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Effectiveness of Sodium Beverages in Hydration Restoration: A Gender Comparison Study of College Students Post-Bleep Test

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Abstract

This study aims to test the impact of consuming sodium-containing drinks (Pocari Sweat) on hydration levels during the bleep test, using urine color as an indicator. This study uses a quantitative method with a one group pretest-posttest quasi-experimental design. The research subjects were 10 undergraduate students of Sports Coaching Education at Surabaya State University, and was conducted at the Surabaya State University Basketball Court in December 2025. The instruments used are urine cups and images of urine hydration levels. Data was collected through observation, questionnaires, and documentation. The results of the study showed a significant difference in hydration levels after consuming sodium-containing fluids. In general, students who consumed sodium chloride showed brighter urine color, which indicates better body hydration conditions, compared to those who only consumed mineral water. This difference is associated with the electrolyte content (sodium, potassium, and magnesium) in sodium-containing drinks, which helps the absorption of fluids into cells more quickly and efficiently, and prevents excessive water excretion through urine. Mineral water, on the other hand, only replaces fluids without replacing lost electrolytes. It was concluded that sodium-containing drinks were more effective in maintaining and improving body hydration than regular mineral water, and it is important for athletes to pay attention to their intake of fluids containing electrolytes to maintain performance and minimize the risk of dehydration.

Keywords: Hydration; Sodium drinks; Urine color; Bleep test

1. Introduction

The development of modern sports demands a deeper understanding of optimal nutrition and hydration for athletes. Performance is highly dependent on endurance and fluid balance. In Indonesia, many athletes, both beginners and professionals, still adopt inappropriate hydration patterns, often relying solely on plain mineral water without considering the loss of essential electrolytes, particularly sodium, through sweat. Previous research has highlighted the importance of electrolyte intake for athletic performance. A study by Arifin (2022) on soccer athletes showed that consuming an isotonic drink containing sodium and carbohydrates significantly delayed fatigue and increased recovery time [1].

Dehydration is a physiological condition in which total body water is reduced due to insufficient fluid intake or excessive fluid loss [2]. In healthy adults, body water comprises approximately 50–60% of total body mass and plays an important role in maintaining normal physiological functions, especially during physical activity [3]. Dehydration in athletes can cause various problems, including difficulty concentrating, an increased risk of injury, and fatigue. All of these dehydration issues ultimately lead to decreased performance. According to Sawka (2021), overall body water levels play a fundamental role in maintaining thermal balance and cardiovascular function, and decreased body fluid levels during exercise can accelerate fatigue and reduce physical performance [4].

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In the context of intensive physical activity, especially for athletes, maintaining fluid and electrolyte balance is key to maintaining optimal performance and preventing health problems. During exercise, the body loses significant amounts of fluid and essential electrolytes, particularly sodium, through sweat. Reviewed by Halodoc (2025) If not promptly replaced, this can lead to dehydration, fatigue, and decreased performance [5]. Sodium-containing beverages like Pocari Sweat are specifically designed with a composition that mimics body fluids, enabling rapid rehydration while replacing lost sodium and electrolytes. By rapidly restoring sodium and fluid levels, these beverages are not only effective in preventing dehydration but have also been shown to increase endurance.

Therefore, this study aims to formulate evidence-based hydration guidelines that can help athletes optimize performance and prevent dangerous conditions like hyponatremia. The expected contribution is the creation of a specific and effective hydration protocol, which will benefit not only athletes and coaches.

2. Material and methods

This study used a quantitative research method with a type of quasi experimental research with the structure of one group pretest-posttest. The purpose of this study is to explore the impact of sodium drink consumption on the appearance of sample urine colour, which serves as an indicator to measure the body's hydration level. Subsequently, urine samples were collected and analysed to identify differences in urine colour after consuming sodium liquid and a visual scale that identifies the degree of hydration of urine colour. Medanta (2023) At levels 1-3 it can be called hydrated (quite fluid), at levels 4-5 it is called dehydration (liquid deficiency), at levels 6-8 it is called severe dehydration (very fluid deficiency) [6]. Participants are selected through random-sampling to ensure relevance the research objectives. Therefore, the target population of this study is students studying sports coaching that consume Pocari sweat in Surabaya. This is because the research analyses the intake of Pocari sweat drinks produced by PT. Otsuka.

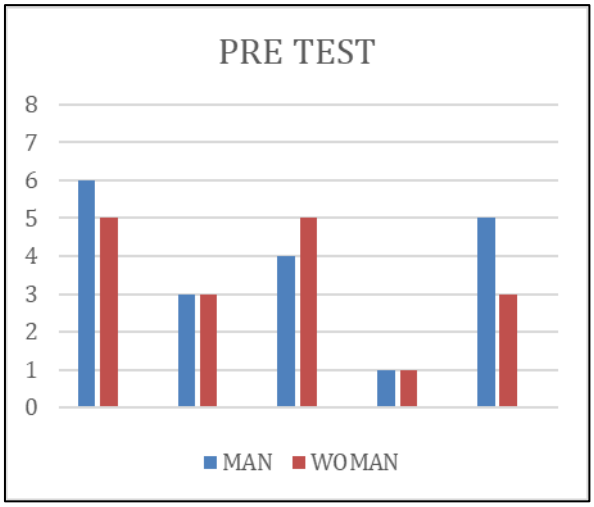
This research was conducted at the Sports and Health Science basketball court, State University of Surabaya, on Friday, December 5, 2025. This study involved a comparison of two groups based on gender, namely ten students from the Sports Coaching Education undergraduate program at State University of Surabaya. The hydration of the subjects on the field was also a focus of the study. This review included the implementation protocol for the Bleep Test (Multi-Stage Fitness Test), which will be used as a consistent method to create a body fluid deficit [7]. In addition, isotonic drinks serve as a therapeutic preparation with a predetermined dose. After understanding this, the researchers developed and completed a comprehensive Standard Operating Procedure (SOP) for this study, including an appropriate plan for the implementation of the exercise, the cost of the provided treatment, and a thirty-minute observation period, so that equality between male and female groups can be carried out regularly and planned on the field of the Faculty of Sports and Health Science, State University of Surabaya.

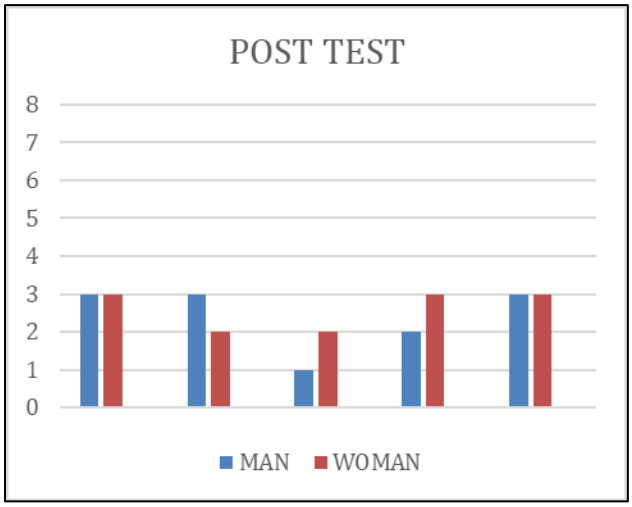
3. Results and discussion

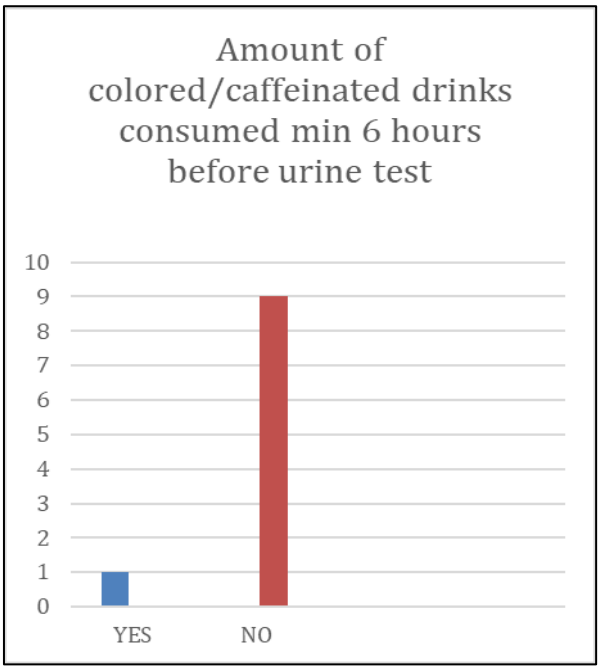
The research used in this study included several tools and materials that served to measure student hydration levels before and after treatment. The subjects involved in this study were 5 girls 5 boys from Surabaya State University students. This selection of subjects is intended to clearly define the populations and samples that are part of the study. The main instruments used for data collection are urine tests, which technically include the use of urine cups to house urine samples, as well as visual scales that identify the level of urine hydration. This color scale is a visual measurement tool used to assess the hydration level of participants in the pre-test and post test stages. Quantitative data supporting the research process included an observation sheet for recording the results of direct observation during the data capture process, as well as a documentation in the form of photographs or field records related to participants' activities and urine measurement results. Additional data were also obtained through questionnaires, to determine hydration habits and physical activity that could affect the results of the study. Which is tailored to the needs of the research variables. Next, the collected data will be analyzed using an inference statistical analysis. This analysis approach was chosen to evaluate the hypotheses of the study as well as provide clarity in the processing and interpretation of the results.

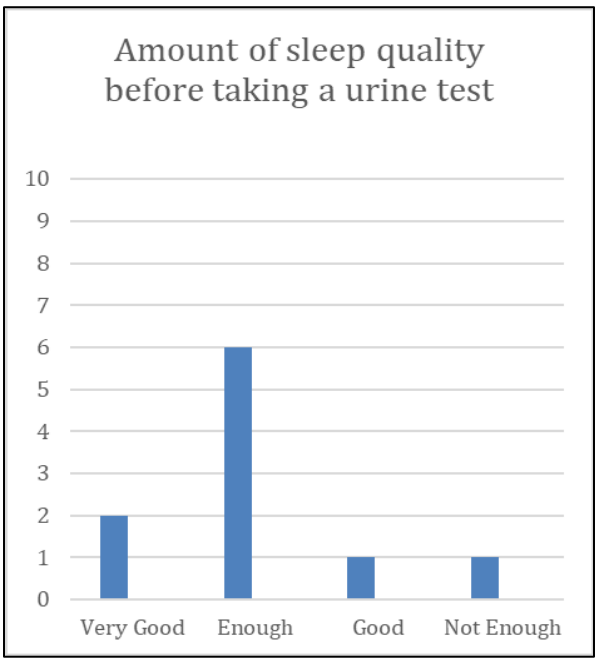
Table 1 Characteristics of research subjects

Parameters	Women (n=5)	Man (n=5)	p-value
Age (yrs)	18.80±0.45	19.60±0.55	0.036
Height (m)	1.56±0.05	1.71±0.05	0.001
Weight (kg)	57.84±6.11	69.20±10.63	0.081
Body mass index (kg/m2)	23.30±1.25	23.60±4.08	0.881
VO2max (ml/kg/min)	35.14±5.97	40.00±5.04	0.203









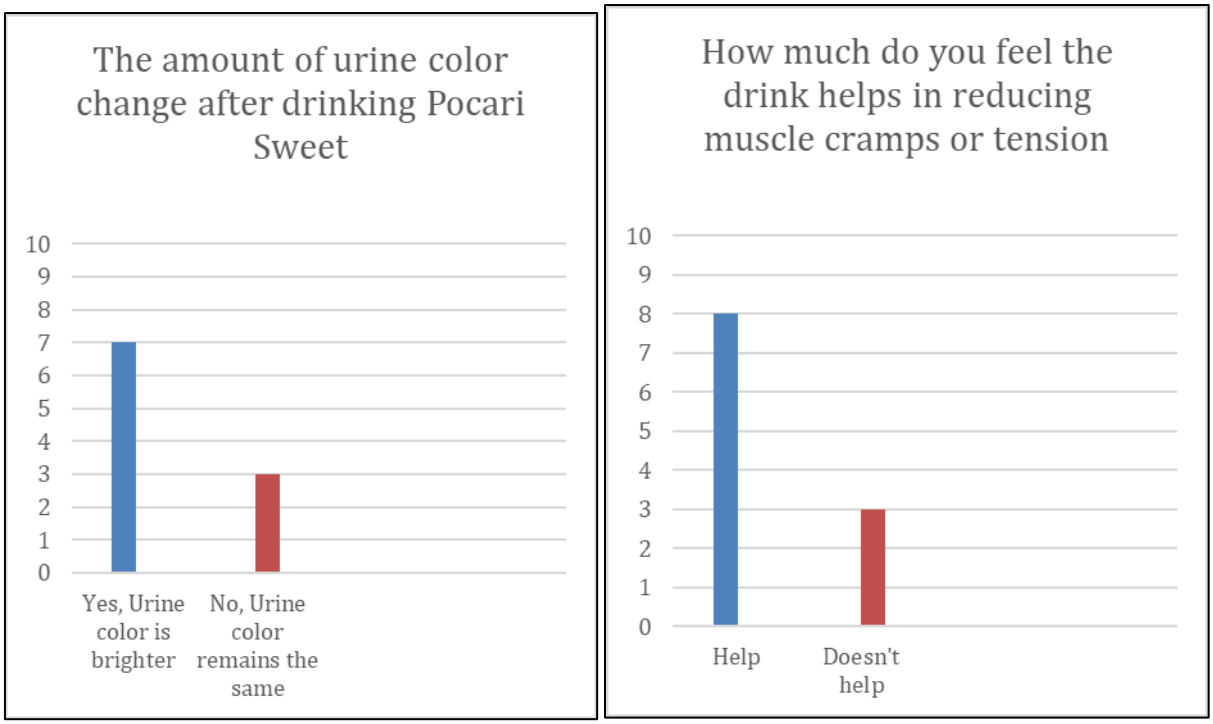


Figure 1 Hydration status in both sexes

Based on the results of the study (Figure 1), there was a significant change in the hydration level of students between the conditions before and after consuming Pocari Sweat. The physical activity carried out in this study in the form of bleep tests is a form of intensive exercise involving the entire musculoskeletal system. Study Nugroho and Yuliastrid (2022) exercise is a systematic and structured musculoskeletal system with the goal of achieving healthy body conditions, including frequency, intensity, type, and time. In the context of this study, bleep tests require students to run back and forth with increasing intensity gradually, thus triggering a significant physiological response of the body [8]. Haetami (2022) At this time of exercise, fluids are urgently needed because the body will release large amounts of fluids through sweat and breathing, which can cause dehydration if not balanced with sufficient fluid consumption [9]. The importance of fluid balance during physical activity is a major focus in this study, considering the direct impact on students' performance and health as subjects of the study.

The initial measurement (pre-test) was performed when students woke up, and the results showed a darker color of urine in most of the study subjects (Figure 1). This condition indicates a mild to severe dehydration rate, which is a normal physiological phenomenon after a period of sleepless nights. Increased body temperature during activity promotes perspiration, which resulting in a loss of liquids and salts. According to Azuma (2020) the risk of dehydration increases in the lack of enough fluid replacement [10]. Its widely understood as dehydration impairs overall physical body efficiency, muscle endurance, and cardiovascular function. In for the purpose of to prevent dehydration and maintain maximum physical performance, sports science students have to investigate study fluid balance. Accoording to Wiratama (2023) dehydration is the lack of body fluids because the amount of fluid discharged is greater than the amount of fluid ingress, so a balance is needed between intake and discharge [11]. During sleep, the body does not receive fluid intake for hours, but the metabolic process continues and the body continues to release fluid through minimal respiration and perspiration. This causes the concentration of urine to become more concentrated, which is reflected in darker colors. Sofie (2025) dehydration can affect various age groups and has an impact on decreasing concentration, productivity, and more serious health problems if not addressed immediately [12]. The dehydration condition in this pre-test is an important baseline to compare the effectiveness of the intervention given, namely the consumption of Pocari Sweat after intensive physical activity.

After performing a bleep test that causes significant amounts of body fluid to drain through sweat, students are given Pocari Sweat as a rehydration drink. The results of the post-test measurement showed a fairly clear change, in which the student's urine color became brighter and most of them were in the hydrated category. This change in urine color indicates that the body has succeeded in replacing fluids lost during physical activity and that the hydration level has increased significantly. The definition of isotonic drink according to SNI 01-4452-1998 Sipahelut (2025) is a carbonated or non-carbonated soft drink product consumed to improve body fitness, containing sugar, citric acid, and minerals

[13]. Putri (2024) Pocari Sweat as one of the isotonic drinks has a composition specifically designed to resemble body fluids, so it can be absorbed more quickly and efficiently [14]. Consuming sports drinks such as isotonic is an effective way to overcome dehydration, especially after intense physical activity This effectiveness is evident from post-test results that show improvements in hydration status in a relatively short time after consumption, proving that isotonic drinks are superior in the context of post-training rehydration.

Pocari Sweat's superior ability to rehydrate the body is closely related to its electrolyte content, particularly sodium, potassium, and magnesium, which work synergistically to restore the body's fluid balance. Beverages with the addition of electrolytes, especially sodium, can help energy absorption, balance body fluids, stimulate drinking desire, and help the body hold water longer, thus providing positive benefits in the rehydration process. By study Budiman and Ray Sodium (2021) is the main electrolyte that has a crucial role in maintaining the balance of extracellular fluid, accelerating water absorption in the smooth intestine through active transport mechanisms, and maintaining the volume of blood plasma to remain stable [15]. When sodium is absorbed with water, the rehydration process becomes more efficient because water is not immediately excreted through urine, but is kept longer in the body. Potassium functions in support of intracellular fluid balance, helps muscle contraction, and preserves the functions of the nervous system, while magnesium plays an important role in aerobic and anaerobic energy metabolism during physical activity. This combination of electrolytes makes isotonic drinks much more effective than ordinary mineral water that simply replaces the volume of the liquid without returning the electrolyte lost through perspiration. The findings of this study are in line with Arifin's study (2022) which shows that consumption of isotonic drinks containing sodium and carbohydrates significantly delays fatigue and increases recovery time in football athletes [1]. Thus, empirical evidence from this study strengthens the argument that isotonic drinks such as Pocari Sweat are the optimal choice for effective rehydration after exercise or intensive physical activity, providing a double benefit in replacing both liquid and electrolyte loss.

4. Conclusion

Based on the research results and supported by various relevant scientific sources, it can be concluded that the consumption of Pocari Sweat is effective in increasing the hydration rate of students after performing physical activities. Measurements of urine during sleep (pre-test) show a more concentrated color as a sign of mild to moderate dehydration, a common condition because the body does not receive fluid intake during sleep. After the running activity and consumption of Pocari Sweat, some urine on the post-test seemed brighter, indicating improved hydration status. This effectiveness is in line with the literature stating that isotonic drinks containing electrolytes especially sodium, potassium, and magnesium are capable of accelerating fluid absorption and maintaining the body's electrolyte balance. Sodium plays a role in maintaining plasma volume and preventing excessive fluid loss, while potassium and magnesium support muscle function and metabolism during physical activity. Therefore, the results of this study strengthen evidence that isotonic drinks such as Pocari Sweat are the right choice for effective rehydration after exercise or intensive physical activity.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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