effort over the length of the match and accelerates the healing phase throughout and throughout successive matches (9, 36). The United World Wrestling (UWW) is a multinational governing body for the sport of wrestling. Formerly recognised as the Multinational Association of Related Grappling Forms or in French as the Fédération Internationale des Luttes Associées (FILA). It manages the Olympics' wrestling. It presides over foreign tournaments for diverse styles of wrestling, include Greco-Roman wrestling & freestyle wrestling for men & women.

LITERATURE REVIEW

Samuel David et. al. (2018) The study of psychological causes and their connexion to accidents in wrestlers is a recent area of science. Specifically, this research reflects on the participation of athletes and their relationship with injuries. We define other causes, such as preparation loads, overall amount of accidents, topography, & other symptoms. Thirty-five wrestlers of varying ages and competition standards react to the Athlete Participation Questionnaire and Population Study. The findings show that there is little correlation between the cumulative participation of the wrestlers & total amount of casualties. Even so, the cumulative amount of incidents is correlated with complications arising from damage, like physical & psychological. We also have advice on the development & promotion of healthier wrestling activity.

The University of Mary Wrestling Anaerobic Output Test (UMWAPT) procedure simulates the specifications of a complete wrestling match. The aim of the analysis was to evaluate and equate the mechanical effects of WANT and UMWAPT. Fifteen wrestlers underwent all treatments at random. Mechanical performance (W) and fatigue index (percent) were measured and correlated within protocols and within the UMWAPT. Peak power associations between protocols were poor to moderate and poor to high in the UMWAPT test. Mean power associations between protocols were poor and poor to high in the UMWAPT test. Anaerobic ability connexions between protocols were poor and moderate to high in the UMWAPT test. Fatigue index associations between protocols were poor and mild to moderate in the UMWAPT examination. Both participants stated that the

UMWAPT was a very realistic approximation of their most difficult wrestling match. In conclusion, the UMWAPT appears to be a really effective procedure to simulate the most difficult match of the wrestler. The UMWAPT encouraged the wrestlers to use their own strategy, contributing to better mechanical outputs, hence it seems like this study offers the hope that a wrestling-specific all-out success protocol like the UMWAPT may be used rather than a non-specific protocol including the WANT.

Paulo Martins et. al. (2018) This research investigates the interaction between motivating laws in the spectrum of self-determination and healing mechanisms in wrestlers. Such awareness will enable coaches to build and sustain a supportive environment, both in preparation and competition, making for improved outcomes and success. Findings suggest that both intrinsic & extrinsic motivations are linked to the mechanism of healing of the athlete, in specific personal & social characteristics. For eg, the innate motivation & correlation with personal & social well-being is r = .60, p = .05, and the transitional extrinsic motivation & professional approval is r = .66, p = .05. In this research, it is possible to further grasp the emotional habits of the wrestlers and their interaction with the recovery method, which helps coaches to better control the emotions of athletic adherence & belonging generated within the squad in terms of their contribution to the recovery process.

Ozkan Isik et. al. (2018) United World Wrestling (UWW) modified the laws of the Wrestling Sport prior to the 2016 Olympic Games. The goal of this analysis was to create a wrestling competition format focused on the new UWW competition rules for all age levels and types. 300 wrestling matches were witnessed and examined separately. We then defined the flaws, confusions and faults in the type and took a collective judgement on the variables. Finally, we have got an updated type. This type allows access to the new wrestling laws, which would make it simpler for analysts focusing on performance study wrestling, as well as allowing coaches and trainers to document their wrestlers' matches in tournaments and their rivals. As a consequence, wrestlers will use this method to determine where, where and how they applied the technique; on which side they applied the technique; so how many points they got. In addition, the method can allow them to receive definitive outcomes. So, the characteristics of the wrestlers can be registered in compliance with the current competition laws.

Daichi Yamashita et. al. (2018) The purpose of this research was to explain the physiological abilities of foreign male wrestlers relative to those of college wrestlers. Twenty Japanese men's freestyle wrestlers in the lightweight classes were divided into two categories. The first party consisted of 11 foreign warriors. The second category composed of 9 collegiate-level wrestlers. The structure of the body was measured by a multifrequency bioimpedance analysis unit. Isokinetic concentric knee and hip extension and flexion torque were calculated using an isokinetic dynamometer of 180 and 60 deg / sec. Anthropometric data was collected by a three-dimensional analysis. Eleven circumferences (neck, upper arms, forearms, calves, lower legs, chest and hip) and four lengths (both arms and legs) were measured. Easy answer time was measured utilising an automated method. Intergroup analyses of these variables were done for unpaired t or Welch checks. There were no variations in body shape, circumference, and duration of limb within groups other than the circumference of the breast ($p < .05$). There were no variations in hip and knee strength and basic response time between classes. These findings indicate that chest circumference is necessary in order to become an international wrestler. Additionally, other factors, such as multi-engine and technological expertise, could be of interest to foreign wrestlers.

Hewett et. al. (2005) The aim of this chapter is to objectively examine current reports on the epidemiology of paediatric wrestling accidents and to address recommendations for avoidance of injury and further study. Reports sources: Data has gathered from sports medicine and scientific literature since 1951. Literature queries were done using the National Library of Medicine, Pubmed, Medline, Thankful Med, Athletic Sciences, Sports Discus. The terms used include 'Wrestling, Wrestling, Wrestling, Injury and Dermatological Disorders.' Key Results: Only eight prospective or retrospective trials have been reported for paediatric wrestling accidents which given adequate details to enable estimates of injury rates. Exposure-based accident incidence ranged from 6.0 to 7.6 incidents per 1,000 sporting exposures. Injury rates have risen with age, expertise and degree of activity. The head / spine / trunk was the body area with the largest rate of accidents, accompanied by the upper and lower extremities. Conclusions: There are many important avenues for reduced risk of injury in wrestlers, including tools, instruction, officiating and preparation. However, educated judgments on the prevention of accidents rely on the accuracy of the relevant epidemiological evidence available and, at this point, risk factors analyses and possible protective steps are missing.

Barbara J. (2004) In this essay , the author suggests that we need to conceptualise gender as a social framework, by doing so, we could better examine how gender is rooted in the human, collaborative and institutional aspects of our culture. The conceptualization of gender as a framework positions gender at the same degree of general social importance as economics and politics. The author further suggests that whilst the significance of intersectionality must remain central, various systems of oppression have different constructions & therefore different prominent explanatory processes at a certain given historical moment. We ought to follow both a plan to recognise the gender framework, race framework and other mechanisms of oppression as they actually function, while simultaneously

consistently paying attention to how these poles of dominance converge. Finally , the author recommends that we pay greater attention to study and writing philosophy, with explicit exposure to how our studies might potentially help improve as well as educate society.

Messner et. al. (2003) This analysis of broadcast sports reporting on three network affiliates & ESPN's Sports Center develops and builds on earlier research in 1990 & 1994 to analyse the consistency and quantity of television coverage of women's sports. The prevailing trend across the decade spanned by the three surveys is the absence of progress. Women's sports are still "missing in action" on the news of the night and are even less visible at the Sports Center. Textual research showed some improvement throughout the decade, but mainly reflected persistent gender asymmetries in broadcast sports news & highlights: (a) the option to commit a substantial proportion of the already-thin coverage of women's athletics to satirical focus articles regarding non-serious women's sports, and (b) the (often satirical) casual objectification of athlete & non-athlete people. The writers end with a review of how and why television tended to pursue the rise of girls' & women's sport with suspicion rather than guiding or encouraging it.

Galster et. al. (2001) Urban sprawl literature confuses factors, effects and circumstances. This essay provides a statistical description of sprawl centred on eight distinct dimensions of land use patterns: width, consistency, fragmentation, clustering, centrality, nuclear urban form, & proximity. Sprawl is described as a state of land use expressed by low values in one or more of these dimensions. Each dimension is operationally specified and evaluated in 13 urban areas. Results for six dimensions are recorded for each region and an initial comparison of the period in 13 areas is given. The test supports the importance of the method and indicates that a better philosophical & organisational description will promote research into the causes and implications of the outbreak.

Horswill et. al. (1992) The's physiological profile of the effective wrestler is one with a strong anaerobic strength (mean range of 6.1 to 7.5 W / kg for weapons; mean range of 11.5 to 19.9 W / kg for legs); strong anaerobic ability (range of weapons 4.8 to 5.2 W / kg; range of legs 7.4 to 8.2 W / kg); good muscle endurance; normal to above normal aerobic intensity (range 52 to 63 ml / kg / min); decent pulmonary strength. Training techniques involve grappling and non-wrestling exercises that enhance weight and strength (i.e. resistance exercise) and boost physical health (i.e. aerobic exercise). Unfortunately, details on the independent impact of wrestling on health and the form of training regimen best successful for wrestling performance are sparse. The practise of weight reduction is widely used among wrestlers to increase results. Rapid weight loss has significant detrimental effects on wrestler physiology but has no impact on power or anaerobic performance as tested in the laboratory. On the other side, muscle flexibility tends to be compromised by accelerated weight loss. Present research on weight reduction and success in wrestlers has followed two directions: (a) for medical therapies to avoid suboptimal muscular endurance; and (b) for the creation of systems to predict the minimum weight based on body structure strategies and therefore eliminate weight loss.

METHODS:

12 healthy male participants (age: 22.6 ± 1.98 years of age; height: 177.3 ± 4.85 cm; weight: 71.2 ± 5.81 kg) who have undergone no limb operation or limb damage in the last six months have been recruited for this research. None of the patients had neuromuscular conditions linked to the device. Participants were divided into pairs that were identical in body weight, and anthropometric details for the dominant upper limb were given in Table 1. Winning or losing a match was decided by the WAF (World Arm Wrestling Sport Federation) rules. The raw EMG signals were digitised at 1000 Hz by the EMG method (MA300-16, Motion Analysis Company, USA) with a surface electrode to monitor the behaviour of pectoralis major (PMJ), latissmus dorsi (LSD), infraspinators (IFS) & flexor carpi ulnaris (FCU) and a comparison of the muscle activity between winners and losers was required. On the identified muscles, two powerful inner shoulder rotators, PMJ and LSD, were used to gain arm wrestling. The wrist flexor regulated the rotation of the forearm. Hand was the only section connected to the competitor and transmitted the force created by the trunk, upper arm and forearm muscles to the competitor. The Eagle motion framework (Motion Analysis Corp., Santa Rosa, CA, USA), such as the host computer system & eight digital cameras (Eagle CCD cameras) & camera hubs (Eagle Hub) at a sampling rate of 100 Hz, was used to monitor the kinematics during the race track. A effective trial (from the preparatory position to the winning position, which ended the match in 30 seconds) was obtained for data review. A grappling arm in relation to WAF was used. The Bandpass philtre (5 to 300Hz) was used for filtering, and the root mean square (RMS) value was used to reflect the results. The activity level and the statistic used the mean RMS value for every 0.5 s throughout the game to equate winning & losing places in four muscles. MATLAB was used to figure out how to adjust joint angles by Newton's Euler equations. In this analysis, an experimental t-test was utilized to evaluate the relative activation of four distinct EMG muscles between the winner and loser & relative variations in EMG muscle activation between the winning & losing positions were contrasted. Regression analysis was utilized to see whether any of the muscles might affect the result or

location. .Statistic significance amount was set as α= 0,05.

Table 1 Anthropometry of the dominant upper extremity

	Winner/winning position	Loser/losing position	*p*-value
Length			
Upper arm	32.6±1.14	33.2±2.17	0.357
Forearm	28±0.35	28.3±1.86	0.082
Hand	19.2±0.91	19.3±1.3	0.463
Circumference			
Chest	89.4±5.87	88.5±4.58	0.736
Upper arm	28.6±2.13	28.3±1.35	0.621
Forearm	22.5±1.32	22.8±1.35	0.936

RESULTS:

Accessible results were reported in only four of the six established wining classes. The muscular function ratio was averaged by the Overall Manual Muscle Power Measure (MMT). Only PMJ displayed slightly higher muscle activation in winning / winning condition than in losing / losing condition (p=.039). Winning position FCU displayed higher muscle activation than losing position. Figure 1 displayed a contrast of four muscle activity levels in winning and losing places, & mean RMS value for every 0.5 s was utilized throughout the game.

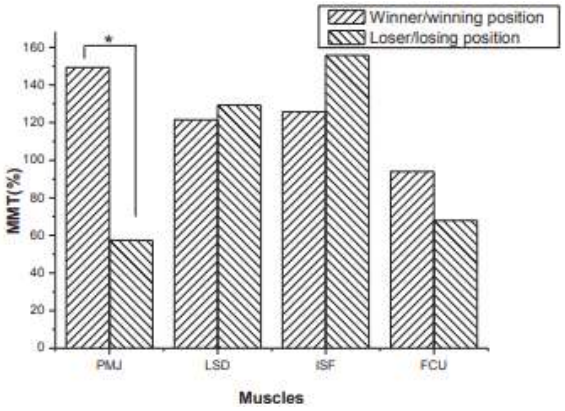

Figure 1: Comparing winning & losing positions throughout arm wrestling (* p<.05)

Regression analyses found that PMJ had a substantial effect on the arm wrestling result (p<.01) but no major influence on the other three muscles. There were no major variations in both roles in the upper arm, wrist, side, face, upper arm & wrist of the participants. The joint elbow movement displayed flexion during the first half of the match and extension later in the winner; extension first& flexion later in the loser; the winners had more wrist flexion (about 15 degrees) than the losers. The total range of motion was 18 degrees in winner (highest at 43 degrees) &26 degrees in loser (maximum at 45 degrees).

DISCUSSION:

Arm wrestling experiments have not been comprehensive and prior research have mainly concentrated on fracturing (Khashaba, 2000; Ogawa 1997; Parker, 2008; Torchia, 1998; Whitaker, 1977). It is also impossible to equate this analysis with others. Both winning places (149 MMT per cent) displayed higher muscle activity than losing place (57 MMT per cent) in the PMJ. In addition , the major impact of PMJ on arm wrestling match suggested that PMJ was an effective muscle in arm wrestling. In our analysis, PMJ 's operation was higher in the winning position than in the losing position. It may be attributed to a strong attempt to gain the PMJ spot. Winners' elbow flexed, when the trunk was stuck to the table in the first half of the play. This may be clarified by the assumption that elbow flexion & closeness between the trunk and the table were critical elements to achieve benefit in the arm wrestling match. On the opposite, the losers missed the advantaged position and found it impossible to use power. The contestant had to press the rival, so the winner had to force the back of the loser 's hand to the elbow extension pad as the loser was bent. Winners pushed their chest to the wall, and elbow flexion could be a reasonable way to contract PMJ. PMJ was also more involved in the winners than in the losers. The same state was not identified with a internal LSD rotator. The location of the trunk can influence the duration of the muscle & function of the LSD. Participants will utilize a separate trunk location to aid in the development of force. There was no rule for them to occupy the trunk role. It happened in the IFS muscle as well. It was not obvious how the winning & losing roles influenced the muscle movement throughout the game.

CONCLUSION

The physiological demands of Wrestler are complex, necessitate athletes to has highly defined capacities of full weight, control, muscle stamina, optimal aerobic power & anaerobic capability. Wrestling is a common physical activity in which the power of the player is practised and the capability of the condition is assessed. While it is an individual event, an enormous connexion is formed with the participants of the squad much as every other event. Our review concluded that PMJ was the most valuable muscle in arm wrestling, & FCU could be an effective activity in arm wrestling match to achieve advantageous role. Winners with elbow flexion in the first half of the match can take advantage of the role.

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