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A STUDY OF BODY COMPOSITION AND MOTOR FITNESS IN COMBATIVE AND NON-COMBATIVE SPORTS

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INTRODUCTION

In the realm of sports, attaining optimal performance stands as the ultimate objective for both athletes and coaches. To unlock an athlete's complete potential, comprehending the intricate interplay between body composition and motor fitness holds paramount importance. Body composition denotes the relative ratios of fat, muscle, bone, and other constituents that form an individual's physique (Baker, 1999). Conversely, motor fitness encompasses the physical attributes and proficiencies essential for effectively executing sport-specific movements, encompassing attributes like strength, power, speed, agility, endurance, and coordination. The combined impact of body composition and motor fitness on sports performance has captured substantial attention in the domain of sports science and has evolved into a pivotal realm of investigation (Roemmich and Sinning, 2017).

In both competitive and non-competitive sports, the interplay of body composition and motor fitness holds pivotal significance in influencing athletes' performance. The composition of an athlete's body, encompassing factors such as muscle mass distribution, fat accumulation, and bone strength, holds the potential to profoundly affect their aptitude for achieving excellence in their selected sport (Buford et al., 2007).

In sports that do not involve direct combat, such as gymnastics, badminton, track and field, swimming, and tennis, the roles of body composition and motor fitness remain equally vital (Sedeuad et al., 2014). While these sports may not entail direct physical confrontations, they heavily rely on an athlete's capacity to execute precise movements, generate substantial power, and sustain enduring levels of stamina. The pursuit of an ideal body composition in sports is underpinned by the recognition that diverse athletic disciplines necessitate unique physical attributes. To illustrate, combative sports like boxing or wrestling demand athletes to possess elevated levels of strength, power, and agility, enabling them to overpower adversaries and promptly respond to dynamic scenarios (Bandopadhyay, 2019).

The composition of the body significantly influences an individual's physical fitness level and overall performance. In activities that involve supporting one's body weight over a distance, a higher proportion of active tissues (muscle) and a smaller proportion of inactive tissues (fat) can offer distinct advantages. Extensive research has delved into the realm of body composition, particularly with a focus on athletes. When studying athletes, a pivotal aspect of consideration revolves around the quantity of body fat and skinfold measurements at specific sites. Notably, athletes with a leaner physique or a lower percentage of body fat, yet a higher weight due to well-developed muscles, often display enhanced prowess in select competitive sports. For instance, in disciplines such as long-distance swimming, water polo, and synchronized swimming, a moderate level of adipose tissue can contribute positively to performance by furnishing additional buoyancy (Carter & Yuhasz, 1984) and insulation, thereby mitigating heat loss.

Motor fitness stands as the supreme standard by which all other dimensions of physical fitness or overall fitness in individuals are assessed and gauged (Brock and Pennock, 1941). Performance forms the bedrock for evaluating motor fitness, and this performance is subject to the influence of several contributing factors. Notably cited fitness elements encompass strength, endurance, power, speed, agility, balance, and flexibility. While these factors collectively contribute to motor fitness, certain factors might exert a more pronounced influence and establish a more robust correlation compared to others (Barrow and Rosemary, 1979).

MATERIAL AND METHOD

Subjects

The current study enlists participants categorized into two groups: Combative and Non-Combative sports. Within each category, a quartet of sports, games, or events is chosen. Under the combative sports umbrella, the selections encompass Wrestling, Boxing, Judo, and Wushu. Meanwhile, within the non-combative sports category, the chosen disciplines are Track (including sprinters specializing in the 100m, 200m, and 400m races), Field (encompassing jumpers, both long jumpers and high jumpers), Badminton, and Gymnastics. Employing a purposive approach, a sample of 30 subjects will be deliberately chosen from each individual sport or event. The cumulative count of subjects reaches 120 for each of the two primary categories—combative sports, non-combative sports—and team sports, culminating in an overall sample size of 240.

Variables

The central objective of this study was the thorough investigation of two key variables: Body Composition and Motor Fitness. The exploration of Body Composition encompassed the examination of elements such as percentage of body fat, fat weight, lean body mass, and body density. On the flip side, Motor Fitness was comprehensively evaluated through an array of components, including speed, explosive strength, agility, endurance, flexibility, balance, and abdominal strength. Through a meticulous analysis of the interplay between these variables and their consequential influence on athletic performance, the study aimed to uncover valuable

insights into the intricate relationship linking physical attributes and motor capabilities among athletes engaged in both combative and non-combative sports.

RESULTS

Table- 1. t-test between body composition variables of combative and non-combative sports

variable	group	N	Mean	S.D	mean difference	Df	t value	p value
Percent Fat	Non-Combative	120	15.28	2.57185	-0.454	238	1.5	0.135
	Combative	120	15.73	2.09362				
Fat Weight	Non-Combative	120	10	2.57436	0.543	238	1.85	0.066
	Combative	120	9.46	1.93562				
Lean Body Mass	Non-Combative	120	54.7	5.44682	4.473	238	7.78	<0.001
	Combative	120	50.22	3.16748				
Body Density	Non-Combative	120	1.06	0.00571	9.55E-04	238	1.47	0.143
	Combative	120	1.06	0.00473				

The above table shows the difference between means of body composition measurements of combative and non-combative sports and the results revealed there is a significant difference in lean body mass of combative and non-combative sports.

Table 2. t-test between motor fitness components of combative and non-combative sports.

Variables	group	N	mean	sd	mean difference	df	t value	p value
Speed	Non-Combative	120	7.45	0.556	-0.8346	238	10.56	<0.001
	Combative	120	8.29	0.663				
Explosive Strength	Non-Combative	120	2.34	0.345	0.4359	238	10.59	<0.001
	Combative	120	1.9	0.29				
Agility	Non-Combative	120	9	0.47	-1.251	238	16.29	<0.001
	Combative	120	10.25	0.697				
Endurance	Non-Combative	120	2195.5	209.897	51.9167	238	1.87	0.062
	Combative	120	2143.58	219.376				
Balance	Non-Combative	120	6.39	2.275	0.0559	238	0.178	0.859
	Combative	120	6.34	2.58				
Flexibility	Non-Combative	120	3.79	2.825	1.765	238	4.93	<0.001
	Combative	120	2.02	2.71				

Abdominal Strength	Non-Combative	120	33.38	6.31	-0.3917	238	0.475	0.635
	Combative	120	33.77	6.451				

The above table compare the means of combative and non-combative sports in regard to motor-fitness components. The results shows that there is a significant difference between speed, explosive strength, agility and flexibility.

DISCUSSION

By applying the t test, the study aims to determine if there are significant differences in the mean scores of the variables between the two groups of athletes. The two groups being compared are male athletes involved in combative sports (such as boxing, wrestling, or judo) and male athletes engaged in non-combative sports (such as track and field, gymnastics, or badminton).

The results, thus, obtained are discussed with interpretation from similar results on relative studies. The present study found out a significant difference among the body composition variables of non-combative sports. Each of the four sub variables of body composition show a significant difference among sprinters, jumpers, gymnasts and shuttlers.

Yadav (2015) conducted a study that studied the four body composition variables, which are also a part of the present study. While examining body composition variables such as percentage of fat, total body fat, and lean body mass and body density, a significant difference was observed among 100m, 200m, and 400m sprinters and the results are in line with the present study. On the other hand, Duggal (2015) reported contrasting results, showing that body composition variables did not show any significant difference at a one percent level. These findings differ from the present study, suggesting the existence of variations in the relationship between body composition and performance among different research studies.

Similar results were observed by Perroni, F., Vetrano, M., Camolese, G., Guidetti, L., & Baldari, C. (2010) that shows there have been a significant difference in various body composition variables among gymnasts of different events. In a similar study Utter, A. C. et al., (2003) observed the body composition variable of young male and female gymnasts and the results revealed there has been a significant difference in the body composition of the gymnasts at one percent significant level which are in absolute harmony with the results of the present study.

In regard to motor fitness, the current study found a significant difference in all the components of motor fitness like speed, explosive strength, agility, balance, endurance and abdominal strength in non-combative sports.

A similar study was conducted by Kaur, L. (2019) in regard to motor fitness of sprinters and jumpers which revealed that there is a significant difference in motor fitness variables among long jumpers, triple jumpers and high jumpers with respect to speed, muscular endurance, agility, dynamic balance and power, however,

insignificant differences with regards to muscular leg strength, muscular back strength, cardiovascular endurance, flexibility and reaction time. The results of the study are partially in line with the present study.

The outcomes of the current study are in line with the findings of Sharma (2015). In his study, it was observed that sprinters exhibited higher speed and reaction time compared to jumpers and throwers. On the other hand, jumpers showed greater agility when compared to sprinters and throwers. These results suggest variations in the physical fitness characteristics among the different athlete groups and are in harmony with the present study.

CONCLUSION

In regard to body composition scores, percentage fat showed highest score in judokas, followed by wushu players and wrestlers and the boxers. The fat weight scores show highest values for judokas followed by wushu players, wrestlers and boxers. The lean body mass of judokas was highest followed by wushu players, wrestlers and boxers.

The motor fitness scores showed the following results. The boxers were fastest followed by wrestlers, wushu players and judokas. The explosive strength of boxers was highest followed by wrestlers and judokas while wushu players had the least scores. Judokas were most agile followed by wrestlers, boxers and wushu players. Boxers showed more endurance than wrestlers followed by judokas and wushu players. The highest balance score was for boxers followed by judokas, wushu players and wrestlers. Boxers were most flexible followed by wushu players, judokas and the wrestlers. The abdominal scores showed boxers to be at number one followed by wrestlers, judokas and wushu players.

The t-test between body composition variables reveal that there was no significant difference in any of the variable except lean body mass. Percent fat, fat weight and body density does not show any significant difference between combative and non-combative sports. However, the lean body mass scores show that there was a significant difference between combative and non-combative sports.

The t-test scores of motor fitness components between combative and non-combative sports show that there was a significant difference between both the categories in selected motor fitness variables, namely speed, explosive strength, agility and flexibility. However, there was no significant difference found in the balance, endurance and abdominal strength between combative and non-combative sports.

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