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RELATIONSHIP BETWEEN HYDRATION STATUS AND THE FLUID CONSUMPTION OF TENNIS ATHLETE

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Abstract

The purpose of this study is to identify the relationship between hydration status and fluid consumption in tennis athletes. With this consumption pattern, it is expected that the fluid in the body in the training/match does not extend 2%, for the value more than 2% makes the body performace decreases of 10%.

This study uses mixed method design, for the data sampling and processing are performed by two methods, qualitative and quantitative. The data collected comprises fluid consumption, hydration status, drinking habit consisting of the frequency, the type and the source of drink, and the knowledge about fluid. Drinking habit and water consumption and the knowledge of fluid are measured by using questionnaires "*Food Beverage" (questionnaires of drink)* and hydration status can be seen using color graphic.

According to the result of the study presented, it can be taken some conclusions as follows: (1) There are 3 types of fluid which are frequently consumed by respondents, mineral water, milk and tea; whereas there are 5 types of fluid belonged to the category of occasionally consumed which are pure fruit juice, pure vegetable juice, packed fruit juice, soft drink without soda, and non-alcoholic drink. There are 6 types of fluid included in never or rarely consumed by the respondents which are low fat milk, soft drink, low-sugar soft drink, coffee with cream and sugar, hypotonic/isotonic drink, and energized drink. (2) Hydration status of Tennis Athletes is mostly experiencing dehydration (50%). Of 8 athletes; 1 (12,5%) respondent has good hydration status, 4 (50%) respondents experience dehydration, and 3 (37,5%) respondents have high-level dehydration. (3) There is no significant relationship between the amount of fluid consumption and hydration status of Tennis Athletes Training Camp of Special Region of Yogyakarta.

Key Words: Hydration Status, Fluid Consumption, Tennis Atletes Training Camp of Special Region

BACKGROUND

Achievement in sport in Indonesia tends to undergo up and down which is uncontrollable and stabile, even it recently undergoes decrease in international event such as in Sea Games and Asian Games. The decline in sport achievement gained by Indonesia in international sport event is characterized by the decline in the number of medal achievement and ranking. Athlete achievement is influenced by several factors; one of them is related to nutrient. One of significant nutrient element is water. The inadequate fluid consumption can affect fatigue, hydration status, and athlete performance. Fatigue can be experienced by all athletes in different sport branch; one of them is field tennis athletes. Tennis is a high-intensity sport and frequently called as endurance sport.

High intensity in tennis results in fatigue before the match ends. Fatigue may occur due to much sweat in the match and is not balanced with adequate fluid consumption to maintain the balance of body fluid so that it can increase the risk of dehydration. Dehydration is the

excess loss of body fluids for the fluid replacement is not sufficient due to inadequate intake for the body requirement and water discharge level is high.

Good hydration status can be achieved by athletes by consuming adequate fluids before, during and after training. The lack of water consumption in athletes becomes nutrient problem for the teenagers prone to undergo dehydration caused by many exhausting physical activities and high body fluid consumption. The loss of body fluids or dehydration is more frequently experienced by children, teenagers and elder people, but it may be also experienced by people in other ages. It is proven from the result of the study *The Indonesian Regional Hydration Study* (THIRST) in several cities in Indonesia, of 46,1% of Indonesians experience mild dehydration, the number is higher than that in the teenagers (49,5%) compated to adults (42,5%). Other study in young teenager in Bogor found that 62,8% of the teenagers experience mild dehydration.

When doing exercise, dehydration causes decline in concentration ability, reaction speed, increases body temperature and inhibits the rate of energy production. Dehydration together with the lack of carbohydrate storage are two primary factors causing body performance decline when performing exercise. Therefore, athletes are expected to have good drinking strategy so that the body hydration is constantly maintained. With various reasons such as 'feeling heavy in stomach', 'feeling full' or 'feeling afraid of frequent urinating' many athletes or individuals who do not consider adequate fluid consumption is significant before and during the exercise and after exercise so that the body functions can run smoothly particularly thermoregulation function. With this regular consumption pattern, it is also expected so that the fluid decrease in the body in training/match does not exceed 2%, for the in the value more than 2%, the body performance decreases of 10%.

Dehydration and the lack of carbohydrate storage are 2 primary factors of the decline in body performance in exercise. Therefore, the athletes are expected to have good drinking strategy so that the body hydration is constantly maintained. The athlete group is partly prone to dehydration and overdehydration. When undergoing dehydration, the adults may experience decline in thirst sensitivity, which may inhibit and restore the body fluid independently. The adults are also prone to have slower kidney response to water and sodium content, and may encounter higher hyponatremia risk. The children who are involved in organized sport may be prone to heat.

It is not a new thing that the balance of fluids/electrolyte is significant for the performance of athlete endurance. However, water is the primary component for the body for each cell and network available within. The fluid distributed throughout the body is also included mineral solved known as electrolyte. Electrolyte help manage the fluid level in and between the cells and the role is significant for the formation of cells and network, including muscle tissue. Nevertheless, as an athlete, the balance of fluid/electrolyte is daily challenge. During the training, the muscles will produce much internal heat which may quickly form and is poisonous if it is not released soon. Fortunately, the body may cool itself by releasing sweat. However in its process, the body loses much fluid and electrolyte especially sodium, which is significant to maintain the hydration and keep the body cool. The body may survive when losing sweat without affecting the performance, but in several conditions. Dehydration mau result in the liver works harder to maintain, body temperature will increase, and the training performed is increasingly difficult. Consequently, the athlete performance will drastically fall. If it is left unmanaged, the dehydration will result in serious health consequence. The purpose of consuming good nutrient in pre-competition stage for the athletes in endurance sport branch, particularly long-duration field tennis is to maintain optimal blood glucose level and energy storage (glycogen) in the liver and muscle through carbohydrate consumption and protein consumption for muscle improvement and formation. Thus, a study concerning Relationship between Hydration Status and Fluid Consumption in Tennis Athletes is required.

LITERATURE REVIEWS

1. Hydration

Hydration is defined as the balanced of fluid in the body and is the important requirement to assure the function of body cell metabolism. Meanwhile, dehydration means the lack of fluid in the body for the amount released is greater than the amount absorbed. Human beings release fluids through respiration, sweat, urine and feces. Meanwhile, the function of fluid in the body: (1) building substances, (2) the solvent, (3) nutrient transportation and released substances, (4) body temperature management, (5) lubricant, (6) shock brace. If the body loses much fluid, then the body will experience dehydration. There are 3 types of dehydration, which are: (1) Hypotonic is the body loses electrolyte solution (salt, potassium, chlorine, calcium, and phosphate). (2) Hypertronic is the body loses water (3) Isotonic is the body loses water and electrolyte solution, this condition is the most frequent. Meanwhile, the danger of dedyhration is cognitive ability decreases due to the difficulty in concentration, urinary tract infection risk and the formation of renal calculi, drink sufficiently and do not retain to urinate are the most effective way to prevent infection in urinary tract, and decrease the stamina and work performance by means of headache, being lethargic, convulsions until being fainted. The loss of fluid > 15% will result in fatal.

Hydration level can be characterized through the urine color. This is the guideline to characterize whether you suffer acute dehydration or not. To make sure that our body is not lack of fluids, you can see from the examination of urine color. The level of urine color shows the water condition and balance in the body. Indonesian Doctor Association (IDI) issues the method which can detect hydration level by means of PURI (Self Urine Examination). Here, there is urine color table consisting of eight colors starting from clear to yellow. If the urine is clear, then it shows that the body hydration is good. If the urine shows yellow/orange color, it indicates that the body needs more water intake to replace the body fluid loss and the condition of body fluid is still balanced. Here is the way to perform PURI:

a) All types of urine can be employed, except urine in the morning.
b) Ideally, we use "mid-stream urine", which is urine discharged in the middle of urinating.
c) This urine is accumulated in adequate amount in a clean and clear container, and then we can compare the urine color to the color graphic according to the poster and sticker distributed by PDGMI.
d) Perform color comparison under white neon lamp or sun rays. Avoid examining this urine under yellow-color lamp or other colors for it can make the examination biased.
e) Do not forget that the urine color may be affected by drugs or certain diet.
f) This PURI is developed by Prof Armstrong, the expert of sport and exercise medicine from United States. His finding has been used in several big sport events such as Olympiade in Beijing and Athena.
g) For IDI, by promoting PURI it is expected that they still maintain and monitor their urine color. By being aware of good hydration level, then each individual can monitor the amount of fluid required.

2. Fluid requirement in the body

Water in the body establishes around 50-60% of the total body weight. In this case is 35-42 L for individual with body weight of 70 kg is the amount of water. The water in the body has significant function which is (1) transporting nutrient & oxygen to body cells, (2) managing body temperatures, (3) assisting digestion process, (4) lubricant in joint movement,

(5) the place to produce energy. The lack of water consumption resulting in dehydration is dangerous for the health and makes the body works harder. When doing exercise, dehydration causes the decline in concentration ability, reaction speed, increasing body temperature and inhibiting the rate of energy production. Here is some suggestions to hydration consumption before training/match, such as:

a. Limit or avoid diuretic drink (increasing the urine production) such as tea or coffee particularly when approaching the training/match time and after training/match.
b. Maintain hydration level of the body with regular drinking pattern and do not wait for thrist.
c. The best choice to drink before exercise: mineral water, sport drink or fresh fruit juice.
d. Sport drink or fresh fruit juice contains carbohydrate which can simultaneously help add energy storage in the body and maintain the level of body hydration.
e. Examine the urine color before training/match. The bright urine color means the level of body hydration is good, turbid urine color means the body is lack of fluids.
f. Prepare and contiuously bring sport bottle to the field in the training/sport match
g. Ideally, bring 2 bottles in the training/sport match. 1 bottle contains common water, 1 bottle contains water with carbohydrate & electrolyte such as sport drink or fruit juice (watery) to help maintain energy storage & fluid balance.

3. Fluid requirement (hydration) in the Training/Match

Beside serving as initial prevention to dehydration, consuming fluid in sufficient amount before training/match will give benefits to the body such as: (1) Maintain the smoothness of sweat discharge, (2) Maintain the management of bedy heat (thermoregulation) to be constantly normal, (3) Maintain the process of energy metabolism, (4) Reducing the risk of heat stroke. In the interval 3 to 15 minutes before ecercise, mineral water can be one choice, but if training/sport match will be performed in high intensity or long duration such as tennis, badminton, football, basketball, marraton, cycling and so on, completing mineral water and carbohydrate (glucose, sucrose, maltodextrins), consuming fruit juice which is not too dense can be an ideal alternative for it is not only helpful to maintain: (1) the smoothnes of the sweat grandma, (2) reducing the risk of heart stroke. In the interval of 3-15 minutes before doing sport, mineral water can be an alternative, but if in the training/match it will be performed in long duration such as tennis, buluangkis football, basket ball, or marathon, cycling, and so on, we complete mineral water and the carbohydrate addition (glucose, sucrose, mathodextrins), consuming fruit juice which is not too dense may be an ideal solution for we can not only help hydration level and to increase energy storage, prevent the occurrence of hypoglikemia (blood glucose decline) maintain body performance when doing exervise. The study and the result of the study shows that the athletes/individuals who start training/match with good body hydration will have endurance, response or reaction speed and also superfine sport performance. This makes good hydration strategy to be the integral part for professional athletes not to make the sport endurance good all the time, but also beneficial to maintain body health. Here are the suggestions to fulfill fluid requirement (hydration) in training/match, which are:

a. Drinking in adequate amount regularly to avoid body performance degradation due to dehydration.
b. 2% dehydration decreases 10-20% body performance. 5% dehydration decreases 30% of body aerobic ability.

c. In order not to feel heavy in stomach, 1-2 gulps regularly each 10-15 minutes better than directly drinks in big amount.
d. Do not wait until feeling thirsty, ideally, drink 100-150 ml each 10-15 minutes or determine consumption pattern considered suitable for each athlete.
e. Avoid drinking diuretic drink such as coffee and tea and soft drink with soda.
f. Select ideal drink for sport:

1) Low-intensity sport with duration < 45 minutes —> Mineral water
2) Medium-high intensity sport with duration > 45 minutes —> sport drink or fruit juice (watery)
3) Endurance sport, duration > 45 minutes —> sport drink or fruit juice (watery).
4) Carbohydrate in sport drink can accelerate fluid absorption, supplement the energy and prevent hypoglycemia (the decrease of blood glucose). Moreover, electrolyte mineral in the content can also optimize rehydration when doing exercise and prevent muscle cramp.
5) Sport drink consumption is also scientifically proven able to help maintain performance and enhance body endurance and speed so that it becomes the alternatives chosen by professional athletes in the training or match.
6) Other alternatives of carbohydrate source during exercise to supplement energy are fresh fruit such as oranges, apples, bananas or watermelon as performed by world professional tennis players, marathon athletes and also cyclist.

4. Fluid requirement (hydration) after training/sport match

Fluid or water can be said the most important nutrient for the body. The body can survive for more than 3 days without food intake but the body can survive only 1 day without fluids in the body as a result of sweat released is one factor causing fatigue and performance degradation. The rate of sweat released of each individu will have different value. Beside being influenced by external factor such as sport intensity (low, medium, high), sport duration, temperature and environmental condition during exercise, the amount of sweat released is also affected by internal characteristics of individu such as genetic factor, body weight and the level of body fitness.

According to the study on the average mentions that the rate of sweat released during exercise at competitive level is around 0.4-1.4 L per hour. Ideally, in the training or also in athlete match it is recommended to drink water regularly so that the hydratino level in the body can be maintained. With consumption pattern of hydration requirement is expected to be able to reduce the fluid in the body after training/match can restore to normal, it can be used as guidance of fluid requirement after training or match, as follows:

a. After training/sport match there are 2 factors which should be re-supplied in the body which are fluids to replace the sweat and carbohydrate to refill the storage of "fuel" used during the exercise.
b. Drink at least 1-1.5 L fluid every 1 kg of body weight loss.
c. Drink gradually in the interval of 0-2 hours after exercise. Drink selection: mineral water, sport drink or fresh fruit juice (watery)
d. Sport drink and fresh fruit juice (watery) can simultaneously supply carbohydrate and fluids fast for the body.

e. Other alternatives to supply carbohydrate and fluids for the body are the combination of fresh fruits and mineral water. Select fresh fruit which can be absorbed fast so that it will be optimal in replacing energy after exercise: papayas, watermelons, bananas, raisins.
f. Re-observe the urine color to assure the good hydration level.

RESEARCH METHOD

1. Research Design

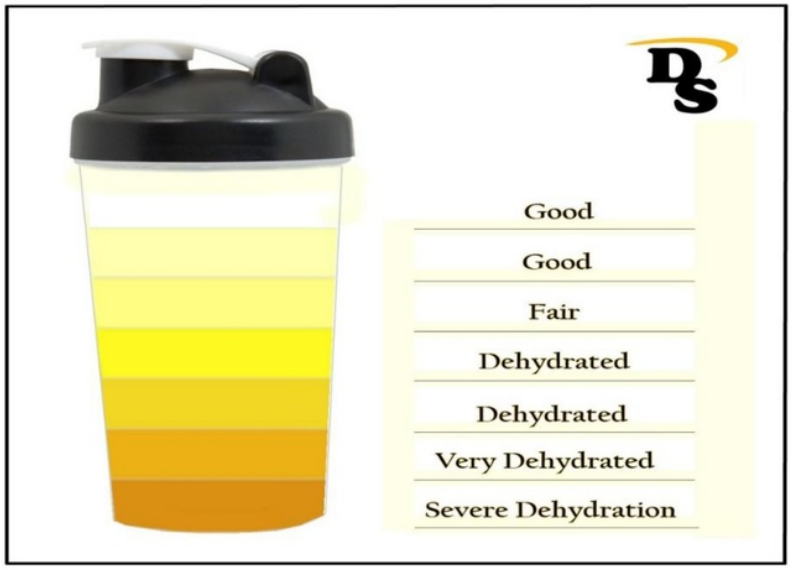
This study is research with *Mixed methods* design, for the data sampling and processing are conducted by two methods, qualitative and quantitave which are performed continuously. Quantitative method is performed in fluid consumption estimation, whereas qualitative method is undertaken to probe hydration status in tennis athletes.

2. Research population and Subject

The subject of study Relationship between Hydration Status and Fluid Consumption in Tennis Athletes. Sampling technique used is the whole Tennis Athletes of Training Centre of Yogyakarta (Sampling population) which will be prepared for PON competition of 8 people, consisting of: male athletes of 4 people and female atheletes of 4 people.

3. Research Instrument

In the Tennis Athletes of Training Centre of Yogyakarta of quantitative research in form of Food Recall 24 hours, then the amount of food and drink intake is estimated to count the amount of food calories and the fluid and the types of drink consumed in one ady before the actual match simulation. Meanwhile, in qualitative study by using urine sample taken after the athletes conduct tennis match (match simulation), then urine color is adjusted to urine color indication. The table of urine color is as follows:



Source: www.google.com/search?q=urin+colour+chart&client=firefox-a&rls=org.

4. Data analysis technique

1. Requirement test (Data Analysis Assumption)

In this study, the data is analyzed by using parametric statistics, which are multiple regression analysis, there are several requirements to meet, such as:

a. Normality test

Normality test is intended to show that the samples taken from the population has normal distribution. In this study, normality test employs Kolmogorov-Smirnov test, with criteria if $p>0.05$, then the data is concluded normal, and otherwise, if $p<0.05$ then data is not normal.

b. Linearity Test

Linearity test is performed by looking for the similarity of regression line of independent variable X to dependent variable Y. Based on the regression line made, then significance of regression line coefficient and linearity is being tested. (Sulistyo, 2010). In this study, F_{Beda} (*Deviation from Linearity)* is employed, with criteria if it is obtained price of F_{hitung} with $p>0,05$ meaning that it is not diverged from linearity, so that the relationship is linear.

2. Corellatio and Regression Analysis

Hypothesis is interim result of the research problem. To prove the hypothesis stated, then hypothesis testing is performed. Hypotesis test is undertaken after performing analysis test. In this study discussing: There is Relationship between Hydration Status and Fluid Consumption in Tennis Athletes of Training Centre of Yogyakarta, then it is included in associative hypothesis criteria.

RESEARCH RESULTS AND DISCUSSION

1. Respondent Characteristics

The respondents of this study are male athletes and female athletes of Training Centre of Special Region of Yogyakarta prepared for Pre-PON match of 8 people who are 4 male athletes and 4 female athletes with age range of 15-20 years. The characteristics of the respondents of athletes of Training Centre of Yogyakarta, is briefly presented in the following table:

Table 4.1 Characteristics of Research Respondents based on Gender

Respondent Characteristics	Description	f(n)	%
Gender	Male	4	50
	Female	4	50
Total		**8**	**100**
Age (year)	15-16	2	25
	17-18	2	25
	>18	4	50
Total		**8**	**100**
IMT	Thin	0	0
	Normal	5	62,5
	Overweight	3	37,5
	Obesity	0	0
Total		**8**	**100**

Table 4.1 shows that the respondents consist of 4 males (50%) and 4 females (50%). The distribution of the respondents in this study based on gender is equal with percentage

of 50%. The most of respondents in this study is aged more than 18 years of 4 people (50%), whereas the respondent characteristics based on body mass index are mostly normal of 5 people (62,5%). The data of respondent characteristics visually can be seen in the following diagram:

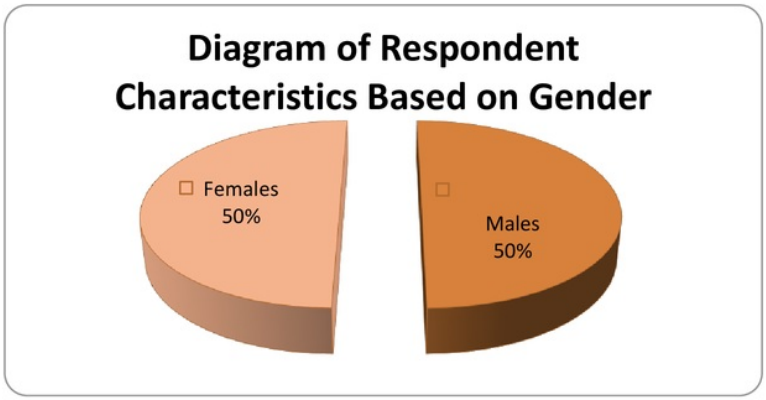


Figure 1. Respndent Characteristics Based on Gender

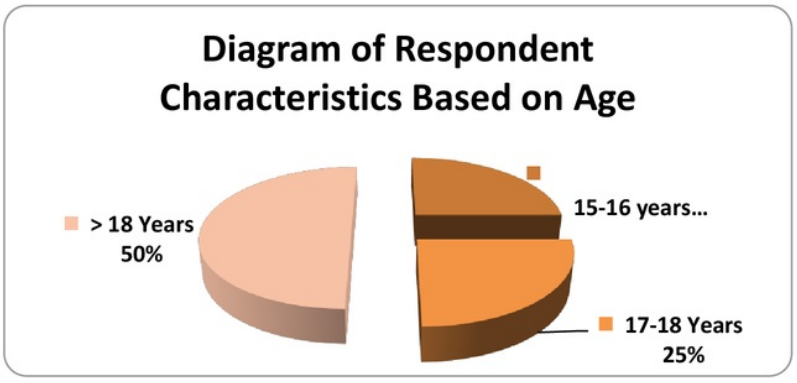


Figure 2. Respondent Characteristics Based on Age Distribution

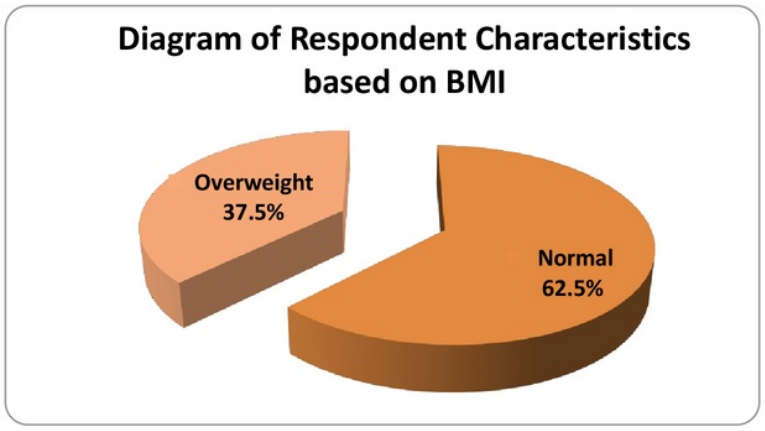


Figure 3. Respondent Characteristics Based on BMI

2. Description of Research Variable

a. Hydration Status

Assessment on hydration status of the respondents in this study based on the result of urine color testing. The sampling of urine is performed after the athletes perform tennis match (match simulation), then the urine color is adjusted to urine color indicator. The provision of urine color indication is if it shows 1-2 then the hydration status of the respondent is good, 3 means the hydration status is fair, 4-5 mean that the hydratin status is dehydrated, 6 menas dehydration status is very dehydrated, and 7 means the hydration status is severe.

Based on the result of data analysis by means of computer software, it is obtained central tendency value as follows: mean of 21,48; median of 21,30; mode of 20,3; and standard deviation of 2,288: and the lowest score is 16,0 and the highest score is 25,9.

The distribution of hydration status frequency of the tennis athletes of Training Center of Yogyakarta based on the score category in the table 4.3 below.

Table 4.3 Data Distribution of Hydration Status in Tennis Athletes of Training Center of Yogyakarta

No.	Category of Hydration Status	Normal/ Category Interval	Frequency	
			f (n)	%
1.	Good	1-2	1	12,5
2.	Fair	3	0	0
3.	Dehydrated	4-5	4	50
4.	Very Dehydrated	6	0	0
5.	Severe	7	3	37,5
Total			**8**	**100**

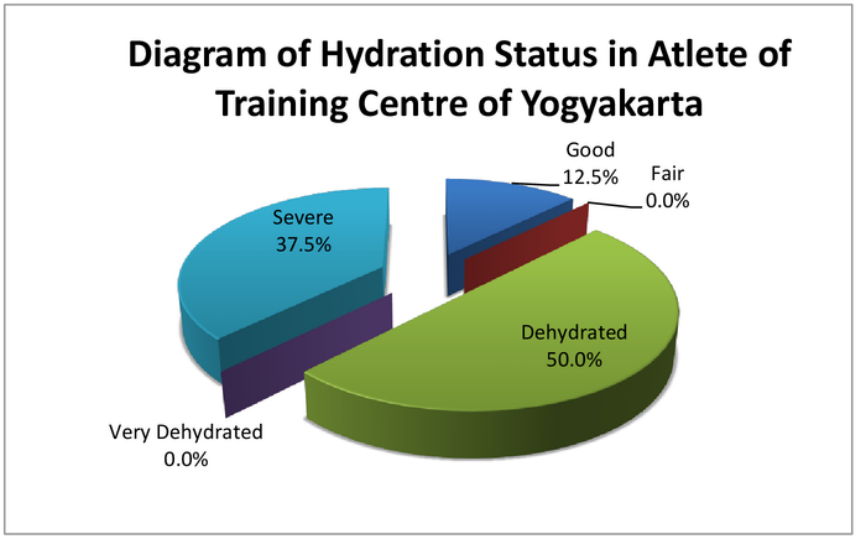


Figure 4. Hydration Status in Tennis Athletes

b. **Fluid Consumption**

Assessment fluid consumption in Tennis Athletes of Training Center of Yogyakarta in this study is measured by using questionnaires in form *Food Recall* 24 hours, then the amount of fluid consumed is estimated. The result of data analysis of fluid consumption shows central tendency value as follows: mean of 138,27; median of 139,00; mode of 153; and standard deviation of 23,199; and the lowest score of 97 and the highest score is 179.

The distribution of data frequency of fluid consumption data in Tennis Atheletes of Training Center of Yogyakarta can be seen in the table 4.4 below.

Table 4.4 Frequency Distribution of Fluid Consumption of Tennis Athletes of Training Center of Yogyakarta

Type of Drink	Drinking Intensity	The Number of Glasses/Drinks						Total
		0 f(n)	<¾ f(n)	1 f(n)	1 ½ f(n)	2 f(n)	> 2 ½ f(n)	f(n)
Mineral Water	3+ times/ day	0	0	0	0	0	8	**8**
Total		**0**	**0**	**0**	**0**	**0**	**8**	**8**
100% Fruit Juice	1x/week	0	0	0	1	0	0	**1**
	2-3x/ week	0	0	1	0	0	0	**1**
	4-6x/ week	0	0	2	2	0	0	**4**
	1x/ day	0	0	2	0	0	0	**2**
Total		**0**	**0**	**5**	**3**	**0**	**0**	**8**
Packed Fruit Juice	Never	1	0	1	0	0	0	**2**
	1x/ week	0	0	0	2	0	0	**2**
	2-3x/ week	0	0	2	0	0	0	**2**
	4-6x/ week	0	0	2	0	0	0	**2**
Total		**1**	**0**	**5**	**2**	**0**	**0**	**8**
100% Vegetable Juice	Never	2	1	1	0	0	0	**4**
	1x/ week	0	2	1	0	0	0	**3**
	2-3x/ week	0	0	1	0	0	0	**1**
Total		**2**	**3**	**3**	**0**	**0**	**0**	**8**
Milk	4-6x/ week	0	0	1	0	0	0	**1**
	1x/ day	0	0	3	0	1	0	**4**
	2+ x/ day	0	0	1	0	1	0	**2**
	3+ x/ day	0	0	0	0	0	1	**1**
Total		**0**	**0**	**5**	**0**	**2**	**1**	**8**
Low-fat milk	Never	3	1	1	0	0	0	**5**
	1x/ week	0	0	1	0	0	0	**1**
	1x/ day	0	0	2	0	0	0	**2**
Total		**3**	**1**	**4**	**0**	**0**	**0**	**8**
Soft Drink	Never	4	1	0	0	0	0	**5**
	1x/ week	0	0	2	0	0	0	**2**
	4-6x/ week	0	0	1	0	0	0	**1**
Total		**4**	**1**	**3**	**0**	**0**	**0**	**8**
Low-sugar Soft Drink	Never	3	3	0	0	0	0	**6**
	1x/ week	0	0	1	0	0	0	**1**
	2-3x/ week	0	0	1	0	0	0	**1**
Total		**3**	**3**	**2**	**0**	**0**	**0**	**8**
Soft drink without soda (pop ice, bottled tea etc)	Never	1	1	0	0	0	0	**2**
	1x/ week	0	0	2	0	0	0	**2**
	2-3x/ week	0	0	2	1	0	0	**3**
	4-6x/ week	0	0	0	1	0	0	**1**
Total		**1**	**1**	**4**	**2**	**0**	**0**	**8**
Sweet Tea	1x/ week	0	0	2	0	0	0	**2**
	4-6x/ week	0	0	1	0	0	0	**1**
	1x/ day	0	1	1	1	1	0	**4**

	2+ x/ day	0	0	1	0	0	0	**1**
Total		**0**	**1**	**5**	**1**	**1**	**0**	**8**
Coffee with Cream and Sugar	Never	5	1	0	0	0	0	**6**
	1x/ week	0	0	1	0	0	0	**1**
	2-3x/ week	0	0	1	0	0	0	**1**
Total		**5**	**1**	**2**	**0**	**0**	**0**	**8**
Non-alcoholic Drink (syrup, nutrisari, etc)	Never	1	1	0	0	0	0	**2**
	1x/ week	0	0	2	0	0	0	**2**
	2-3x/ week	0	0	4	0	0	0	**4**
Total		**1**	**1**	**6**	**0**	**0**	**0**	**8**
Hypotonic/Isotonic Drink	Never	3	0	1	0	0	0	**4**
	2-3x/ week	0	0	1	0	1	0	**2**
	4-6x/ week	0	0	1	0	0	0	**1**
	1x/ day	0	1	0	0	0	0	**1**
Total		**3**	**1**	**3**	**0**	**1**	**0**	**8**
Energized Drink	Never	5	3	0	0	0	0	**8**
Total		**5**	**3**	**0**	**0**	**0**	**0**	**8**

Based on the frequency distribution above, it is seen that the most of the drink type consumed by the respondents is mineral water of 8 (100%) respondents with intensity more than 3 times a day and 2 ½ glass per drink. Whereas the drink type least consumed by the respoindents is energized drink of 8 (100%) respondents with the intensity of never or seldom (less than once per week) and less than ¾ glass per drink.

The types of beverages of which the average of consumption intensity are categorized as frequently consumed (minimally once a day) are fresh water, milk and sweet tea. The types of beverages of which the average of consumption intensity are categorized as occasionally consumed (maximum 4-6 times a week) are pure fruit juice, packaged fruit juice, pure vegetable juice, soft drinks without soda (pop ice, *teh botol*, etc.), and non-alcoholic beverages (syrup, fruit tea, *nutrisari*, etc.); meanwhile, the types of beverages of which the average of consumption intensity are categorized as never or rarely consumed (maximum once a week) are low fat milk, soft drink, low sugar soft drink, coffee with cream and sugar, hypo/isotonic drink and energy drink.

3. Analysis Requirement Test (Assumption Test)

In this study, the data analysis was conducted using parametric statistics in the form of double regression analysis. Therefore, some assumptions or analysis requirements should be complied, they are: (1) normal distribution data, and (2) association between independent variable and linear dependent variable.

1. Normality Test of Distribution

Normality test of data distribution in this research utilized Kolmogorov-Smirnov method. The in-brief calculation result of normality test of distribution is presented in the table 7 as follow.

Table 4.5 Summary of Data Normality Test Result

Variable Data Distribution	*Kolmogorov-Smirnov Z*	p-Value	Conclusion
Liquid Consumption (X)	0,669	0,762	**Normal**
Hydration Status (Y)	0,620	0,837	**Normal**

According to the table above, it is known than the Kolmogorov-Smirnov Z are all p>0.05. The conclusion from this result is that there is no difference between observation frequency (the result) and normal expectation frequency. It means that all data in this study are normally distributed. Therefore, all data in this study met the assumption of distribution normality.

2. Linearity Test

Linearity test is conducted using SPSS computer software. The summary of linearity test result can be seen on the table 4.6 as follow.

Table 4.6 Summary of Association Linearity Test Result

Functional Association	F counted	p Value	Conclusion
Association between liquid consumption (X) and hydration status (Y) of Tennis Athletes in Pelatda DIY	0,912	0,472	**Linear**

4. Hypothesis Testing

Hypothesis of this research is: "There is association between liquid consumption and hydration status of Tennis Athletes in Pelatda DIY." The hypothesis is an alternative hypothesis (H_a), in which the regards of hypothesis testing it changed into null hypothesis (H_o), into: "there is no association between liquid consumption and hydration status of Tennis Athletes in Pelatda DIY".

Those hypotheses were tested using correlation analysis. A computer program called SPSS for windows software was utilized for data analysis. From the computation, we obtained the data as presented in table 4.7 as follow.

Table 4.7 Summary of Correlation Analysis Result

Tested Variable	r_{XY}	p (sig.)	Note
Liquid Consumption (X) * Hydration Status (Y)	-0,278	0,506	**Insignificant**

From the table above, it can be seen that the coefficient of product moment correlation (Pearson Correlation) between liquid consumption and hydration status as many as r_{XY} - 0.278 with p (sig.) – 0.506. The fact shows that >0.05; and the vector is negative (-); therefore the H_0 is accepted and Ha is rejected. Thus, it can be concluded that there is an insignificant negative association between the total liquid consumption and hydration status of Tennis Athletes in Pelatda DIY. It means that there is no association between the total liquid consumption from the beverages they drink every day and the hydration status according to the measurement of urine color.

Discussion

Data analysis result on respondents characteristics exhibits that the distribution of respondents gender is equal, meaning that there are 50% males and 50% females; Meanwhile, according to the characteristics regarding ages, the majority of respondents are older than 18 years old (50%); this can be seen from Body Mass Index (BMI) which shows that majority of research respondents are included in normal BMI with the percentage of 62.4%.

Data analysis on the variable of liquid consumption of Tennis Athletes in Pelatda DIY showed that there are three types of beverages which are frequently consumed by the respondents. They are fresh water, milk and sweet tea; Meanwhile, the types of beverages which are categorized as occasionally consumed include five types of beverages i.e., pure fruit juice, pure vegetable juice, packaged fruit juice, soft drink without soda, and non-alcoholic beverages. The types of beverages which are included in the category of never or rarely consumed by respondent comprised of 6 types i.e, low-fat milk, soft drink, low-sugar soft drink, coffee with cream and sugar, hypo/isotonic drink, and energy drink.

Data analysis result on hydration status variable showed that among 8 Tennis Athletes in Pelatda DIY, as many as 1 (12.5%) respondent is on a good hydration status, 4 (50%) respondents suffer from dehydration and 3 (37.5%) respondents are extremely dehydrated. This hypothesis testing on this study concluded that there is an insignificant negative association between liquid consumption with hydration status of Tennis Athletes in Pelatda DIY. It means that there is no association between total liquid consumption from the beverages they drink every day and hydration status according to the measurement of urine color. The null hypothesis, which stated that there is no significant association between total liquid consumption and hydration status of Tennis Athletes in Pelatda DIY, may be rejected if we reduced other factors which may affect the research result. According to Andayani (2013) people's need of water is affected by age, gender/sex, environment temperature, physical activities, physical size or nutrition status. Gender/sex, nutrition status and other factors may affect the result of this research. Moreover, the null hypothesis may be rejected if the respondents of this research consume liquid enhancer drinks only and do not consume any liquid which may cause dehydration.

According to International Olympic Committee (IOC) in Penggalih & Hayati (2007: 193), consuming coffee, tea and alcohol in such high doses may cause a degradation in body fluids level because those kinds of liquid or beverages have a reactive effect as diuretics. The respondents in this research are not only consuming liquid enhancer drinks, but also consuming beverages or liquid which may reduce body fluids level. It is predicted that this action may affect the association between total liquid consumption and hydration status. Therefore, an arrangement on liquid consumption of athletes prior to, during and after training is needed. It is expected for the athletes to avoid or reduce the consumption on liquid with may cause degradation on body fluids level and to add liquid consumption which may increase body fluids level such as sport drink.

Dehydration undergone by athletes is increasingly developing; this is caused by the lack of fluid consumption either in the competition or in the training. The athletes undergo dehydration easier than non-athletes. Tennis athletes are the athletes performing high-intensity exercise. Tennis athletes are potential to experience dehydration if losing fluid due to the increase of water discharge through sweat and the respiration is not balanced with adequate fluid consumption. Adolescent athletes have higher dehydration risk than adult athletes. Ideally, in the training or in the match the athletes are suggested to drink water regularly so that the hydration level in the body can be maintained. The lack of liquid consumption which causes dehydration is dangerous for health and will harden body workload. During physical exercise, dehydration cause the lowering of concentration level, reaction speed, increasing body temperature and hindering energy production speed. Dehydration, together with decrease in carbohydrates store, are the two major causes the decrease of body performance during exercise. Therefore, athletes or sport activists should have a good drinking strategy in order to keep their own body hydration. The danger of dehydration is it is reducing cognitive competence due to difficulty in concentrating, risk of urinary tract infection and the forming of kidney stones. Drinking adequately and not holding urine are the most effective ways to prevent urinary tract infection and reducing stamina and work productivity through headache, lethargy, seizure and loss of consciousness. Losing body fluids up to 15% will damage one's body fatally. The needs of water for drinking are various. It depends on age, gender/sex and activity. Total body needs for water is 1 milliliter per kilo calorie of body energy requirement. Supposing in teenagers and adults whose energy needs are 1,800-3,000 kcal, their needs of liquid are approximately 1.8-3 liter a day. Generally, 1/3 of their needs is fulfilled by food intakes, thus water consumption that they need to take daily is as much as 2 liter a day. Fruit juice is one of beverages that can fulfill their needs of body fluids. Not only can fulfill body needs for liquid, fruit juice can also be a benefit for the body for it contains an essential antioxidant that important for health.

Hydration level can be measured from excreted urine color. This is the guideline to identify whether a person is suffered from acute dehydration or not. In order to verify that human body is not lack of liquid, everyone can check it from excreted urine color. The level of urine color shows the liquid condition and liquid balance within body. If the urine is clear, it shows a good body hydration status. When the urine shows a dark orange color, it means that the body is in need of more water intake immediately so that liquid loss within body can be handed right away and it will keep the balance of body liquid. In physical exercise, consuming adequate portion of water and completing it with consuming a proper portion of nutrition will help the body for practicing in a longer period, preventing early fatigue and efficiently helping skill improvement as well as helping speeding up recovery process after training/competition.

Conclusion

In accordance to the research findings and discussion presented on previous parts, some conclusions are drawn as follow:

1. There are three kinds of liquid which are frequently consumed by respondents i.e., fresh water, milk and sweet tea; Meanwhile, the types of beverages which are categorized as occasionally consumed include five types of beverages i.e., pure fruit juice, pure vegetable juice, packaged fruit juice, soft drink without soda, and non-alcoholic beverages. The types of beverages which are included in the category of never or rarely consumed by respondent comprised of 6 types i.e, low-fat milk, soft drink, low-sugar soft drink, coffee with cream and sugar, hypo/isotonic drink, and energy drink.

2. Hydration status of Tennis Athletes in Pelatda DIY shows that majority of the athletes suffer from dehydration (50%). Among 8 Tennis Athletes in Pelatda DIY, as many as 1 (12.5%) respondent is on a good hydration status, 4 (50%) respondents suffer from dehydration and 3 (37.5%) respondents are extremely dehydrated.

3. There is no significant association between total liquid consumption and hydration status of Tennis Athletes in Pelatda DIY.

Corresponding to some conclusions above, it is suggested that there is an arrangement on liquid consumption of athletes prior to, during and after training is needed. It is expected for the athletes to avoid or reduce the consumption on liquid with may cause degradation on body fluids level and to add liquid consumption which may increase body fluids level such as sport drink.

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