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Effects Of Oxygen Supplementation On Heart Rate Recovery In National Vs. International Judokas

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ABSTRACT

This study investigates the effects of oxygen supplementation on heart rate recovery in National and International judokas following a Judo bout. A total of 40 judokas (20 National and 20 International) were tested under two recovery conditions: Normal recovery and Oxygen supplementation. Heart rate was recorded immediately after the bout, 3 minutes post-bout, and 5 minutes post-bout. The data were analyzed using Independent Samples t-tests to compare recovery between the two groups. Results indicated that both groups experienced reduced heart rate recovery with oxygen supplementation, but International judokas exhibited a more pronounced reduction. At all time points, National judokas showed higher heart rates than International judokas, suggesting that cardiovascular conditioning influences recovery efficiency. Oxygen supplementation was particularly beneficial for the International group, emphasizing the importance of fitness levels in optimizing recovery strategies. These findings provide insights into individualized recovery protocols, suggesting that oxygen supplementation could be a valuable tool for accelerating recovery, particularly in athletes with higher cardiovascular fitness.

KEYWORDS

Oxygen supplementation, heart rate recovery, judokas, National judokas, International judokas, cardiovascular fitness, recovery strategies, Judo, aerobic metabolism, recovery efficiency.

INTRODUCTION

Judoka athletes experience high cardiovascular strain during and after competitive bouts, making efficient recovery essential for performance. Recovery is the process through which the body restores itself after exertion, and it plays a crucial role in optimizing the physical state of athletes. Among various recovery strategies, oxygen supplementation has been shown to help accelerate the recovery of athletes by

enhancing oxygen delivery to tissues, which in turn speeds up metabolic processes and alleviates the cardiovascular burden (Gonzalez-Alonso, 2012).

Heart rate recovery, a key indicator of the body's ability to return to homeostasis after exercise, is often used to assess the effectiveness of recovery strategies. Faster heart rate recovery is typically associated with better cardiovascular fitness and more efficient recovery mechanisms (Kenney et al., 2012). This study examines the effects of oxygen supplementation on heart rate recovery in National and International judokas, two groups that may differ in cardiovascular conditioning. Specifically, it seeks to compare the heart rate recovery patterns of both groups immediately after the bout and at two subsequent time points (3 minutes and 5 minutes) under both normal recovery and oxygen supplementation conditions.

METHODOLOGY

The participants in this study were 40 judokas, divided equally into two groups: 20 National judokas and 20 International judokas. Both groups were subjected to a Judo bout under two recovery conditions: Normal recovery (no additional intervention) and Oxygen supplementation (providing extra oxygen immediately after the bout). Heart rate was recorded immediately after the bout, 3 minutes post-bout, and 5 minutes post-bout. A Shapiro-Wilk test was first applied to assess the normality of the data. The heart rate recovery data were then analyzed using Independent Samples t-tests to compare the effects of the two recovery conditions on both groups at each time point.

RESULTS

Heart Rate Recovery in National vs. International Judokas

Table 1: Descriptive Statistics for Heart Rate Recovery Data

Recovery Condition	Group	Mean Heart Rate (bpm)	Standard Deviation (bpm)	Standard Error (bpm)
Immediately After Bout	National	177.7	1.95	0.44
	International	170.25	3.19	0.71
	Oxygen	172.7	3.95	0.88
	International	165.6	3.93	0.88
3 Minutes Post-Bout	National	144.1	3.51	0.78
	International	135.55	3.50	0.78
	Oxygen	132.75	3.57	0.80

Recovery Condition	Group	Mean Heart Rate (bpm)	Standard Deviation (bpm)	Standard Error (bpm)
	International	124.2	3.59	0.80
5 Minutes Post-Bout	National	114.35	2.11	0.47
	International	107.9	2.07	0.46
	Oxygen	104.95	1.99	0.44
	International	98.95	1.99	0.44

The heart rate immediately after the bout, measured under Normal recovery conditions, was significantly higher for the National judokas (177.7 bpm) compared to the International judokas (170.25 bpm). This suggests that National judokas experienced a more significant cardiovascular strain during the bout. However, once oxygen supplementation was introduced, both groups exhibited a reduction in heart rate. National judokas had a mean heart rate of 172.7 bpm, while the International judokas' mean heart rate dropped to 165.6 bpm.

This pattern continued at the 3-minute recovery point. National judokas had a mean heart rate of 144.1 bpm under Normal recovery conditions, whereas International judokas showed a slightly lower mean of 135.55 bpm. After oxygen supplementation, the National judokas' heart rate decreased to 132.75 bpm, while the International judokas' mean heart rate dropped to 124.2 bpm, further reinforcing the trend that oxygen supplementation helps both groups, but it is more beneficial for International judokas.

At the 5-minute mark, the heart rate recovery was even more pronounced. National judokas had a mean heart rate of 114.35 bpm under Normal recovery conditions, compared to 107.9 bpm for the International judokas. With oxygen supplementation, National judokas showed a mean heart rate of 104.95 bpm, while International judokas exhibited an even lower mean of 98.95 bpm. These results demonstrate that, while both groups benefited from oxygen supplementation, International judokas experienced a more significant reduction in heart rate recovery.

DISCUSSION

The results of this study clearly indicate that oxygen supplementation significantly enhances heart rate recovery in judokas, with the effects being more pronounced in International judokas compared to National judokas. The higher heart rates observed in National judokas immediately post-bout suggest that these athletes may be less conditioned or have a lower baseline cardiovascular fitness level. This aligns with previous research, which shows that athletes with lower cardiovascular fitness levels tend to exhibit slower heart rate recovery after physical exertion (Bishop et al., 2008).

The more pronounced effects of oxygen supplementation in International judokas suggest that these athletes, due to their higher levels of cardiovascular conditioning, may benefit more from supplemental oxygen. Oxygen supplementation helps to improve aerobic metabolism, facilitating faster recovery by increasing the delivery of oxygen to tissues and helping to clear metabolic byproducts more efficiently (Murias et al., 2017). International judokas likely have a greater ability to utilize this additional oxygen, leading to more rapid recovery.

On the other hand, the National judokas, while benefiting from oxygen supplementation, exhibited slower recovery times compared to their International counterparts, especially at the immediate post-bout and 3-minute recovery points. This suggests that while oxygen supplementation is an effective recovery strategy, its efficacy may be influenced by an athlete's conditioning level. For National judokas, other recovery strategies—such as improving aerobic fitness through endurance training—may be necessary to achieve similar recovery outcomes to those seen in better-conditioned athletes.

These findings also have practical implications for optimizing recovery strategies in competitive judo. Coaches and trainers working with National judokas may consider implementing a more comprehensive recovery protocol, including not only oxygen supplementation but also active recovery techniques, proper hydration, and nutrition, to enhance recovery and improve performance (McClung et al., 2018).

CONCLUSION

In conclusion, this study highlights the significant effects of oxygen supplementation on heart rate recovery in National and International judokas. While both groups benefitted from oxygen supplementation, the results suggest that more highly conditioned athletes, such as the International judokas, experience a greater reduction in heart rate post-bout. These findings emphasize the importance of individualized recovery strategies based on an athlete's cardiovascular fitness level and provide evidence for the potential use of oxygen supplementation as a key recovery intervention in elite-level athletics. For less conditioned athletes, such as National judokas, additional interventions may be necessary to further optimize recovery and improve overall performance.

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