

**KNOWLEDGE, ATTITUDE AND PRACTICES OF WATER INTAKE  
AMONG UNDERGRADUATE STUDENTS IN UNIVERSITY OF  
ELDORET, KENYA**

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**ABSTRACT**

Water is essential to body mechanisms but this fact is overlooked by a large number of people due to limited knowledge on effects of low intake on health and wellbeing. This study attempted to provide some sense of current knowledge of water including overall patterns of intake, factors linked to intake and the amount of water required. The research was conducted in University of Eldoret undergraduate students aged 18-25 years using a cross-sectional survey. A sample population of 344 was used to derive descriptive data using self-administered questionnaires. The data was analyzed on SPSS 22. Most of the respondents had limited knowledge on basic facts on water and its adverse effects on health and they also consumed less water than the recommended daily amount especially when the environment was not conducive. Nutrition knowledge and course taken ( $r = .2052^{**}$ ) and water intake practices and year of study ( $r = .2067^{**}$ ;  $P < .001$ ), respectively, were main determinants of positive water intake behavior. There is need to enhance nutrition education especially regarding water intake so as to encourage positive attitudes and practices among consumers. Institutions are also encouraged to work on healthy and comfortable drinking water points which may enhance daily water intake among their populations.

**Keywords:** Daily water intake, University students, Knowledge, Attitudes, Practices

**1. INTRODUCTION**

**1.1 Background**

Water is a body's principal chemical nutrient components and makes up about 60% percent of the human body. Every system in the body depends on water. For example, water flushes out toxins, carries nutrients, regulates the body temperature, provides a moist environment, plumps up the skin and protects and cushions body joints and organs. Simple observation of the general population suggests that drinking practices have changed significantly over the years. According

to the World Health Organization (WHO), dehydration is the adverse consequence of inadequate water intake. The symptoms of acute dehydration vary with the degree of water deficit and hydration is a recognized determinant of health status for all population groups (WHO, 2016).

Healthy humans regulate daily water balance remarkably well throughout their lifespan despite changes in biological development and exposures to stressors on hydration status. The benefits of maintaining water balance has been long acknowledged for health and survival. It typically makes up the main component (60%) of the human body. The disturbed water balance may lead to potential life threatening events like dehydration and water intoxication hyponatremia (Jusoh, 2010).

A standard of eight glasses a day which equates to two litres of water is the recommended daily intake of water (Williams *et al.*, 2001) and the primary determinant of maintenance water requirement appears to be metabolic but the actual estimation of water requirement is highly variable and complex.

The National Food Consumption Surveys indicate that a portion of the population may be chronically mildly dehydrated. Several factors may increase the likelihood of chronic, mild dehydration, including poor thirst mechanism, dissatisfaction with the taste of water, common consumption of the natural diuretics caffeine and alcohol. Mild hydration can have negative health effects such as impaired physical function and cognitive decline. A sufficient water intake is needed to combat dehydration which saps energy, causes fatigue and reduces concentration (Alfred Gilman, 2007).

Dieticians are encouraged to monitor and promote fluid and water intake among all their clients and patients through education and help them design a fluid intake plan (Kleiner, 1999). Research indicates that fluid consumption in general and water consumption in particular has an effect on various conditions such as risk to urinary infections, cancers of the breast, childhood and adolescent obesity, mitral valve prolapse, salivary gland function and overall health for the elderly (Rajiah *et al.*, 2012).

All people should access clean water for consumption at all times to meet the daily intake requirement. Most consumers take drinking water for granted and some do not have knowledge on how hydration affects health and well-being, even the impact of water in chronic diseases. Despite how crucial water is; a significant number of people fail to consume recommended levels of fluids each day. Perhaps it is the ambiguous nature of water drinking such that many people do not prioritize it.

This research investigated the knowledge, attitudes and practices of daily water intake among University students. The factors that hinder the correct intake of water were assessed and the relationships between variables were determined.

### **1.2 Factors Affecting Water Intake**

Human water requirements are not based on the minimum intake as it might lead to water deficit because of numerous factors that modify water needs (metabolism, climate, physical activity, diet and so on). Instead, water needs are based on experimentally derived intake levels that are expected to meet nutritional adequacy for members of a healthy population, this is adequate intake determined for adolescents, infants, adults and elderly individuals (Sawka et al., 2005)

Numerous factors such as high ambient temperature and humidity levels, physical activity and exercise and heat stress in particular influence water needs. Thus, the adequate water intake determined for standard conditions does not meet these particular requirements and adequate water intake must be increased in relation to these conditions (Jequier and Constant, 2009).

Hot and humid weather increases sweat losses and necessitates addition intake of fluids. Heated indoor air can also increase sweat losses during cold weather. Altitudes greater than 2500m may trigger increased urination and rapid breathing which may also cause fluid losses. Illness can effect water losses, conditions like fever increase water losses by 200ml/day for an increase in each degree Celsius in body temperature. Vomiting and diarrhea can also cause a tremendous loss of water and electrolytes in a short amount of time (Mayo clinic, 2014). If fluid intake is not increased and dehydration left untreated, it may become severe. In untreated dehydration, urination stops, the kidneys fail and the body can longer remove toxic waste and products. For sedentary to moderately active individuals under temperate conditions, water is lost from the body urine via urine, feces, respiration and evaporation. The minimal amount of fluid loss that occurs is referred to as obligatory water loss. However, a variety of factors can affect the obligatory water loss. For example, obligatory urine loss occurs because of the need to remove various solutes from the body. The minimum water required for urine is dependent on daily solute excretory load, which is determined by diet and the maximum urinary concentration achievable. (Grandjean, 2004). Therefore, the water needs to be replaced to avoid dehydration.

### **1.3 Water Intake and Sources**

Water intake includes that which is consumed as food and beverage, along with relatively small volumes of water created by oxidation of food and breakdown of body tissue. Some reports on water intake report only tap water, and therefore water provided by beverages is not included in the calculations. The estimates of mean water intake rates reported in literature range from 1.04 to 1.63L/person/day (Williams *et al.*, 2001). This is on top of the water provided by what you eat.

Humans ingest water as plain drinking water, as beverages and in food. Water in food can be inherent or added during preparation and also produced during metabolism (Grandjean, 2004). When choosing the drinks one should be aware that although all of them provide water, some also contain essential vitamins, minerals, they may also provide energy (calories). Fruit are an excellent source of water. Water melon is 90% water it ranks highest on the list. Oranges, grape fruit and melons like cantaloupe and honey dew are also strong contenders.

Vegetables though not full of water as fruit; they can also provide a nutrient rich water source example celery, cucumbers, tomatoes and green peppers. Food also contributes to the water intake, 20% of the water intake comes from food such soups and stews. So food can provide extra water on top of the 8 glasses of fluid one should consume.

Besides guzzling water, milk is a top choice to hydrate, it has essential nutrients such protein, B vitamins and calcium as well as water. Sodas even diet sodas can be hydrating, juices and sports drinks are also hydrating, one can lower the sugar content by diluting them with water (Soong, 2011). Drinking plain water is a great choice since it delivers fluid without adding calories.

#### **1.4 Attitude & Practice of Water Intake.**

A simple observation has been done of the general population suggesting practices of drinking water have evolved over the years. Nowadays it is common to see people carrying water bottles wherever they go during the day either in sedentary individuals or in people who perform regular physical activity (Jusoh, 2010).

There are tips set to guide in drinking more water they include: On a sedentary day, try to drink around two litres of water, one should also start by drinking a glass of fresh water when they get up in the morning. Those who are not used to drinking water regularly should try initially replacing just one of their other drinks a day with fresh water, increasing consumption as the weeks go by. Individuals should ask for a glass of tap water to go with their coffee and tea in the cafes. One should drink a glass of water before and during each meal, hot water with fresh mint, lemon balm or a piece of fruit in like lime, lemon, orange etc. often helps those who want a hot drink. Individuals should also carry chilled water with them all the time. For the active individuals during exercise, they should drink at 10-15 minute intervals or think of it as a full glass every thirty minutes, drink slowly and drink early, it is physically easier to do this when one is feeling fresh. One should also keep checking their urine as a general guide of hydration, it should be plentiful, pale in color and odorless.

In addition, individuals should choose beverages that meet individual needs example if one is watching calories, he/she should go for non-caloric beverages or water. They should eat more fruits and vegetables since their high water content will add to hydration (Chang, 2008).

### **1.5 Research Methodology and Design**

A cross-sectional survey was conducted to determine the knowledge, attitudes and practice of daily intake. The research was conducted in University of Eldoret situated approximately 9km along the Eldoret-Ziwa road in Eldoret town, Uasin Gishu County, Kenya. The population of interest was the undergraduate students aged 18-25years.

The sample size was calculated using fisher formula as recommended by Fisher et al., (2003) and 344 respondents were selected using non-probability sampling. The study applied both primary and secondary methods of data collection in order to give a complete viewpoint. The data collection methods included self-administered questionnaires. Descriptive data analyses were carried out on SPSS 22.

## **2.0 RESULTS AND DISCUSSIONS**

### **2.1 Characteristics of Respondents**

More males 193(56%) than females 151(44%) participated in the study, whereas there were more respondents in the age bracket of 22-25 179(52%) and those in year 3-4, 182(53%) were also higher than those between years 1-2. Those who were science oriented were 227(66%) and art based were 117(34%) as shown in Table 4.1.

**Table 2.1: Characteristics of Respondents**

<b>Variables</b>		<b>Frequency(n)</b>	<b>Percent (%)</b>
Gender	Males	193	56
	Females	151	44
Age (years)	18-21	165	48
	22-25	179	52
Year of Study	1-2	162	47
	3-4	182	53
Course taken	Science based	227	66
	Art based	117	34

N=344

**2.2 Nutrition Knowledge**

The results indicated that 141 (41%) respondents had taken a nutrition class in college, out of which 65% were in 3<sup>rd</sup>-4<sup>th</sup> year of study, of which 108(76%) of them pursued a science oriented discipline. The respondents who indicated that they occasionally read nutrition articles on the internet and other media were 220(64%), out of which a majority of them, 132(60%) and 154(70%) were 3<sup>rd</sup> -4<sup>th</sup> year students and the science oriented disciplines respectively. It is important to note here that some of the respondents (59%) had neither taken a nutrition class and some (36%) did not venture into reading articles on nutrition.

**Table 2.2: Respondents Level of Nutrition Knowledge**

Variable	Whole population N= 344	Year of study		Discipline	
		1-2	3-4	Science	Arts
I have taken a nutrition class in college	141(41%)	49(35%)	92(65%)	108(76%)	33(23%)
I occasionally read some articles on nutrition on the internet, books and magazines	220(64%)	88(40%)	132(60%)	154(70%)	66(30%)

N=344; multiple responses allowed

**2.3 Knowledge on Water**

Only 86(25%) of the respondents agreed that the body requires frequent rehydration, whereas 289(84%) indicated that dehydration can be harmful to health and only 76(22%) of them stated that they knew the amount of daily of water intake for a normal adult. Half of the respondents, 172(50%) indicated that they were not sure that alcohol and caffeine cause dehydration whereas a majority of the respondents 275(80%) did not agree to the fact that thirst is the best indicator of dehydration and neither did they agree 227(66%) that excessive sweating, thirst, cramping are indicators of dehydration, and only 83(24%) agreed and 186(54%) disagreed to the fact that less intake of water causes health hazards.

**Table 2.3: Respondents Knowledge on Water**

Statement on knowledge on water intake	Agree	Not sure	Disagree
Do you know that the body requires frequent rehydration?	86(25%)	258(75%)	-
Do you know that dehydration can be harmful to your health?	289(84%)	41(12%)	14(4%)
Do you know the amount of daily of water intake for a normal adult?	76(22%)	223(65%)	45(13%)
Do you know that alcohol and caffeine cause dehydration?	89(26%)	203(59%)	52(15%)
Do you know that an air conditioned room can cause dehydration?	127(37%)	172(50%)	45(13%)
Thirst is the best indicator of dehydration?	52(15%)	17(5%)	275(80%)
Excessive sweating, thirst, cramping are indicators of dehydration	52(15%)	65(19%)	227(66%)
By monitoring the color of urine, one can judge if he/she is dehydrated	145(42%)	69(20%)	131(38%)
Dehydration decreases athletic performance	114(33%)	116(34%)	114(33%)
Do you know that less intake of water causes health hazards?	83(24%)	76(22%)	186(54%)

N=344; multiple responses allowed

## **2.4 Attitude towards Water Intake**

The respondents who agreed that they use thirst alone as a way of telling if they were dehydrated were 148(43%) whereas 199(58%) strongly agreed that they felt that the drinking water location was one of the contributory factors for drinking less water. A majority of the respondents 206(60%), strongly agreed that that carrying own drinking water bottle would help them to drink more water whereas 210(61%) strongly agreed that an awareness program about daily water intake could change their outlook towards regular water intake. A majority of the respondents 206(60%) also strongly agreed that uncertainty pertaining to quality of water led to low water intake, whereas 213(62%), strongly agreed that body hydration knowledge may affect their intake of water positively.

**Table 2.4: Respondents Attitude towards Water Intake**

Statement	Strongly agree	Agree	Disagree	Strongly disagree
I use thirst alone as a way to tell if am dehydrated	89(26%)	148(43%)	52(15%)	55(16%)
I feel that drinking water location is one of the contributory factor for drinking less water	199(58%)	110(32%)	17.5(5%)	17.5(5%)
I feel that carrying own drinking water bottle will help drink more water	206(60%)	103(30%)	17(5%)	17(5%)
I feel that awareness program about daily water intake will change my outlook towards regular drinking	210(61%)	96(28%)	21(6%)	17(5%)
I feel that my thirst is less in air conditioned rooms	52(15%)	52(15%)	172(50%)	68(20%)
I feel that uncertainty of quality of water makes me drink fewer amounts	206(60%)	68(20%)	41(12%)	29(8%)
Knowing the hydration knowledge could affect my intake of water	213(62%)	86(25%)	21(6%)	24(7%)

N=344

### **2.5 Practice towards Daily Water Intake**

A majority of the respondents 218(63%) stated that they do not carry their own water bottle whereas 72(21%), and 213(62%) indicated that they take half a litre and one litre of water everyday respectively and that they take the water twice 162(47%), and three times 103(30%) a day. However, 59(7%) respondents indicated that they do not consume any water and 241(70%) indicated that they have had a feeling of dehydration at some point in life while 231(67%) indicated that they had experienced a health problem due to drinking water whereas only 86(25%) stated that they had not taken any fruit juices nor eaten a fruit 93(27%) in the past 7 days.



**Table 2.5: Respondents Practices of Daily Water Intake**

Variables	Yes	No	Not necessary
Do you carry your own water bottle	68(20%)	218(63%)	58(17%)
	Half a litre	One litre	None
How much amount of water do you drink in a day approximately?	72(21%)	213(62%)	59(7%)
Number of times you take water in a day	Once	Twice	Thrice
	65(16%)	162(47%)	103(30%)
	Yes	No	
Have you ever felt dehydrated at any time in life?	241(70%)	103(30%)	
Have you ever experienced any health problem due to drinking water?	231(67%)	113(33%)	
Have you ever had at least one drink of alcohol?	254(74%)	90(26%)	
	Once	Twice	None
During the <b>past</b> 7 days, how many times did you drink 100% fruit juices such as orange juice or mango juice?	234(65%)	34(10%)	86(25%)
During the past 7 days how many times did you eat fruit?	93(27%)	72(21%)	179(52%)

## 2.6 Correlation relationships between major variables of study

Nutrition knowledge correlated significantly positively and strongly with course taken ( $r = .2052^{**}$ ) and year of study ( $r = .1950^{**}$ ), respectively at  $P < .001$ . Water intake knowledge was also strongly positively correlated with course taken and year of study all at  $P < .001$  and positively but weakly correlated with gender and nutrition knowledge. This indicates that advancement in year of study gave the respondents a greater chance to interact with more courses that are related to nutrition and water and this happened more among the science oriented respondents. The attitude towards water intake was also positively correlated with all the variables, even though non-significantly. Water intake knowledge was significantly and positively correlated with gender, whereas water intake practices correlated negatively but significantly. A significantly positive correlation was noted with year of study and water intake

practices ( $r= 2067^{**}$ ;  $P<.001$ ), thus water intake practices improved as the respondents got more advanced in their studies, and were able to positively change their attitude ( $r=.1599^*$ ,  $P<.05$ ) and improve their water intake (Table 4.6).

**Table 2.6: Correlation matrix among all major variables**

	1.	2.	3.	4.	5.	6.	7.
1. Gender	–						
2. Course Taken	.0303	-					
3. Year of study	.0047	.0004	-				
4. Nutrition knowledge	-.0527	.2052**	.1950**	-			
5. Water intake knowledge	.1731*	.2096**	.3951**	.1570*	-		
6. Water intake attitude	.1046	.0261	.0635	.0691	.1089	-	
7. Water intake practices	-.1353*	.1624*	.2067**	.0033	.0246	.1599*	-

\*\* $P<.001$ ; \* $P<.05$

## 2.7 Discussion & Conclusion

Respondents were well knowledgeable in basic facts about water, especially that dehydration may cause health problems but they were not aware of the indicators and adverse effects of low water intake even though a majority of them indicated that they have experienced dehydration and that they do take alcoholic drinks often. The drinking water location and safety of water were contributing factors to drinking less water and the respondents felt that carrying their own water bottle would lead to regular water intake.

This study concludes that nutrition education strategies through media and courses taken and advancement in year of study contribute in raising levels of knowledge, improving attitude and practices towards water intake and should therefore be encouraged across the university. These aspects can also be more beneficial if the knowledge on benefits of sufficient water intake is passed to all the students earlier in their education system. Universities need to create enabling environments where students can access and exploit sources beyond the conventional classroom set up using media to enable them benefit from a wide range of authenticated water intake information. Science students who exhibited higher knowledge than Social science students may

help in developing positive nutrition habits within their peer networks. The ministry of health should work on introducing nutrition education interventions to encourage water intake among the population for better health benefits.

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