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A Comparative Exploration Of Psycho Motor Abilities: Reaction Time And Limb Movement Speed In Kalaripayattu And Taekwondo Practitioners

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Abstract

The study sought to explore the psycho-motor abilities of individuals practicing Kalaripayattu and Taekwondo, specifically focusing on practitioners aged 13 to 19 years with a minimum of one and a half years of experience. The study included a total of 250 participants, evenly distributed between the two disciplines, with 125 individuals from each. This sample consisted of 75 males and 50 females. The mean and standard deviation (SD) of the total sample's age were 15.89 ± 2.05 for males and 15.29 ± 1.82 for females. The chosen participants underwent testing for reaction time using Allen's (2002) reaction time test and speed of limb movement through the plate tapping test. Statistical analysis, including mean, standard deviation, and two-way multivariate analysis of variance (MANOVA), was conducted. The SPSS package was utilized for data analysis, with a significance level set at 0.05.The study's findings indicated no significant difference in selected psycho-motor abilities between the two martial arts disciplines. However, a significant difference was observed between genders in terms of reaction time and speed of limb movement.

Key words: Kalaripayattu, Taekwondo, Reaction time, Speed of limb movement

Introduction

Physical Education and Sport are mainly based on motor skills.The term skill denotes a movement that is reasonably complex and the execution of which requires at least a minimal amount of practice. It is essential that an athlete learns about and applies a set of psychological and psychomotor skills for the better performance in sport. Physical action does not happen in the absence of cognitive functions. For every physical action or task there is one or other kind of psychological ramification. It is quite evident that the success of the athlete is determined by his or her emotional conditioning.

The term "psycho" encompasses psychic activity in two dimensions: socio-affective and cognitive. Conversely, "motor" relates to movement. Hence, "psychomotor" denotes the interplay between the psychic activity of the human mind and the body's capability for movement. The process of psychomotor abilities involves the interaction among perceptual systems (or the five senses), the brain (responsible for interpreting perceptual information), and the body (where the individual responds to such perceptual stimuli).

There were no studies done on psychomotor abilities of both the practitioners of Kalaripayattu and Taekwondo. The proposed study will help to understand selected psychomotor abilities like Reaction Time and Limb Movement Speed of Kalaripayattu and Taekwondo practitioners.

Aim:
The present study sought to analyse psychomotor abilities of Kalaripayattu and Taekwondo practitioners on their scores of Reaction Time and Limb movement Speed with respect to Sport and Gender.

Methodology

To achieve the purpose of the study, 250 practitioners in the age group of 13 -19 years, from Kalaripayattu and Taekwondo, having the experience of one and half years and above, were selected as subjects. Each discipline consisted of 125 practitioners inclusive of 75 males and 50 females. The mean and SD of age in case of male and female athletes for the total sample is 15.89 ± 2.05 and 15.29 ± 1.82 years. The selected subjects were tested on reaction time using reaction time test by Allen (2002) and speed of limb movement using plate tapping test. The **s**tatistical technique employed for this study was mean, standard deviation, two-way multi variate analysis of variance – (MANOVA). SPSS package was used for different statistical tools analyzed.

Results and discussions

Table – 1 Descriptive statistics of reaction time and speed of limp movement scores for various sport group practitioners and gender

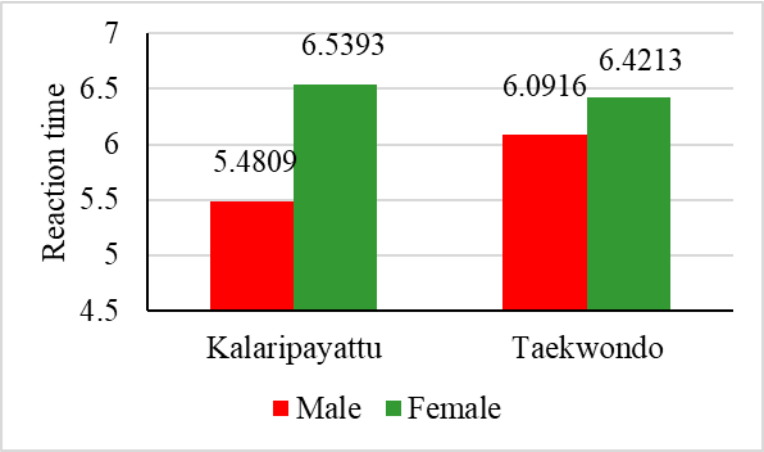
Variable	Gender	Sports	Mean	Std. Dev	N
Reaction time (in ml.sec)	Male	Kalaripayattu	5.4809	1.36601	75
		Taekwondo	6.0916	2.14722	75
	Female	Kalaripayattu	6.5393	2.69227	50
		Taekwondo	6.4213	1.59430	50
Speed of limb movement (in sec)	Male	Kalaripayattu	11.0652	1.78156	75
		Taekwondo	11.2555	1.74936	75
	Female	Kalaripayattu	11.7662	1.95844	50
		Taekwondo	11.9619	1.34628	50

Table-1 indicates the mean scores of reaction time and plate tapping for speed of limb movement for both the female and male practitioners of Kalaripayattu and Taekwondo.

The mean score of reaction time of Kalaripayattu male and female is 5.4809 ± 1.36 and 6.5393 ± 2.69. The mean score of reaction time of Taekwondo male and female is 6.0916 ± 2.14 and 6.4213 ± 1.59.

The mean score of speed of limb movement of Kalaripayattu male is 11.0652 ± 1.78 and female are 11.7662 ± 1.95. The mean score of speed of limb movement of Taekwondo male are 11.2555 ± 1.74 and female are 11.9619 ± 1.34.

The graphical illustration of the mean scores of reaction time for both male and female practitioners of both the groups is presented in figure 1.



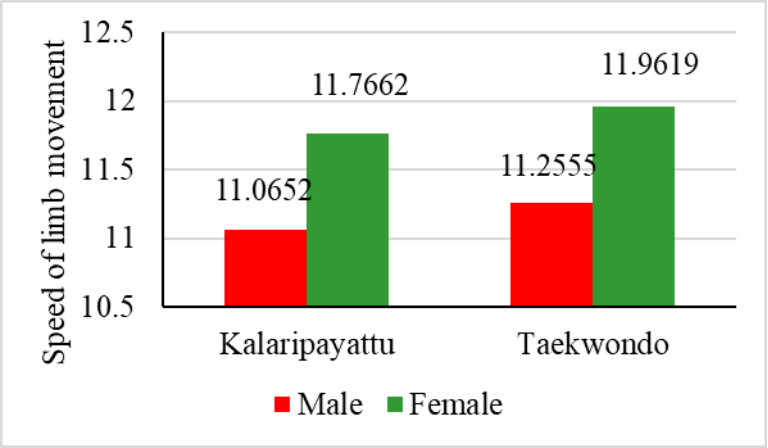


Figure 1. Mean Scores of the reaction Time (in mili Seconds) and speed of limb movement (in sec) for sport practitioners of both gender

To assess the homogeneity of variances and covariances in the MANOVA, the assumption of equality of covariance matrices was examined using Box's test. This statistical test evaluates the null hypothesis that the variance-covariance matrices are consistent across all groups. In the current dataset, the p-value obtained was 0.000, significantly less than the 0.05 threshold. Therefore, it is inferred that the covariance matrices are not equal, indicating a violation of the assumption. Despite this violation, the robustness of Wilks' lambda has effectively compensated for the non-equality of covariance matrices.

Table – 2 Wilks' lambda multivariate out puts of the reaction time and speed of limb movement of various practitioners (Sports and Gender)

Effect	Value	F	df	Error df	Sig.
Intercept	.021	5579.451	2	245.000	.000
Gender	.946	7.002*		245.000	.001
Sports	.994	.678		245.000	.509
Gender * Sports	.991	1.081		245.000	.341

Table 2 represents the Wilks' lambda multivariate analysis out puts for the psychomotor variables of reaction time and plate tapping of both the group of practitioners. Though there are four multivariate tests, the value of Wilks' lambda was considered. The value of wilks lambda was not found to be significant for the main effect of sports (w=0.994, p=0.509) and the interaction effect of gender and sports (w=0.991, p=0.341), therefore no further analysis was done for these two factors. Whereas in the main effect of gender on the dependent variables, the value of wilk's lambda (0.946) was found to be significant and hence further analysis was done. The results are displayed in the following tables. There was no significant difference between the two martial art sports. Significant difference was observed between the gender. Hence, the hypothesis was partially accepted.

Levene's test was employed to assess the equality of error variances among the groups. This test aims to evaluate the null hypothesis, which posits that the error variance of the dependent variable remains consistent across the various groups.

Table 3 Genderwise univariate analysis in reaction time and speed of limb movement of various sport practitioners

Dependent Variable		Sum of Squares	df	Mean Square	F	Sig.
Reaction Time	Contrast	28.907	1	28.907	7.415*	.007
	Error	958.982	246	3.898		
Plate Tapping	Contrast	29.710	1	29.710	9.902*	.002
	Error	738.079	246	3.000		

*Significant at 0.05 level F0.05 (1, 246) = 3.87

Only the main effect of gender was further analysed by the application of one-way analysis of variance and the results are displayed in table 5. The calculated F value of reaction time (F=7.415, p=0.007) and the plate tapping (F=9.902, p=0.002) was found to be significant at 0.05 level of significance. Hence, to know the group differences, a pairwise comparison was done by applying Bonferoni adjustment and the results are displayed in table 6.

Table 4 Pairwise comparisons in reaction time and plate tapping of various sport practitioners

Dependent Variable	(I) Gender	(J) Gender	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference[a]	
						Lower Bound	Upper Bound
Reaction time	Male	Female	-.694*	.255	.007	-1.196	-.192
Speed of limb movement	Male	Female	-.704*	.224	.002	-1.144	-.263

Though from the mean difference, it is very clear that in both the variables, female athletes had higher scores than the male counterparts, it should be concluded that male players were better, because the task was measured in seconds. The lesser the score, better the individual's ability.

An individual's ability is the skills and qualities which make it possible for him or her to achieve a task. These are stable and enduring characteristics which are genetic and can be either completely perceptual, completely motor or a combination (known as psychomotor). Psychomotor skills are based on the relationship between cognitive psychology and physical movement. Such skills are learned and can be observed via physical skills such as movement, coordination, manipulation, skill, style and speed.

When learning psycho motor skills, individuals progress through the cognitive stage, the associative stage and the autonomic stage. At first, the movements are discrete and awkward, but eventually progress to the autonomic stage where the neural structure of the brain has changed and the movement becomes autonomic. Thus, the person can produce a consistent and fast performance consistently.

Kalaripayattu is a traditional martial art of India and Taekwondo is from Korea. But both the practitioners of this art require psychological and psycho-motor abilities. Though there are differences in a few factors but there are similarities too. Identifying potential dynamic fight situations and selecting the best defensive actions are the important psycho motor abilities of taekwondo and kalarippayattu practitioners. The males had better scores than the women.

Conclusion

The study found that male athletes in taekwondo and kalarippayattu exhibited greater reaction time and faster limb movement speed compared to their female counterparts. The significant differences in selected psychomotor abilities, specifically reaction time and speed of limb movement, were observed between genders rather than between the two sports.

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