

# Knowledge, Attitudes, and Behaviors Regarding Hydration among Sub-Elite Combat Sports Athletes

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**Abstract:** Loss of body fluids or dehydration can reduce athletes' performance and lead to health problems such as heat illness. The purpose of this study was to determine the level of knowledge, attitudes, and behaviors regarding hydration among Indonesian sub-elite combat sports athletes. A questionnaire containing questions pertaining to knowledge, attitudes, and behaviors on hydration was distributed to the Indonesian sub-elite combat athlete during their training. Twenty-six subjects from six martial arts including Taekwondo, Wushu, Judo, Kempo, Pencak Silat, and Tarung Derajat participated on this study (mean age  $21.73 \pm 4.14$  y.o, weight  $62.12 \pm 11.71$  kg; height  $1.67 \pm 0.09$  m). The mean score for knowledge, attitudes, and behaviors was  $12.54 \pm 2.14$ ,  $11.62 \pm 1.86$ ,  $12.65 \pm 2.26$  out of a maximum of 17. No perfect score was achieved by the subjects. Majority of athletes knew that dehydration could decrease performance, and they understood that urine color monitoring could be used to determine the dehydration. Unfortunately, the majority of them still using thirst as the best indicator of dehydration. The results of this study indicate that the level of knowledge, attitudes, and behaviors of Indonesian sub-elite combat sports athletes are good. Dehydration prevention program can be developed based on questionnaire with low score answer.

## 1 INTRODUCTION

Combat sports refer to a class of contact sports where the athletes engage in one on one combat that can involve striking techniques such as punches, kicks, grappling, or combines of it (Barley et al., 2019). Combat sports are high-intensity activity, which it characteristic tends to lose body fluid through a high rate of sweating or dehydration (Barley et al., 2019). Dehydration gives impact to performance, decreases cognitive function, and lead to other serious health problems, e.g., heat stroke and heat illnesses, particularly if body fluid loss more than 2% (Ghaemi et al., 2014; Moghaddami et al., 2016). Cognitive impairs due to dehydration during practice can cause injury through technical incorrect or slower response. The effects of dehydration in contact sports with a high incidence of injury, such as combat sports, need to be thoroughly evaluated. (Lystad, 2015; Del Vecchio et al., 2018).

Combat sports competition is commonly performed in bodyweight class. Fluid restriction is a common method used by athletes to reduce their

weight for a competition in lower weight classes (Brito et al., 2012). Combination of high-intensity exercise with fluid restriction method in combat sports athletes can increase the risk of dehydration and health complication.

American College of Sports Medicine (ACSM) and National Athletic Trainer Association (NATA) provide the guidelines of fluid replacement during exercise to prevent dehydration (Sawka et al., 2007; Mcdermott et al., 2017). Although the recommendation was published, combat sports athletes still lack of knowledge to maintain their body fluid and prevent dehydration. Research showed that weight class sports athletes have a low level of knowledge regarding hydration (Esa et al., 2015). Knowledge is related to routine behaviors. Thus, it is important to improve athletes' knowledge to prevent dehydration, particularly in weight class sports category.

Sub-elite athletes are population who train to compete in the districts or provinces sports events. Unlike amateur or recreational athletes, they have routine training schedule as intensive as elite athletes but in limited sources. In contrast to the elite athletes

who have a complete official team, including sports medicine personal, i.e., nutritionist and medical doctor, sub-elite athletes do not have private medical professional support. This situation leads sub-elite athletes have limited knowledge due to lack of information and professional education. The number of sub-elite athletes is more than elite-athletes, so this population needs attention.

Level knowledge, attitudes, and behaviors measurement are important as a basic step to develop an education strategy to prevent dehydration. The objective of this study was to determine the level of knowledge, attitudes, and behaviors regarding hydration among Indonesian sub-elite combat sports athletes.

## **2 METHODS**

### **2.1 Participants**

Twenty-six sub-elite combat sports athletes who registered as Yogyakarta province athletes for National Sports Games (Pekan Olahraga Nasional) – Papua 2020 were recruited in this study. The subjects have not become as Indonesia national athlete for participating in the international event. These subjects actively trained and joined training center program for six martial arts including Taekwondo, Wushu, Judo, Kempo, Pencak Silat, and Tarung Derajat. Pencak silat and Tarung Derajat are traditional combat sports that are held in the National Sports Event. Pencak silat has competed in SEA-Games and first time competed in ASIAN GAMES 2018. The university's review board approved the study protocol.

### **2.2 Assessment of Knowledge, Attitudes and Behaviors Regarding Hydration**

The subjects answered the questionnaire to determine their knowledge, attitudes, and behaviors on hydration. The questionnaire was developed from previous research and adapted to the Indonesian language (Nichols et al., 2005). The languages validation was conducted using experts and a small group of collegiate athletes from Faculty of Sports Science, Universitas Negeri Yogyakarta, Indonesia.

The questionnaire consists of 3 parts, namely part A for knowledge's assessment, part B for attitudes assessment, and part C for behaviors assessment. Each part comprised of 17 questions which true or false statement in part A, five-point Likert scale (strongly agree to strongly disagree) in part B and yes or no question in part C. Scoring "0" and "1" point was applied in each part of the questionnaire. In part A, score "1" was given for every correct answer and "0" for the wrong answer. In part B, Positive statement was scored "1" if subjects answered "strongly agree", "agree", otherwise it was scored "0" for "neutral", and "strongly disagree", "disagree". On the other hand, a negative statement was scored "1" if subjects answered "strongly disagree", "disagree", otherwise it was scored "0" for "neutral" and "strongly agree", "agree". In part C, score "1" was given to answer based on proper behavior and score "0" was given for poor behavior.

### **2.3 Data Collection and Analysis**

The collected data were tabulated and presented using SPSS 25.0 software. Descriptive data were presented in the mean and standard deviation. Normality test was performed using Shapiro Wilk (total subjects < 50). Pearson test was conducted to determine the relationships between knowledge, attitudes, and behaviors on hydration of the subjects. Spearman (non-parametric) test was performed as an alternative for the Pearson test when the data were not normally distributed. The significant levels was set to 0.05 ( $p < 0.05$ ).

## **3 RESULT**

Twenty-six subjects from 6 martial arts participated in this study including Taekwondo (n = 10), Wushu (n = 4), Judo (n = 2), Kempo (n = 3), Pencak Silat (n = 6) and Tarung Derajat (n = 1). Subjects' ages range from 15 to 33 years old. Their heights and weights were 1.45 to 1.87 meter and 48 to 95 kg, respectively. Characteristics of the subjects are shown in Table 1.

A total score of questionnaires for each part ranged from 0 to 17, with a higher score representing better knowledge, attitudes, and behaviors regarding hydration compared to the lower score. No perfect score was achieved by the subjects. Result of the questionnaire showed in table 2.

Table 1: Subject's Characteristics

No	Characteristics (n =26)	Mean $\pm$ SD
1	Age (years)	21.73 $\pm$ 4.14
	Male (n = 17)	22.88 $\pm$ 4.46
	Female (n = 9)	19.56 $\pm$ 3.61
2	Height (m)	1.67 $\pm$ 0.09
3	Weight (kg)	62.12 $\pm$ 11.71

Table 2: Score of the Questionnaire Regarding Hydration

No	Part	Score (mean $\pm$ SD)	Minimum score	Maximum Score
1	Knowledge	12.54 $\pm$ 2.14	6	15
2	Attitudes	11.62 $\pm$ 1.86	8	15
3	Behaviors	12.65 $\pm$ 2.26	8	16

### 3.1 Knowledge Regarding Hydration

The mean knowledge scores among all subjects were 12.54  $\pm$  2.14. Nine subjects (34.6%) had good knowledge (total score 14 or higher), sixteen subjects (61.5%) had moderate knowledge (total score between 9 to 13), and one subject (3.8%) had poor knowledge (total score below 9). General dehydration statement such as dehydration decreases sports performance and excessive sweating, thirsty, and cramping are signs of dehydration were answered correctly by 26 (100%) subjects. All (100%) subjects also knew that monitoring color urine could be used as dehydration judgment.

Majority of subjects (92.3%) lacking in knowledge about dehydration indicator and assumed that thirst is the best indicator for dehydration. Knowledge of sports drink consumption was low. Only 14 subjects (53%) knew that an athlete should consume sports drinks trained more than 1 hour.

### 3.2 Attitudes Regarding Hydration

The mean attitudes score among all subjects was 11.62  $\pm$  1.86, which indicate a positive attitudes rate (score above 10). All subjects (100%) strongly agree and agree that monitoring urine color is a way to judge the dehydration status. Twenty -five subjects

(96%) also strongly agree and agree that the availability of fluid during practice is very important. Only one subject (3%) was answered correctly in a negative statement that thirst is the best indicator of dehydration.

### 3.2 Behaviors Regarding Hydration

The mean behaviors score among all subjects was 12.65  $\pm$  2.26. Twenty-five subjects (96%) were prepared fluids during practice and competition. They also knew of signs of dehydration, including excessive sweating, and muscle cramps. About 80% of subjects were followed ACSM recommendation including drink 500-600 cc of water or sports drink a couple of hours before exercise and continue to drink 200 – 300 cc 10-20 minutes before competition.

Only 12 subjects (46%) consumed sports drinks while trained for more than 1 hours. It may be related to other facts that only ten subjects (38%) preferred to consume sports drinks than water because it restores glycogen in the muscle. Five subjects (19%) reported drinking more than alcoholic beverages the day before the competition.

Shapiro Wilk test showed that result in part "knowledge" was not normally distributed ( $p = 0.03$ ) so the Spearman test was conducted. Spearman correlation analysis showed significant positive correlations between knowledge, attitudes, and behaviors ( $p < 0.05$ ). Level of correlation was moderate ( $r$  -value between 0.40 to 0.60). Result of correlation test showed in table 3.

Table 3: Spearman Correlation Coefficients Between Variables Tested

	Knowledge	Attitudes	Behaviors
Knowledge	1.00	0.41*	0.48*
Attitudes	0.41*	1.00	0.42*
Behaviors	0.48*	0.42*	1.00

\*Significant at  $p < 0.05$

## 4 DISCUSSION

This study shows that the majority of sub-elite athletes have good score in knowledge, attitudes, and behaviors regarding hydration with mean score 73, 86, and 74 out of a maximum of 100, respectively.

Majority of athletes still using thirst as the best indicator of dehydration. Thirst is a bad indicator because athletes who feel thirsty mean that their body has dehydration and potential in decreasing performance (Adams et al., 2018). Periodical body fluid is fulfilled without wait to thirst can prevent dehydration. ACSM and NATA recommend consuming 250-300 cc of fluid every 15-20 minutes during exercise. Arnaoutis et al. (2013) showed that consuming fluids when desired (*ad libitum*) still causes dehydration. Education program to improve athletes' knowledge regarding body fluid fulfill without waiting to thirst need to be developed as a strategy to prevent dehydration.

Majority of athletes knew that dehydration could decrease performance so they could prevent losing weight method through fluid restriction. Nutritional education regarding weight loss based on ACSM (0.5 – 1 kg /week) needs to be socialized (Jakicic et al., 2001).

Athletes understood that urine color monitoring could be used to determine the dehydration. This method is quite easy and applicable to maintain the hydration level of the athletes before practice or competition (Casa et al., 2000; Webb and Salandy, 2016).

## 5 LIMITATION

This study only involved sub-elite athletes from 1 province, which was Special Region of Yogyakarta out of 34 provinces in Indonesia. Further research involving large scale subjects need to be done to determine the level of knowledge, attitudes, and behaviors regarding hydration among Indonesian sub-elite athletes.

## 6 CONCLUSIONS

The results of this study indicate that the level of knowledge, attitudes, and behaviors of Indonesian sub-elite combat sports athletes are good. Dehydration prevention program can be developed based on questionnaire with low score answer.

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