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The Effect of a One-Session Archery Qualification Round on Body Fluid Loss among University Archery Athletes

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Abstract. This study aims to determine the effect of archery sports activities on decreasing body fluid levels among members of the Archery Achievement Sports Club (KOP) at Universitas Negeri Jakarta. The research was conducted in one day and one session at the archery field of Campus B, Universitas Negeri Jakarta. This study used a pre-experimental method with a one-group pretest–posttest design. The sampling technique applied was purposive sampling, involving 11 participants selected from a total population of 16 members based on predetermined inclusion criteria. Body fluid loss was measured before and after participants completed an archery activity using a one-session qualification round method. The data were analyzed using a dependent t-test. The results showed that the average decrease in body fluid level was 390.9 ml, with a standard deviation of 7.348 and a standard error of 2.325. The statistical analysis obtained a t-value of 168.491, which was higher than the t-table value of 1.812 at a significance level of 5%. These findings indicate that the null hypothesis (H0) was rejected and the alternative hypothesis (H1) was accepted. Therefore, it can be concluded that archery sports activities significantly affect the decrease in body fluid levels among members of the Archery Achievement Sports Club (KOP) at Universitas Negeri Jakarta.

Keywords: archery; sports activit; body fluid loss; dehydration; athletes

INTRODUCTION

Archery is a sport that can be practiced by people of various ages and genders, both as a recreational activity and as a competitive sport. Although archery is often perceived as a low-intensity sport, performance in archery requires a complex combination of physical, technical, physiological, and psychological abilities. An archer must maintain postural stability, upper-body strength, muscular endurance, coordination, balance, and concentration throughout the shooting process. These components are essential because archery performance depends not only on the ability to release arrows accurately, but also on the athlete's capacity to maintain shooting consistency from the beginning to the end of training or competition (Lau et al., 2020; Sarro et al., 2021; Vendrame et al., 2022; Fan et al., 2025).

In archery, accuracy is the primary indicator of performance. The main objective of an archer is to shoot arrows as precisely as possible toward the target face. Therefore, consistency in body posture, aiming technique, breathing control, muscle tension, and mental focus is required in every shot. Previous studies have shown that postural stability, bow stability, strength, and technical control are closely related to shooting accuracy and competitive performance in archery (Sarro et al., 2021; Kuch et al., 2023; Jacquot et al., 2025; Fan et al., 2025). Expert archers are also reported to optimize postural stability, muscular activation, and timing strategies during shooting, which supports consistent performance across repeated shots (Vendrame et al., 2022). However, maintaining this consistency is not easy, especially during long-duration training sessions or competition rounds. Fatigue may occur when athletes are required to shoot repeatedly over a prolonged period, which can reduce concentration, disturb movement control, and affect the quality of shooting performance.

Environmental factors also play an important role in archery performance. Archery is commonly performed outdoors, where athletes may be exposed to direct sunlight, high temperatures, wind, and humidity. These environmental conditions can increase physiological stress and accelerate fluid loss through sweating. Exercise in hot environments increases body temperature and body water loss, which can influence thermoregulation, cardiovascular strain, perceived exertion, and performance capacity (Périard et al., 2021; Armstrong et al., 2025). When fluid loss is not balanced with adequate fluid intake, athletes may experience dehydration. In archery, dehydration is

particularly important because it can affect concentration, perceived fatigue, heart rate response, and shooting consistency. Savvides et al. (2020) reported that dehydration during archery competition simulation influenced subjective feelings, physiological responses, and archery performance. Therefore, hydration status should be considered an important factor in supporting optimal performance among archery athletes.

Body fluids have an essential role in maintaining physiological function during physical activity. Water helps regulate body temperature, supports blood circulation, maintains electrolyte balance, and assists muscle and nervous system function. During exercise or sports activities, the body loses fluid mainly through sweat and respiration. If this fluid loss is not replaced properly, the body's ability to regulate temperature and maintain physical performance may decrease. The American College of Sports Medicine explains that athletes should begin exercise in a well-hydrated condition and replace fluid losses during and after physical activity to support performance and prevent excessive dehydration (Sawka et al., 2007). More recent hydration literature also emphasizes that monitoring body mass change, urine specific gravity, and thirst can be used as practical field indicators to assess hydration status in athletes (Francisco et al., 2025; Armstrong et al., 2025).

Dehydration can occur when the amount of fluid lost from the body exceeds the amount of fluid consumed. Even mild dehydration may negatively affect physical and cognitive performance. Fluid loss of approximately 2% of body mass has been associated with decreased exercise performance, increased fatigue, reduced thermoregulation, and impaired concentration, particularly in hot environments (James et al., 2019; Périard et al., 2021). Higher levels of hypohydration may further impair cognitive performance, mood, attention, and decision-making capacity, especially when fluid loss reaches approximately 3–5% of body mass (Dube et al., 2022; Jyoti et al., 2023). Zhang et al. (2019) also reported that dehydration may negatively affect fatigue, short-term memory, attention, and reaction time, while rehydration can help improve several cognitive responses. In sports such as archery, where precision and concentration are highly required, even a small decline in hydration status may potentially disturb shooting control and performance consistency.

Several signs and symptoms may indicate dehydration, including thirst, dry mouth, darker urine color, dizziness, fatigue, muscle cramps, reduced skin elasticity,

increased heart rate, and excessive body heat. However, thirst is often considered a delayed indicator of dehydration. Therefore, athletes should not rely only on thirst as a signal to drink. Instead, fluid intake should be planned before, during, and after sports activities, especially when training or competing in hot outdoor environments (Sawka et al., 2007; Périard et al., 2021; Armstrong et al., 2025). In addition, muscle cramps and fatigue during exercise may also be associated with multiple factors, including neuromuscular fatigue, sweat loss, and electrolyte imbalance, so hydration strategies should be considered as part of athlete preparation and recovery (Maughan & Shirreffs, 2019).

Based on these considerations, the study of body fluid loss in archery athletes is important. Members of the Archery Achievement Sports Club (KOP) of Universitas Negeri Jakarta regularly participate in training activities and competition simulations that require repeated shooting and sustained concentration. However, body fluid loss during archery activities is often overlooked because archery is not commonly classified as a high-intensity sport. In fact, prolonged exposure to outdoor conditions and repeated activity during qualification rounds may still contribute to measurable fluid loss. Recent recommendations also suggest that hydration assessment should not rely on a single indicator only, but should ideally combine practical measures such as body mass change, urine indicators, and thirst perception to provide a more accurate understanding of athletes' hydration status (Francisco et al., 2025; Armstrong et al., 2025).

Therefore, this study aims to determine the effect of archery sports activities using a one-session qualification round method on the decrease in body fluid levels among members of the Archery Achievement Sports Club (KOP) of Universitas Negeri Jakarta. The findings of this study are expected to provide practical information for athletes, coaches, and sports practitioners regarding the importance of hydration management in archery training and competition.

METHOD

This study used a quantitative approach with a pre-experimental method. The research design applied was a one-group pretest–posttest design. This design was used to determine the effect of archery sports activities on the decrease in body fluid levels by comparing measurements taken before and after the treatment. The research was conducted at the archery field of Campus B, Faculty of Sports Sciences, Universitas

Negeri Jakarta. The treatment was carried out through archery sports activities using a one-session qualification round method. Before participating in the archery activity, all participants underwent an initial measurement or pretest to determine their body weight. After completing the archery activity, participants were measured again through a posttest. The difference between pretest and posttest body weight was used to estimate the decrease in body fluid levels.

The population in this study consisted of 20 members of the Archery Achievement Sports Club (KOP) of Universitas Negeri Jakarta. The sampling technique used was purposive sampling, which means that participants were selected based on specific criteria determined by the researcher. The total sample consisted of 11 participants who met the inclusion criteria and were able to participate in the full research procedure. The research instrument used in this study was a digital body weight scale/Tanita scale. This instrument was used to measure participants' body weight before and after the archery activity. Body fluid loss was estimated based on the difference in body weight before and after the activity, with the assumption that a decrease in body weight during exercise mainly reflects fluid loss. The measurement results were then converted into milliliters, where 1 kilogram of body weight loss was considered equivalent to approximately 1,000 milliliters of body fluid loss.

The data collection procedure consisted of several stages. First, participants were informed about the research procedure and prepared for the initial measurement. Second, participants' body weight was measured before the archery activity as the pretest data. Third, participants performed archery sports activities using the one-session qualification round method. Fourth, after completing the activity, participants' body weight was measured again as the posttest data. Finally, the difference between pretest and posttest results was calculated to determine the decrease in body fluid levels.

The data obtained were analyzed using descriptive and inferential statistics. Descriptive statistics were used to determine the mean, standard deviation, and standard error of body fluid loss. Furthermore, a dependent t-test, also known as a paired sample t-test, was used to examine whether there was a significant difference between the pretest and posttest results. The significance level used in this study was 5% or $\alpha = 0.05$.

RESULT AND DISCUSSION

RESULT

The data in this study were collected through an initial test and a final test. The initial test was conducted before the participants performed the archery sports activity, while the final test was conducted after the activity was completed. The purpose of these measurements was to determine the decrease in body fluid levels after performing archery activities using the one-session qualification round method. Body fluid loss was estimated based on the difference in body weight before and after the activity. The collected data were then analyzed using descriptive statistics and presented in the form of a data description table, frequency distribution table, and histogram.

Table 1 Description of Body Fluid Decrease Data

Red	390,9
Median	400
Mode	400
Min	200
Max	700
St. Deviation	7,348
St. Mean Error ($SEMX_{1)}$	2,325

Based on Table 1, the average decrease in body fluid level among the participants was 390.9 ml. The median value was 400 ml, and the mode was also 400 ml. This indicates that the most frequently occurring value of body fluid loss was 400 ml. The lowest decrease in body fluid level was 200 ml, while the highest decrease was 700 ml. These results show that all participants experienced a decrease in body fluid level after participating in the archery sports activity.

Table 2 Distribution of The Frequency of Body Fluid Decrease After Performing Tests on The Study Sample

Yes	Interval Classes	Middle Value	Frequency Absolute	Relative
1	0 - 200	100,5	2	18%
2	201 – 400	300,5	6	55%
3	401 – 600	500,5	2	18%
4	601 – 800	700,5	1	9%
			11	100%

Based on Table 2, the highest frequency was found in the interval class of 201–400 ml, with 6 participants or 55% of the total sample. This means that most participants

experienced body fluid loss within this range after completing the archery activity. Furthermore, 2 participants or 18% experienced body fluid loss in the interval of 0–200 ml, 2 participants or 18% experienced body fluid loss in the interval of 401–600 ml, and 1 participant or 9% experienced body fluid loss in the interval of 601–800 ml.

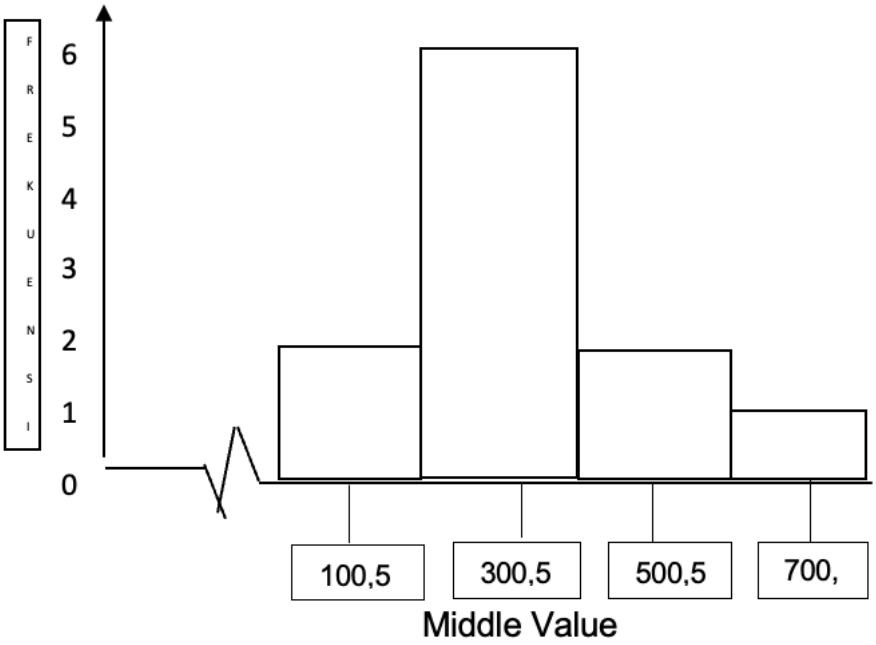

Figure 1 Histogram Graph of the Data on the Decrease in Body Fluid Levels After Testing the Study Sample.

These findings indicate that archery sports activities can cause a measurable decrease in body fluid levels. Although archery is often categorized as a low-to-moderate intensity sport, the activity still requires repeated movement, concentration, postural control, and prolonged exposure to outdoor environmental conditions. When archery is performed in an outdoor field, athletes may experience fluid loss through sweating, especially when the activity is conducted under hot weather or direct sunlight.

DISCUSSION

The results of this study showed that archery sports activities caused a decrease in body fluid levels among members of the Archery Achievement Sports Club (KOP) of Universitas Negeri Jakarta. The average decrease in body fluid level was 390.9 ml after one session of archery activity. This finding indicates that although archery is often considered a low-to-moderate intensity sport, it can still cause measurable fluid loss, especially when performed outdoors and over a relatively long duration. This condition

is relevant because archery requires postural stability, body control, concentration, and repeated shooting consistency throughout training or competition (Sarro et al., 2021; Vendrame et al., 2022; Kuch et al., 2023; Fan et al., 2025).

The decrease in body fluid levels found in this study may be related to sweat production during physical activity. During exercise, the body produces heat as a result of muscular work. To maintain body temperature, the body releases heat through sweating and evaporation. When activity is performed in a hot or outdoor environment, sweat production may increase, leading to greater body water loss. Périard et al. (2021) explained that exercise under heat stress increases body temperature and body water loss through sweating. Armstrong et al. (2025) also emphasized that changes in body mass before and after exercise can be used as a practical indicator of body water loss in athletes. Therefore, even in sports that do not involve continuous running or high-intensity movement, fluid loss can still occur when the activity is performed for a long time under environmental heat exposure.

This finding is also in line with the study by Savvides et al. (2020), which examined the effects of dehydration on archery performance, subjective feelings, and heart rate during a competition simulation. Their study showed that dehydration may influence physiological responses and subjective feelings in archers. This is important because archery requires high concentration, stable posture, controlled breathing, and consistent movement execution. When athletes experience fluid loss, their comfort, focus, physiological stability, and shooting consistency may be disturbed. In addition, studies on archery performance have shown that postural control, bow stability, muscular strength, and anticipatory postural adjustment are important factors in supporting shooting accuracy (Sarro et al., 2021; Vendrame et al., 2022; Kuch et al., 2023; Fan et al., 2025).

In archery, the physical demands are different from endurance sports, but the need for precision and concentration is very high. A small physiological disturbance may influence aiming stability, muscle control, and shooting consistency. Dube et al. (2022) reported that hypohydration can impair cognitive performance and mood, especially when fluid loss reaches higher levels. Similarly, Zhang et al. (2019) found that dehydration may negatively affect fatigue, attention, short-term memory, and reaction time, while rehydration can help improve several cognitive responses. Strüven et al.

(2023) also showed that preparticipation hypohydration may increase concussion-like symptoms and influence cognitive performance in recreational athletes. Therefore, although the average fluid loss in this study was not categorized as severe dehydration, the decrease still needs attention because archery performance depends strongly on mental focus and movement precision.

The results also showed that most participants experienced body fluid loss in the interval of 201–400 ml, while one participant experienced fluid loss up to 700 ml. This variation suggests that individual responses to archery activity may differ. Differences in sweat rate, body size, initial hydration status, clothing, physical fitness, duration of activity, and environmental conditions may influence the amount of fluid lost during exercise. James et al. (2019) explained that hypohydration may impair exercise performance, especially when body mass loss reaches around 2% or more. Meanwhile, Francisco et al. (2025) stated that exercise-induced dehydration often results in reductions in body mass and total body water. Therefore, individual monitoring is important because athletes may respond differently to the same exercise or competition session.

The presence of fluid loss after one session of archery activity also shows that hydration management should not be ignored in archery training and competition. Athletes often drink only when they feel thirsty, whereas thirst may appear after the body has already experienced fluid deficit. Therefore, coaches and athletes should apply planned hydration strategies before, during, and after training or competition. This strategy is important to maintain body fluid balance, reduce fatigue, and support concentration during shooting. Sawka et al. (2007) recommended that athletes should begin exercise in a well-hydrated condition and replace fluid losses during and after activity. More recent studies also recommend the use of several hydration indicators, such as body mass change, urine specific gravity, urine color, and subjective thirst rating, because no single method can fully represent hydration status in all conditions (Barley et al., 2020; Armstrong et al., 2025).

From a practical perspective, body weight measurement before and after exercise can be used as a simple method to estimate fluid loss. In this study, the decrease in body weight after archery activity was used to estimate body fluid loss, where 1 kg of body weight loss was considered equivalent to approximately 1,000 ml of fluid loss. This method is commonly used in sports settings because it is simple, practical, and useful for

monitoring hydration needs. Barley et al. (2020) explained that body mass change is one of the practical methods used to assess hydration changes in athletes, although it should ideally be interpreted together with other indicators. Armstrong et al. (2025) also reported that body mass change is commonly used to represent body water loss or gain during exercise lasting approximately 0.5–4 hours.

The findings of this study also have implications for fatigue prevention. Fluid loss may be associated with increased perceived exertion, reduced comfort, and reduced physiological efficiency during exercise. In addition, muscle cramps and fatigue during exercise may be influenced by several factors, including neuromuscular fatigue, fluid loss, and electrolyte imbalance (Maughan & Shirreffs, 2019). Therefore, archery athletes should not only focus on technical preparation, but also on hydration and recovery strategies. This is particularly important when archery activities are conducted outdoors, under direct sunlight, or in hot and humid conditions.

Overall, the findings of this study support the idea that archery sports activities can contribute to decreased body fluid levels. Although the average decrease was not extremely high, it remains meaningful because hydration status is related to physiological function, comfort, concentration, and performance. Therefore, archery athletes should be encouraged to maintain adequate hydration before, during, and after activity, especially during outdoor training or competition simulations. Future research is recommended to involve a larger sample size and include additional hydration indicators, such as urine color, urine specific gravity, environmental temperature, humidity, thirst perception, and fluid intake records, to obtain a more comprehensive understanding of body fluid loss in archery athletes.

CONCLUSION

Based on the results of this study, it can be concluded that archery sports activities have an effect on the decrease in body fluid levels among members of the Archery Achievement Sports Club (KOP) of Universitas Negeri Jakarta. The findings showed that all participants experienced a decrease in body fluid levels after participating in archery activities using the one-session qualification round method. The average decrease in body fluid level was 390.9 ml, while the highest decrease reached 700 ml. These results indicate that although archery is generally considered a low-to-moderate intensity sport, it can still cause measurable body fluid loss, especially when performed outdoors and over a certain duration. Therefore, hydration management is important for archery athletes before, during, and after training or competition. Maintaining adequate fluid intake may help athletes prevent dehydration, reduce fatigue, maintain concentration, and support shooting consistency. Coaches and athletes are encouraged to monitor hydration status and apply appropriate drinking strategies during archery training and competition activities.

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