Significant Relationship between Knowledge and Hydration Status among Student of Islamic Boarding School Student: Is there dehydration

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ABSTRACT

Pesantren plays an important role in education in Indonesia. The aim of this study is to explore the relationship between the level of knowledge about hydration and the phenomenon of hydration status among students in pesantren in Indonesia. This study used a cross-sectional survey research design with 62 samples of respondents selected through purposive sampling techniques. Respondents were young female students aged 13-18 years. Respondents who were fasting, menstruating, and in a feverish or sick condition were excluded. To determine hydration status, the authors observed midstream urine sample analysis using a urine reagent dipstick that would confirm the urine color indicator to determine hydration status. Age, education level, hydration knowledge, activity level, and hydration fulfillment behavior were obtained through questionnaires. Body mass index is obtained by measuring body weight using body scales and height using calibrated height measuring devices. Analysis to determine the relationship between hydration status and hydration knowledge level was tested using the Chi-Square test. The result of this study is the respondents in this study had a sufficient level of knowledge about meeting fluid needs 40 people (64.5%) with a mild hydration; had a sufficient level of knowledge about meeting fluid needs 40 people (64.5%); there is a significant relationship between knowledge of fulfilling fluid needs with hydration status. It concluded that knowledge related to the fulfillment of adequate hydration is closely related to the hydration status of students. Continuous increase in the intensity of information about efforts to maintain adequate hydration status is needed to increase understanding and a positive attitude in fulfilling adequate body fluids.

1. INTRODUCTION

Pesantren plays an important role in education in Indonesia. However, studies have shown that students in pesantren often exhibit poor, clean, and healthy living behaviors [1]. This condition is concerning because proper knowledge and practices about clean and healthy living behaviors, including proper hydration, are essential for student well-being. The relationship between cultural values and clean and healthy living behaviour among pesantren students has been studied [2]. Pesantren, known as schools integrated with Islamic approach methods accompanied by dormitories, play an important role in the education and upbringing of students in Indonesia. Students who carry out the education process in pesantren are known as santri. One of the government's efforts to improve the quality of healthy life in Islamic boarding schools clean and healthy living program (PHBS) efforts are implemented, including maintaining health through good hydration status. Adequate hydration status is defined as a body water level of 50-60% for women and 55-65% for men [3].

However, some studies show that poor healthy behavior is often found among students in pesantren [1]. This condition is concerning because adequate knowledge and practice of clean and healthy living behaviors, including proper hydration, is essential for the well-being of students. Another study assessing the hydration status of students living in hot environments, including in Indonesia, showed that 90% of students were at risk of dehydration, with no difference in total water intake between the hydrated and dehydrated groups [4]. Another review showed that dehydration had a negative impact on physical performance for activities lasting longer than 30 seconds [5]. In addition, poor hydration status can predispose to kidney disease[2]. Given the unique environmental and cultural factors in Indonesia, further investigation into the hydration status of students is needed.There is no specific research on hydration status among Islamic boarding school students. However, a study conducted in the United Arab Emirates found that 41.3% of college students were dehydrated, with a higher risk among women and those with a higher body mass index (BMI) [6]. Studies have shown that high levels of health knowledge are positively associated with health behaviors, such as hygiene habits and self-protection behaviors, in a variety of contexts, including in the fulfillment of adequate hydration status [7].

The hydration status of female students in Islamic boarding schools in Indonesia is a topic that has not been extensively studied. However, other studies have shown low hydration status (dehydration) in students with several factors, such as sex and body mass index, that affect hydration levels [6]. Given the importance of hydration for overall health and the limited research on the hydration status of students in pesantren, this paper aims to explore the relationship between the level of knowledge about hydration and the phenomenon of hydration status among students in pesantren in Indonesia, in this case. It is one of the pesantren in Cipasung, Tasikmalaya, West Java, Indonesia. In addition, several factors that affect hydration status, in addition to knowledge, are presented. These factors include hydration fulfillment behavior, physical activity level, and body mass index (BMI)

2. METHODS

This study used a cross-sectional survey research design. The location of this research is in Al-Istiqomah Dormitory, Cipasung Islamic Boarding School Complex, Cipakat Village, Singparna District, Tasikmalaya Regency, West Java, Indonesia, in 2023. The population in this study was 108 female students, with 62 samples of respondents selected through purposive sampling techniques with the sample size determined by the Slovin proportion formula. Respondents were young female students aged 13-18 years. Respondents who were fasting, menstruating, and in a feverish or sick condition were excluded. To determine hydration status, the authors observed midstream urine sample analysis using a urine reagent dipstick that would confirm the urine color indicator to determine hydration status. Age, education level, hydration knowledge, activity level, and hydration

fulfillment behavior were obtained through questionnaires. Body mass index is obtained by measuring body weight using body scales and height using calibrated height measuring devices. Analysis to determine the relationship between hydration status and hydration knowledge level was tested using the Chi-Square test.

3. FINDINGS AND DISCUSSION

Table 1. Frequency Distribution of Fluid Intake Knowledge and Hydration Status

No.	Category	N	%
1.	Knowledge of fluid requirement fulfillment:		
	Good	7	11,3
	Simply	40	64,5
	Less	15	24,2
2.	Hydration status: *Urine specific gravity (USG)*		
	Dehydration is good	1	1,6
	Mild dehydration	38	61,3
	Moderate dehydration	18	9,0
	Severe dehydration	5	8,1
3.	Hydration status: *Urine colour (UC)*		
	Safe zone/not dehydrated	1	1,6
	Mild dehydration	35	56,5
	Moderate dehydration	16	25,8
	Severe dehydration	10	16,1

Based on Table 1, the respondents in this study had a sufficient level of knowledge about meeting fluid needs 40 people (64.5%) with a mild hydration status category based on *urine specific gravity (USG)* 38 people (61.3%) and *urine color (UC)* 35 people (56.5%).

1. Bivariate Analysis

a. The relationship between knowledge of fulfilling fluid needs and hydration status: *Urine Specific Gravity (USG)*

The relationship between knowledge of fulfilling fluid needs with hydration status: *urine specific gravity (USG)* can be seen in the following table:

Table 2. Relationship between knowledge of fluid requirement fulfillment and hydration status: *Urine specific gravity* (USG)

Knowledge Fulfillment of Fluid Needs	Hydration Status: *Urine specific gravity* (USG)								Total		*p-Value*
	Good Hydration		Mild dehydration		Dehydration Medium		Dehydration Weight		N	%	
	N	%	N	%	N	%	N	%			
Good	1	1,6	3	4,8	3	4,8	0	0	7	11,3	<0,001
Simply	0	0	32	51,2	6	9,6	2	3,2	40	64,5	
Less	0	0	3	4,8	9	14,4	3	4,8	15	24,2	
Total	1	1,6	38	61,3	18	29,0	5	88,1	62	100	

Table 2 shows that the statistical test results obtained a value of p = <0.001 (p <0.05) so that Ha: ϱ ≠ 0, it can be concluded that there is a significant relationship between knowledge of fulfilling fluid needs with hydration status in adolescent girls in the Al-Istiqomah boarding school Cipasung Islamic Boarding School.

b. The relationship between knowledge of fulfilling fluid needs and hydration status: *Urine Colour (UC)*

The relationship between knowledge of meeting fluid needs with hydration status: *urine color (UC)* can be seen in the following table:

Table 3. Relationship between knowledge of fulfilling fluid needs and hydration status: *Urine Colour (UC)*

Knowledge Fulfillment of Fluid Needs	Hydration Status: *Urine Colour (UC)*								Total		*p-Value*
	Safe Zone not dehydrated		Mild dehydration		Dehydration Medium		Dehydration Weight		N	%	
	N	%	N	%	N	%	N	%			<0,001
Good	1	1,6	4	6,4	1	1,6	1	1,6	7	11,3	
Simply	0	0	29	46,4	9	14,4	2	3,2	40	64,5	
Less	0	0	2	3,2	6	9,6	7	11,2	15	24,2	
Total	1	1,6	35	56,5	16	25,8	10	16,1	62	100	

Table 3 shows that the statistical test results obtained a value of p = <0.001 (p <0.05) so that Ha: ϱ ≠ 0, it can be concluded that there is a significant relationship between knowledge of fulfilling fluid needs with hydration status in adolescent girls in the Al-Istiqomah boarding school Cipasung Islamic Boarding School.

A significant relationship was seen in the variable relationship between hydration status and knowledge level. Indicators of hydration status are urine color and urine-specific gravity. Urine color is closely related to urine specific gravity [8], [9]. Some studies suggest that urine color may be a marker in measurements of an individual's hydration status. The color of urine is the result of the concentration of urine as a physiological output of the kidneys. Urine concentration is inversely proportional to fluid intake. Thus, the higher the fluid intake, the more dilute the urine produced (the color fades closer to the clear color.

The physiology of the kidneys starts from the plasma filtration process in the glomerulus. Plasma filtration results in 20% of blood plasma remaining in afferent arterioles [10], [11]. The remaining 80% (filtrate) enters the proximal tubule and will undergo a process of osmolarity change following a tiered gradient in the cortical area to the renal medulla. The process of urine concentration begins from the moment the filtrate enters the arc of Henle pars descending, which is the process of water reabsorption and sodium reabsorption in the ascending pars. The next concentration of urine occurs in the area of the distal tubule. The filtrate will undergo water reabsorption stimulated by the hormone vasopressin. Vasopressin is a hormone produced by the hypothalamus, and its secretion is stimulated by conditions of water deficiency in circulation (dehydration). The hormone vasopressin causes the distal tubules and collectors to carry out a large enough water reabsorption process and produce urine that is quite concentrated. The secretion process of some waste substances along the renal tubules [12] also influences the concentration of urine produced. Some studies show that the more dehydrated individuals are, the more concentrated the color of urine produced. This condition is not the same as pathological conditions such as chronic kidney failure and other metabolic diseases. Pathological conditions cause the physiology of the kidneys not to function properly, and vice versa [8], [9], [11], [12] 9,10,12,14.

The urine color level indicates the amount and concentration of metabolic waste and urochrome pigment [8], [10] dissolved in it. The concentration of solutes in the urine is indicated in a measure of urine osmolality. Measurement of urine osmolality is not commonly done in clinical settings. Some

studies show that urine-specific gravity is positively correlated with urine osmolality. The higher the osmolality of urine, the higher the specific gravity. Urine osmolality ≤ 500 mosm/L or urine specific gravity ≤1,030 indicates a well-hydrated condition (euhydrated) [8].

Furthermore, urine color with a color scale of 1-3 (see Figure 1.) is normal urine color (well hydrated) [11]. The rest showed signs of moderate to severe dehydration. Dehydration is a condition in which the body loses fluids as much as more than 5% of total body water (TBW).

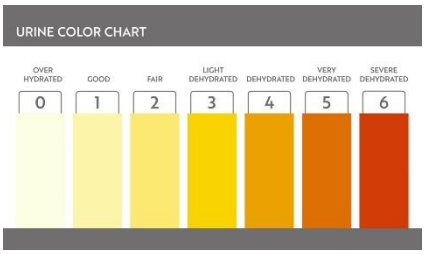

Figure 1.
Hydration Status Scale Based on Urine *Color*

The adequacy of fluid intake strongly influences hydration status and is individualized. The more fluid intake you get, the better your hydration status will be as long as it is still within normal limits (not overhydration). High fluid intake can produce thinner urine and minimize vasopressin in the circulation. Thus, the specific gravity of urine and the urine color scale will be low (euhydrated) [13], [14]. Physical activity is one factor that can affect hydration status. Some research suggests the need for fluids increases with increasing physical activity, whether it is the duration or level of physical activity17. Some studies show that high physical activity increases fluid requirements. In this study, both students and employees showed that the majority had high activity levels and adequate fluid intake. Underhydration/dehydration status can reduce physiological abilities of body systems, such as cardiopulmonary capacity, musculoskeletal physiology, attention, and cognitive ability [15], [16]. In this study, dehydration conditions were still present in both groups. Other factors such as gender, type of activity, and subjectivity in recalling the amount of fluid intake can affect [17], [18]. In addition, some studies suggest that body mass index may be one of the influential factors in hydracy [19], [20] status. Information understood by an individual can generate the condition of hydration status. Understanding the need for hydration can increase awareness of maintaining hydration status so that it is always in top condition. This awareness will lead to efforts to meet adequate fluid needs. Proper knowledge can help an individual consume adequate types and amounts of fluids according to his body's needs [21], [22].

Another study emphasized that attitudes about hydration, especially hydration barriers, were associated with fluid intake behavior, while hydration knowledge was not strongly associated with behavior ([21]). These findings suggest that while knowledge is important, perceived attitudes and barriers to hydration may have a greater impact on actual fluid intake behavior. In the context of school settings, a study on Polish children highlights the importance of adequate hydration for physical and mental health, emphasizing that even slight dehydration can negatively impact cognitive performance [23].

4. CONCLUSION

Knowledge related to the fulfillment of adequate hydration is closely related to the hydration status of students. Continuous increase in the intensity of information about efforts to maintain adequate hydration status is needed to increase understanding and a positive attitude in fulfilling adequate body fluids. Furthermore, Islamic boarding schools need to pay attention to the availability of healthy drinking water so that it can support the fulfillment of student hydration. This paper provides insight into the risk conditions of dehydration threats in students in Islamic boarding

schools and recommendations for prevention. Prevention of dehydration can be done through the delivery of information by pesantren to students intensively both formally in the curriculum and informally in daily activities. The urine color indicator as one of the markers of hydration status can be displayed on toilet doors so that students get reps about their hydration status. Access to healthy drinking water in sufficient quantities is an important aspect in ensuring the adequacy of the hydration status of female students

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