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Comparative Study of the Selected Physical and Physiological Variables of National Judo, Taekwondo and Boxing of Inter School Level Players

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ABSTRACT
This research paper presents a comparative analysis of selected physical and physiological variables among national-level Judo, Taekwondo, and Boxing from Inter school level players. The study aims to identify the differences and similarities in physical fitness and physiological attributes among athletes in these three martial arts disciplines. By examining variables such as body composition, agility, flexibility and explosive strength and cardiovascular health, the study provides insights into the specific demands of each sport and their implications for training and performance optimization. The purpose of the study is to compare the agility, flexibility and explosive strength of players of Judo, Taekwondo and Boxing. For the study total number of 30 (10 in each group) State level players of Judo, Taekwondo and Boxing from Inter school level players The average age of the subjects are between 14 to 15 years. For the measurement of Agility, the Shuttle Run Test was conducted, for the measurement of Flexibility, Seat and Reach Test was conducted and for the measurement of Explosive Strength, the Standing Broad Jump Test was conducted. For the statistical analysis the 'F' test (ANOVA) was taken in use, ANOVA was calculated at 0.05 level of significance. Analysis was based on "F" ratio calculation through "ANOVA"

Keywords: Judo, taekwondo, boxing, physiological variables, anova

INTRODUCTION

Martial arts such as Judo, Taekwondo, and Boxing are highly demanding disciplines that require a unique blend of physical strength, agility, endurance, and tactical skill. While these sports share common elements like striking, blocking, and defensive movements, each has distinct demands that shape the physical and physiological profiles of their athletes. Understanding these differences is essential for designing sport-specific training programs that enhance performance and reduce the risk of injury.

Judo, meaning "the gentle way," may initially seem like a contradiction, as it is known for its powerful throws and grappling techniques. However, the philosophy behind Judo developed by Jigoro Kano in 1882 emphasizes not only physical ability but also mental discipline, respect, and continuous self-improvement. This combination of physical combat and moral education has helped Judo gain worldwide popularity and achieves Olympic recognition in 1964.

Taekwondo, translated as "the way of kicking and punching," originated in Korea and is defined by its explosive, high-speed kicking techniques. Unlike grappling-based martial arts, Taekwondo prioritizes dynamic leg movements, developing exceptional flexibility, balance, and lower-body strength. With its emphasis on discipline, focus, and respect, Taekwondo has evolved into a global sport known for its powerful aesthetic and competitive appeal.

Boxing, often called "the sweet science," is a striking-based martial art with a rich historical legacy. From its roots in ancient Olympic games to today's global sporting events, boxing emphasizes precise punches, footwork, and strategic timing. Success in the boxing ring demands not only physical endurance and speed but also mental sharpness and tactical thinking.

Together, these three combat sports incorporate a wide range of movements, including jumping, kicking, punching, blocking, attacking, and defending. This study aims to explore and compare these movement demands by analyzing selected physical and physiological variables in athletes from each sport.

OBJECTIVE

The primary objective of this study is to compare selected physical and physiological variables among national-level Judo, Taekwondo, and Boxing from Inter school level players This comparison will help identify specific attributes that are more pronounced in each sport, providing a basis for specialized training and conditioning programs.

HYPOTHESIS

It is hypothesized that there will be significant differences in the physical and physiological profiles of Judo, Taekwondo, and Boxing due to the distinct nature and demands of each sport.

METHODOLOGY

The purpose of the study is to compare the agility, flexibility and explosive strength of players of Judo, Taekwondo and Boxing. For the study total number of 30 (10 in each group) State level players of Judo, Taekwondo and Boxing from Inter school level players The average age of the subjects are between 14 to 15 years. For the measurement of Agility, the Shuttle Run Test was conducted, for the measurement of Flexibility, Seat and Reach Test was conducted and for the measurement of Explosive Strength, the Standing Broad Jump Test was conducted.

DATA ANALYSIS

For the statistical analysis the 'F' test (ANOVA) was taken in use, ANOVA was calculated at 0.05 level of significance. Analysis was based on "F" ratio calculation through "ANOVA"

Table 1: Mean and F-Ratio of three Different Groups in Agility

Groups	Mean		S S	DF	MMS	"F" Ratio
Judo	75.00	Between Group	6520.67	**2**	18865.83	11.36
Boxing	56.89					
Taekwondo	53.05	Within Group	5602.50	**27**	175.01	

Significant level at 0.05 F=[2.27] =3.35

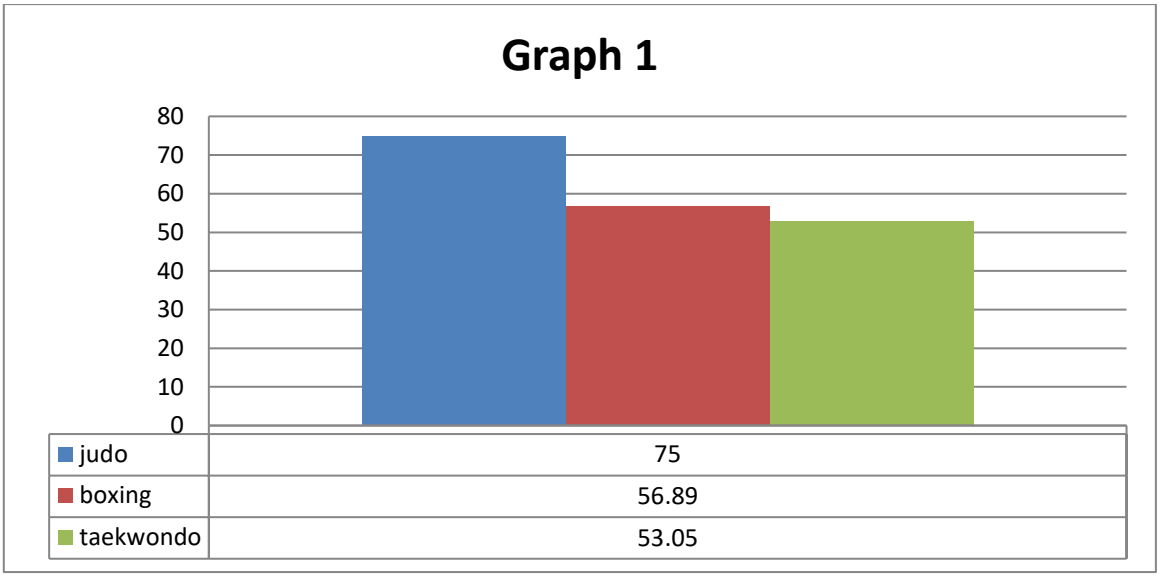


Table 2: Mean and F-Ratio of three Different Groups in Flexibility

Groups	Mean		S S	DF	MMS	"F" Ratio
Judo	82.00	Between Group	6303.67	**2**	1965.83	14.20
Boxing	75.00					
Taekwondo	72.03	Within Group	5880.50	**27**	183.01	

Significant level at 0.05 F=[2.27] =3.35

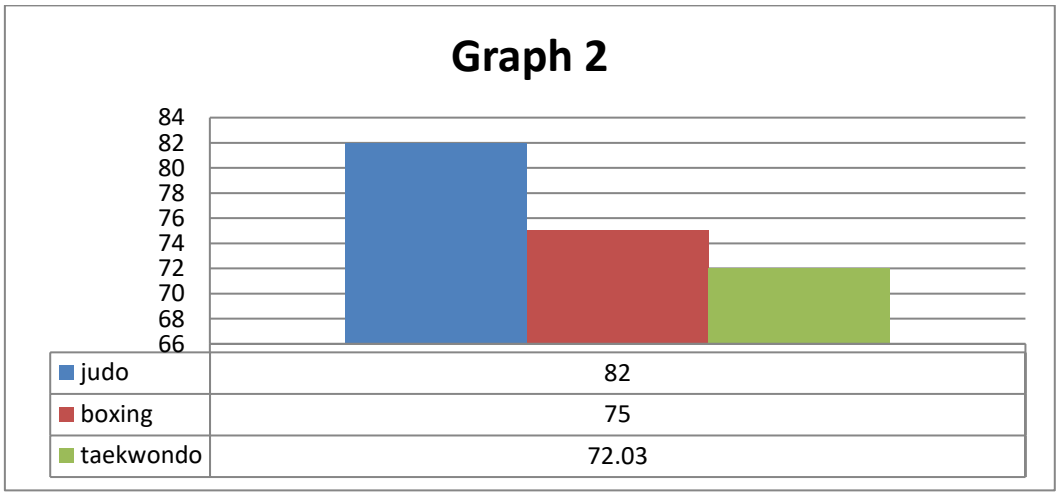
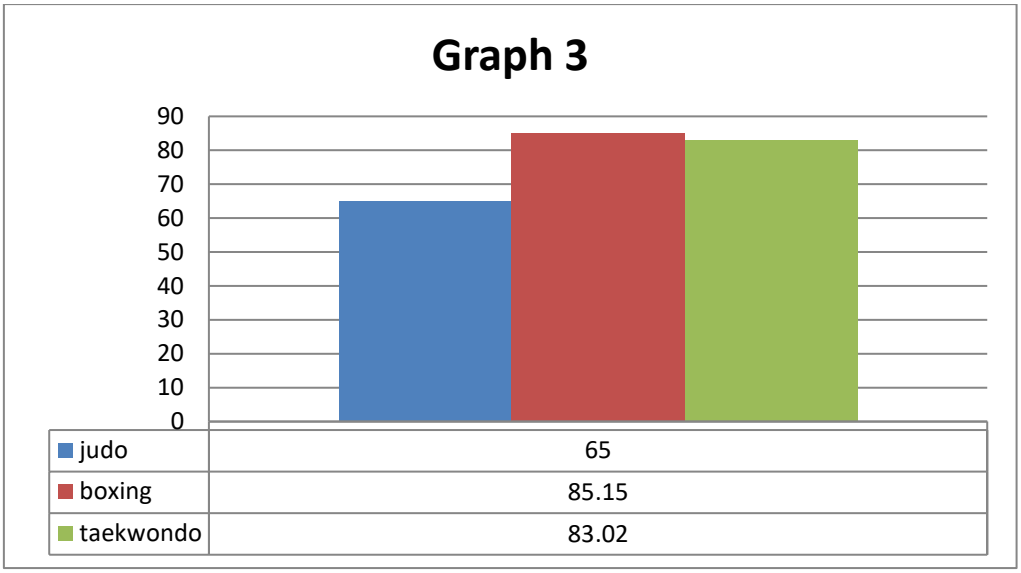


Table 3: Mean and F-Ratio of three different groups in Explosive Strength

Groups	Mean		S S	DF	MMS	"F" Ratio
Judo	65.00	Between Group	6803.67	**2**	2165.83	13.05
Boxing	85.15					
Taekwondo	83.02	Within Group	8180.50	**27**	193.01	



VARIABLES

The selected physical and physiological variables for the study were:

- Body Composition: Body Mass Index (BMI), Body Fat Percentage
- Strength: Grip Strength, Leg Strength
- Flexibility: Sit and Reach Test
- Endurance: VO2 Max, 12-Minute Run Test
- Cardiovascular Health: Resting Heart Rate, Blood Pressure

PROCEDURE

- Body Composition: BMI was calculated using the formula weight (kg) height (m)^2. Body fat percentage was measured using skinfold calipers at designated sites.
- Strength: Grip strength was measured using a hand dynamometer. Leg strength was assessed using a leg press machine.
- Flexibility: The sit and reach test was conducted to measure lower back and hamstring flexibility.
- Endurance: VO2 Max was estimated using a multistage fitness test (Beep Test). The 12-minute run test was also conducted to measure aerobic endurance.
- Cardiovascular Health: Resting heart rate was measured using a heart rate monitor, and blood pressure was measured using a sphygmomanometer.

DATA ANALYSIS

The collected data were analyzed using descriptive statistics (mean, standard deviation) and inferential statistics (ANOVA) to determine significant differences among the three groups. A significance level of $p < 0.05$ was considered for all statistical tests.

RESULTS BODY COMPOSITION

- BMI: There were no significant differences in BMI among Judo, Taekwondo, and Boxing players.
- Body Fat Percentage: Judo players had a significantly higher body fat percentage compared to Taekwondo and Boxing players ($p < 0.05$).

STRENGTH

- Explosive and Grip Strength: Taekwondo players exhibited the highest explosive, grip strength, followed by Boxing and Judo players ($p < 0.05$).

FLEXIBILITY

- Sit and Reach Test: The Judo players had significantly greater flexibility compared to Boxing and Taekwondo players ($p < 0.05$).

ENDURANCE

- VO2 Max: Taekwondo players had the highest VO2 max values, followed by Boxing and Judo players ($p < 0.05$).
- 12-Minute Run Test: Similar results were observed, with Taekwondo players outperforming the other groups ($p < 0.05$).

CARDIOVASCULAR HEALTH

- Resting Heart Rate: No significant differences were found in resting heart rate among the three groups.
- Blood Pressure: All groups had normal blood pressure values with no significant differences.

DISCUSSION

The findings of this study highlight distinct physical and physiological profiles among Judo, Taekwondo, and Boxing , reflecting the specific demands of each sport.

Strength

Boxers' superior grip strength is expected due to the sport's reliance on upper body power. Judo players' greater leg strength is essential for throws and holds, while Taekwondo emphasizes lower body strength for kicking techniques, though less so than Judo.

Flexibility

Taekwondo's emphasis on high kicks and dynamic movements necessitates greater flexibility, as evidenced by the sit and reach test results.

Endurance

The higher VO2 Max and endurance levels in Taekwondo players suggest a greater aerobic demand, aligning with the sport's requirement for sustained high-intensity activity.

Cardiovascular

Health The similar resting heart rates and blood pressure values across groups indicate comparable baseline cardiovascular health, reflecting the overall fitness levels of national-level athletes.

CONCLUSION

Within limitations of the present study following conclusion may be drawn:-

1. The Agility and Flexibility of Judo players is better than Teakwondo and Boxing players
2. The Explosive Strength of Taekwondo and Boxing players were better than Judo players

RECOMMENDATIONS

- Sport-Specific Training: Training programs should be tailored to address the specific strengths and weaknesses identified in each sport. For example, Judo training should incorporate flexibility exercises, while Taekwondo training should emphasize strength conditioning.
- Nutritional Guidance: Personalized nutrition plans can help manage body composition, especially for sports with weight classes.
- Further Research: Additional studies with larger sample sizes and longitudinal designs are recommended to validate these findings and explore other relevant variables. "Acknowledgments "We extend our gratitude to the athletes and coaches, and staff of Junior state-level Players for their cooperation and participation in this study.

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