



## Survey of the Drinking Habits of 12-16 Year Old School Children of Islamabad, Pakistan

<sup>1</sup>Saima Nasir and <sup>1,2</sup>Jamila Ahmed

<sup>1</sup>Pakistan Council for Science and Technology, Islamabad, Pakistan

<sup>2</sup>Allama Iqbal Open University, Islamabad, Pakistan

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**Abstract:** Literature reporting the consumption habits of school children with reference to the drinking of water and other drinks is limited. The type and volume of drinks, consumed over 24 hours, were evaluated according to the gender and socioeconomic status of 551 school children, aged 12-16 years, from 9 schools of different localities of Islamabad, Pakistan.

These results revealed that 4.9% of the students consumed at least two glasses of water, 36.66% consumed 3-5 glasses, 37.2% consumed 6-8 glasses while remaining 21.23% students consumed more than eight glasses of water. Lower socio-economic status (LSES) group consumed the highest average of water on the day of study. Students of higher socio-economic status (HSES) consumed the highest average of fruit juices or fizzy drinks (13.44%) as well as of both milk products and juices (16.67%) while middle socio-economic status (MSES) group was the highest consumer of milk products (69.95%). LSES group (16.48%) consumed no other liquid except water.

This study aids in filling the gap in the literature by providing an analysis of the drinking habits of school children. It includes the consumption of plain water and other drinks. Overall drinking habits are satisfactory in the study group but a continuous effort and planning is required to maintain a healthy trend.

**Key words:** Drinking habits, plain water, school children, Pakistan.

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### INTRODUCTION

Medical experts across the globe accept the health benefits of drinking water. The most common and essential drink is water with no calories. It is considered as human body's most essential nutrient as human body carries a higher proportion of water than any other nutrients in it. Water covers almost 55% to 78% of the human body depending on the body size, age and gender. 60% of a child's body weight consists of water, which is considered as a significant trait to maintain various functions of the body, such as, adaptability of body temperature, maintenance of blood volume, the process of purging the waste products and the intracellular functioning. All these body functions are vital for the mental and physical well-being (Phipps *et al.*, 1991). The right amount of water consumption improves the functioning of the body system as it lessens the risk of colon cancer and aids in enhancing the cardiovascular health (McManus and Churchwell, 1994; Shannon *et al.*, 1996). On the other hand, the results of mild dehydration can have adverse effects as it aids in increasing the level of thirst, causes headache concentrated urine, lack of concentration besides physical performance. Further, it also induces

tiredness and irritability, dry or itchy skin and mucous membranes also causing weight loss (Kleiner, 1999; McCance and Huether, 1990). The right amount of water intake can actually boost up the metabolism and reduces the risk of dehydration. Resultantly, it aids in improving the attention and concentration faculty of an individual (Brander, 2003).

Hunter *et al.* (2004) observed that a child who was suffering from dehydration always depicted the symptoms, such as, tiredness or lack of interest in surroundings or exercise and mood deterioration. It also affects the mental performance of a child. Even 2% of the deficiency of fluid in the body weight has harmful impact on the performance of the system. Brown (2007) noted that when a child experienced thirst, his mental performance had already been reduced by 10%. The results reported by school teachers were significant in this context as they depicted the positive effects of higher water consumption on the performance of the students. They were more focused and active in their studies (Ellins, 2004). So, it is essential to consume adequate amount of water on a continuous basis in order to swap the obligatory losses from the human system through urine, stool and perspiration.

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**Corresponding Author:** Jamila Ahmed, Allama Iqbal Open University, Islamabad, Pakistan  
E-mail: jamisher@gmail.com

The water intake of children is higher than the adults as they have higher body water content relative to their body mass. The kidneys of a child are unable to handle the large amount of renal solute, water and the larger surface area per body mass. For this reason, the required water consumption of infants is 150 ml per kg of body weight, i.e., 1.5 ml per calorie. The recommendations of water intake set for generally healthy children (10-15 years) are 1.5-2 liters per day. It means that they need to consume at least 3 to 4 cups of water at school during the whole day (Balding, 2004; Department of Health, South Australia, 2005). The fact sheet of Consortium on the Obesity level of Chicago Children provided the information about the recommended consumption of water on daily basis by the children of 9-13 years of age. 8 cups of water were recommended for boys and 7 cups of water were recommended for girls. Children of 14-18 years require an average of 11 cups for boys and 8 cups for girls.

The major source of water for our bodies from the beginning has been plain drinking water. In addition, it can be obtained from food and non-nutritive beverages. These beverages may include fruit juices, fizzy drinks or milk based drinks like milk shakes, tea or coffee. Children and adolescents are reported to prefer other beverages over plain drinking water (Yule, 2002; Rugg-Gunn *et al.*, 2007; Tahmassebi *et al.*, 2006). Petter *et al.* (1995) scrutinized the patients' attitude towards consumption of drinks in a pediatric outpatient clinic. He suggested that majority of young children preferred to consume soft drinks, fruit juices, and other drinks in large quantity instead of plain water.

The high risk of weight gain is considered as one of the consequences of consuming sugar sweetened drinks by children on daily basis. These children prefer to eat less healthy diet and ignore the food items, such as, milk, carrying calcium and other essential nutrients required for their healthy growth. Caffeinated drinks should not be used particularly in hot weather because children are already losing water due to sweating and they are needed to increase the water intake in summer season. The common drink in Pakistan is tea. This caffeinated drink causes changes in children's behavior, such as, anxiety or panic attacks, stomach issues, headaches, lack of concentration or sleep. It also causes heart diseases, such as, increased heart rate and blood pressure. Additionally, dehydration occurs as caffeine makes the body lose water (KidsHealth, 2005). Evidence is growing to suggest that increasing consumption of water in the place of sweetened beverages, juices and tea could help combat obesity and maintaining good health. D'Anci *et al.* (2006) noticed that the "act of drinking may not be directly involved with a physiological need for water intake, but can be initiated by habit, ritual, taste, or a desire for warm or cooling effect". Various studies have been conducted in order to make a comparison of nutritional values of

consumption of different beverages, especially the consumption of sweetened beverages (Harnack *et al.*, 1999; Malik *et al.*, 2006; Wang *et al.*, 2008). Limited similar information is available for plain water (Fulgoni, 2007; De Castro and Taylor, 2008). The current study aimed at investigating the role and pattern of consuming plain drinking water by young school children in an urban setting. Descriptive statistics were employed for the analysis. This study will serve as a basis for future researches in the same domain as no literature is available for Pakistan on this perspective.

## MATERIALS AND METHODS

**Population:** Islamabad is the capital city of Pakistan and it is located in the northwest part of the country on Potohar Plateau. Population of Islamabad is 805,235 persons, spreading on an area of 906 sq km and elevation at 507 meters (1,663 ft) (Government of Pakistan, 1998; Islamabad the Capital, 2011). The climate of Islamabad exhibits an atypical form of a humid subtropical climate. It has hot summers that are accompanied by a monsoon season and followed by mild and wet winters. The temperature ranges in winter (October -March) from maximum 16.7 °C to a minimum of 3.4 °C while in summers (April-September) the range is from 34.5 °C to 24.4 °C.

**Subjects:** 600 school children were randomly selected from 9 schools located in different regions of Islamabad. The age of children ranged between 12-16 years. Verbal consent was given by the children for their participation. The data of 49 children were excluded from data analysis as they were unable to follow the instructions or due to lack of verbal assent. The population of one-hundred eighty six children from 3 different private schools with affluent family backgrounds was selected as they can be defined as the higher socio-economic status (HSES) sub-sample. Moreover, the other group consisted of one-hundred eighty three children from 3 different public schools and they were the representatives of middle-class population. They can be defined as middle SES (SES) sub-sample. The recruitment of one-hundred eighty two children from 1 public school and two charity schools represented the serving low-income population, defined here, as lower SES (LSES) sub-sample.

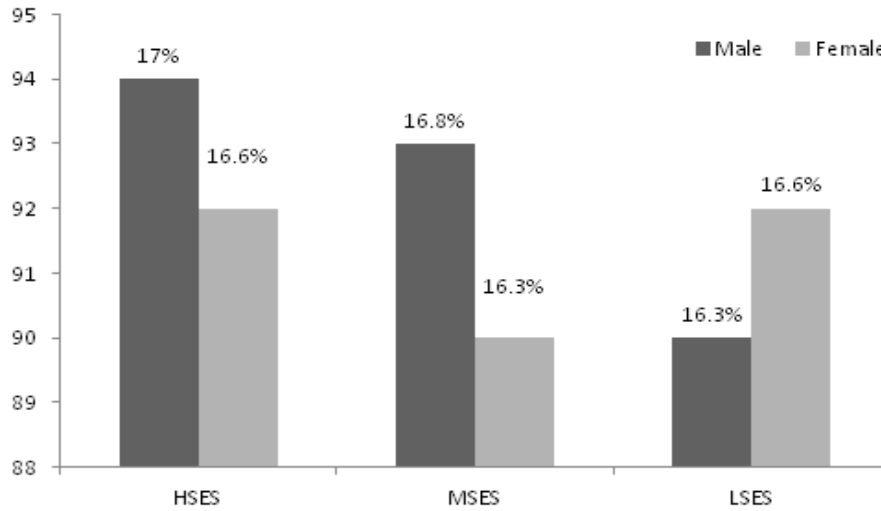
**Dietary intake data collection:** Each participant filled in a 24-h registry of intake of all edible items consumed during the interval of interest for one single day in the course of the study. 551 individual child-registries were thus generated. Self-administered questionnaire was employed to elicit the information about dietary intake. The number of water consumption was represented by the number of mentions of water intake. The data consisted of the number of draught acts and the volume of water per drink. It was evaluated to find out its usage over the

course of time on the sampling day. The calculated volume of water per drink was 220 ml ( $\pm 5$  ml).

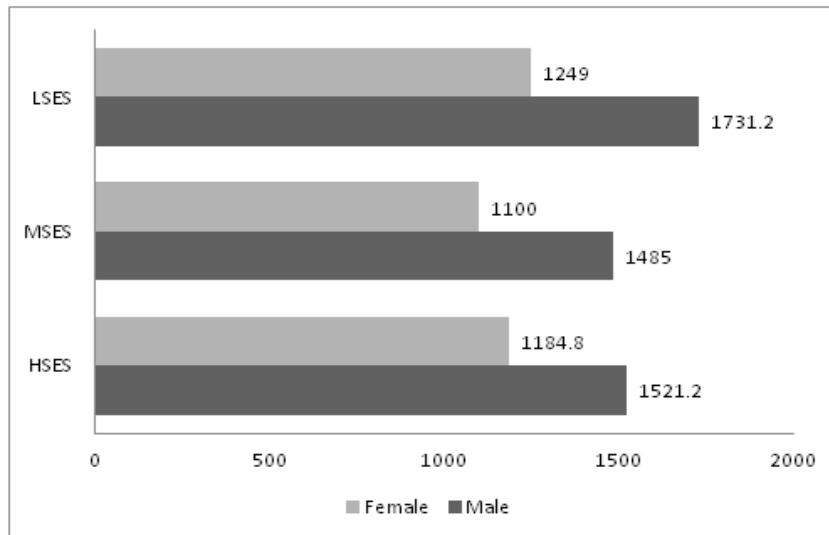
**Data handling and statistical analysis:** Comparisons were made for 551 registrants and single and multiple draught water consumers' percentages were evaluated in comparison. It was then stratified by gender and social class subgroups. A detailed statistical analysis was carried out for the volume of drinking water recorded for the entire registrants on their 24-h period of consumption. These included mean, minimum, median, and maximum values for the entire sample, classified by gender and social class subgroups. In addition, the questionnaire was utilised to record any other drinks consumed by the children on that particular day. One-way ANOVA was used to analyze the differences in water consumption between SES.

**RESULTS AND DISCUSSION**

A total of 551 students were registered for this study, of which 277 (50.27%) were male, while 274 (49.72%) were females. Figure 1 illustrates the number and percentage of students categorized on the basis of gender and socio-economic status. At least, two glasses of tap water were reported to be consumed by 27 (4.9%) students, 202 (36.66%) students consumed 3-5 glasses of water on the specific day of data recording, 205 (37.2%) students consumed 6-8 glasses of plain water, while the remaining 117 (21.23%) students consumed more than eight glasses of water. Genderwise average consumption of plain water (ml) over 24 hours in different socio-economic groups is given in Fig. 2.



**Fig. 1: Number and percentage of students disaggregated by the gender and socio-economic status.**



**Fig. 2: Genderwise average consumption of plain water (ml) over 24 hours by students of different socio-economic groups**

On the basis of socio-economic groups, male students of HSES group consumed an average of 7.606 ( $\pm 0.44$ ) glasses of water on the day of study, while the female students consumed 5.924 ( $\pm 0.348$ )

glasses of water. Male of MSES group consumed 7.425 ( $\pm 0.443$ ) glasses of water, while female consumed 5.05 ( $\pm 0.401$ ) glasses of water. Both male and female students of LSES group consumed 8.065

(± 0.401) of water, while female consumed 6.245 (±0.335) glasses of plain water. The frequency of water consumption recorded among the students of each group is shown in Table 1.

Of the HSES group, 14 students (7.53%) reported less than two glasses of water consumption in total 186 consumers while 66 (35.48%) students reported 3-5 glasses, 67 (36.02%) students reported 6-8 glasses and 39 (20.97%) students reported more than 8 glasses of water consumption. MSES group showed nearly same values as 10 (5.46%) of this group reported less than two glasses of water consumption

in total 183 consumers, 81 (44.26%) students reported 3-5 glasses, 64 (34.97%) students reported 6-8 glasses and 28 (15.3%) students reported more than 8 glasses of water consumption. LSES group showed relatively different values from both the other groups. There were total 182 consumers and only 3 (1.65%) reported less than two glasses of water consumption, while 55 (30.22%) students reported 3-5 glasses, 74 (40.66%) students reported 6-8 glasses and 50 (27.47%) students reported more than 8 glasses of water consumption.

**Table 1: Descriptive statistical comparison of the volume of plain water (in number of glasses) consumed by the participants classified according to the gender and socio- economic-status and sub samples.**

	MALE		FEMALE	
	Mean	Standard error mean	Mean	Standard error mean
HSES	7.60	0.44	5.92	0.34
MSES	7.42	0.44	5.50	0.40
LSES	8.65	0.40	6.24	0.33

The most interesting thing of this study was to examine the consumption of liquids other than water in each socio-economic group.

Table 2 shows a 3-dimensional picture of consumption of milk products (i.e. milk, tea, coffee, milk shake, etc), fizzy drinks and fruit juices. 100 (53.76%) students of HSES group also consumed milk products during this specific day, 25 (13.44%) students consumed fruit juices or fizzy drinks, 31(16.67%) consumed both milk products and juices, while 30 (16.11%) students consumed no other liquid during whole day. MSES group showed a slightly different picture as 19 (10.38%) students consumed no other liquid source. 128 (69.95%) of this group consumed milk products as well, 10 (5.46%) students consumed fruit juices or fizzy drinks, 26 (14.21%) consumed both milk products and juices. 122 (67.03%) students of LSES group also consumed milk products during this specific day, 11 (6.04%) students consumed fruit juices or fizzy drinks, 19 (10.44%) consumed both milk products and juices, while 30(16.48%) students consumed no other liquid except water.

Every human body needs adequate amount of water to maintain different body systems and to combat dehydration (D’Anci *et al.*, 2006; Manz *et al.*, 2002; Rochette and Patterson, 2005; Manz, 2007). Tea, coffee, milk, juices, milk shakes and soft drinks are also sources of water other than plain water.

The present study of 551, 12-16 year-old students provided results based on the daily plain water consumption plus other liquids taken to fulfill the daily water needs of an individual. There were selected nearly equal number of male and female students to lessen the difference error up to the highest possible level and same principle was followed for socioeconomic groups.

Since, the educational system is not uniform in Pakistan, the type of school represents the socioeconomic scale of the students, therefore, the students were distributed into three different socioeconomic groups, i.e., HSES, MSES and LSES.

The findings of the study represent that all three socioeconomic groups of the study revealed no significant difference regarding the water intake on a daily basis except that LSES consumed relatively larger amount of water as compared to other groups. This is totally in contrast to a similar study done in Guatemala (Campos *et al*, 2009), which reported that LSES girls had consumed 100 ml less water as compared to their more privileged counterparts, while the high consumption of water and the participation in consumption of plain drinking water was found higher among the HSES group. This difference may be explained on the basis of availability of water as the common practice in Pakistan, is to use tap water for drinking, which is available free of cost. While in most of the countries, where similar studies have been conducted the children mostly use bottled plain water, for which they have to pay. So the children prefer soft drinks and fruit-flavored drinks over plain drinking water (Tahmassebi *et al.*, 2006; Cullen *et al.*, 2002; Jinhui *et al.*, 2011). The findings of the study proposed that the male students had a tendency to consume more water as compared to female in all the three groups, which can be justified with their higher exercise and movement level and thus a higher need of fluid intake. This is supported by many previous studies (Jinhui *et al.*, 2011; Zohouri *et al.*, 2004; Sichert-Hellert *et al.*, 2001; Food and Nutrition Board, 2005; Westrell *et al.*, 2006).

By taking an average of 200 ml per glass, it becomes an average of 1378.5 ml water consumption per day per student in this study, which is significantly higher amount as compared to other

studies carried out in other parts of the world. Campos *et al.* (2009) reported 492 ml of average daily water intake in students of Quetzaltenango, Guatemala. Westrell *et al.* (2006) identified that the mean age of girls and boys who preferred drinking water was 8.1 years. Average daily consumption of tap or bottled-water consumption was 330 ml. Dortmund study also demonstrated the parallel results that the amount of water consumed by boys was 334 ml and girls consumed 289 ml water in the age group of 9-13 years (Sichert-Hellert and Kersting, 2004). This study also revealed that the girls tend to consume less amount of water (1177.9 ml) per day as compared to boys (1579.1 ml).

Only one study at Stockholm, Sweden, reported comparatively higher average of 590 ml of water consumed by 9 to 18 year old students (Westrell *et al.*, 2006). The difference may be because Pakistan is comparatively warm and excess evaporation of water from body stimulates body to consume higher amount of water to tackle this loss.

It is interesting to note that the students who consumed moderate amount of water in all the three groups also consumed other energy filled liquids in higher amounts, which showed that water intake can control overall energy level of the body. Students who consumed large amount of other liquids also consumed 3-8 glasses of water in all three socio-economic groups while students who consumed less than two or more than eight glasses of water did not prefer to consume other liquids much.

This study also revealed high trends of milk products consumption in Pakistani students in contrast to other available data (Sichert-Hellert *et al.*, 2001; Gregory and Lowe, 2000; Rugg-Gunn *et al.*, 1987; Sohn *et al.*, 2001). It is because tea is used in nearly every family of Pakistan and milk is a major component of traditional Pakistani tea. As tea is the most frequently available drink and is cheap as compared to fizzy drinks, so its consumption is comparatively high in LSES group as compared to other groups. On the other hand, this study also reflects the fact that fizzy drinks can be afforded by HSES group as a result their consumption was relatively higher in HSES group. However, the high amount of sugar in soft drinks and tea can increase the risk of obesity in children and some other diseases.

Although, overall drinking habits and consumption of plain water is satisfactory depending on the customs and culture of Pakistan. A continuous effort and planning is required to maintain and promote this healthy trend. As children spend much of their time in schools so their feeding and drinking habits can be altered by different school programs. Teachers can play a major role in setting their habits and preferences.

## CONCLUSION

Drinking a healthy amount of water is one of the vitals for human beings. It influences the mental and physical well-being of children. It has also a direct effect on the students' capability to study and function. Water occupies a necessary place in human anatomy and physiology, so it is required on continuous basis to replace obligatory losses through urine, stool and perspiration, so it is important to find plain water consumption patterns, as well as of other drinks consumed by school children. As literature reporting the drinking habits of school children is limited, the present study evaluated the type and volume of drinks consumed over 24 hours stratified according to the gender and socio-economic status of the participants.

The overall drinking habits of school children of Islamabad, Pakistan, are satisfactory in the study group but a continuous effort and planning is required to maintain this healthy trend.

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