Original Article

Water Consumption of Older Adults in Rural Areas: A Descriptive Research in Turkiye

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Abstract
Introduction: Elderly individuals are among the people at risk in society due to inadequate fluid consumption and nutritional problems. Adequate fluid intake is important in protecting and improving health and improving the quality of life in the elderly. Inadequate fluid intake and fluid loss are frequently neglected problems in the elderly.
Objective: The present descriptive research aimed to determine the water consumption characteristics and adequacy of water intake among elderly subjects living in rural areas
Methods: The study population comprised the older adults subjects (N = 517) registered at the family healthcare center located at the Mudurnu District of Bolu Province. The sample size was determined using the formula that is employed when the population size is known; 221 elderly individuals registered at the Family Healthcare Center were involved. Data were collected via face-to-face interviews conducted by the researcher using a questionnaire about the general and water consumption characteristics of the elderly subjects.
Results: The mean age of the participants was 72.5 ± 6.2 y, the mean body mass index was 29.3 ± 5.2 kg/m^2, mean number of chronic diseases was 1.7 ± 1.3, and mean water consumption was 4.0 ± 2.1 glasses per day. We found that 91% of the elderly did not consume sufficient water. Moreover, amount of water consumed per day by the elderly was associated with the occurrence of urinary incontinence, fear of urinating, being distant from water sources, forgetting to drink water, and disliking the taste of water ($p < 0.05$).
Conclusion: Most of the elderly in this study were determined not to consume enough water. Further research is warranted on this subject to increase the amount of water intake in the elderly.

Keywords: Elderly, Fluid intake, Rural areas, Turkey, Water intake,

Introduction

Water is formed by the bonding of oxygen and hydrogen atoms that are essential for life (Hall & Hall, 2020) Water is essential for life and constitutes 45%–75% of an individual's body weight. The water requirement of the body varies on an individual basis, depending on internal and external factors, such as age, presence of chronic diseases, nutrition, habits, physical activity levels, and climate (Edmonds, Foglia, Booth, Fu, & Gardner, 2021). However, fluid lost from the body needs to be replaced to preserve the fluid volume of the body (Hall & Hall, 2020). Primarily, water as well as other fluids that are used by the body are described as visible and invisible water that can be found in foods and beverages. Fluids other than water include alcoholic-nonalcoholic beverages, carbonated-noncarbonated beverages, soup, tea, coffee, milk, and drinks made of yogurt (Health, 2016).

The quantity of daily fluid and water consumed is important. Several institutions have provided recommendations about the daily fluid and water intake. According to the European Food Safety Authority, the reference value for total fluid intake should be 2.5 L in men and 2 L in women (Eskola, Altieri, & Galobart, 2018). In addition, the Australian Dietary Guidelines (2013) recommend a fluid intake of 2600 mL for adult men and 2100 mL

for adult women and encourage the consumption of water over that of other fluids (Government, 2013). Wojszel (Wojszel) reported daily water intake of 1218 mL in older adults men and 603 mL in older adults women in addition to other fluids (Wojszel, 2020). This quantity of water intake is not sufficient, considering the recommended levels. The study conducted by Wojszel (Wojszel) with 358 older adults, the low hydration rate (osmolarity> 295 mmol / L) was found in 58.4% (Wojszel, 2020).

The older adults drink less water owing to poor thirst, lack of appetite, pain, dysphagia, depression, nausea-vomiting, presence of various diseases, use of multiple drugs, urinary incontinence and decline in hand dexterity or cognitive functions (Muz, Ozdil, Erdogan, & Sezer, 2017; Oh, Noh, Sims, Guo, & Sawyer, 2018; Picetti et al., 2017). Such conditions constitute a risk of dehydration. Dehydration is the most common fluid disorder in the older adults (Volkert, 2020) . It may have severe clinical impacts, cause irreversible damage, and even lead to death. In a study by Edmonds et al., (2021), the prevalence of dehydration was reduced from 3% to 1% by increasing the availability of beverages for the older adults at a risk of dehydration, increasing staff awareness ($p < 0.05$)(Edmonds et al., 2021).

Health improving and protecting behavior can be insufficient for people living in rural areas due to limited access to healthcare services and understaffed institutions (Muirhead & Birks, 2019). Moreover, the healthcare services provided by the governments are more limited in rural areas than in urban areas. The researchers are more common in urban areas. In rural areas, these are not enough (Kluwer, 2010; Xie, Zhou, Deng, Richmond, & Na, 2019; Yang, Winslow, Huang, & Zhou, 2021). Therefore, the present study aimed to determine the water consumption characteristics in the older adults. We believe that our results contribute to the determination of water consumption levels and characteristics, thus enabling the necessary measures to increase water intake in the older adults.

Research Questions

- ✓ What is the water intake level among the older adults?
- ✓ Does the quantity of water consumed depend on the socio-demographic characteristics of the older adults?
- ✓ Are the level of water intake and health status of the older adults correlated?
- ✓ Does the quantity of water intake vary as per the water consumption characteristics of the older adults?

Method

Study design: Descriptive research.

Setting and participants: The study population comprised the older adults subjects (N = 517) registered at the family healthcare center located at the Mudurnu District of Bolu Province. The sample size of the population was determined with the formula used when the population size is known. The sample size was determined as 221, the sample size was calculated with a confidence interval of 95% and an error margin of 5%; the following values were used in the formula: N = 517; t = 1.96; p = 0.50; q = 0.50; d = 0.05. In the study, convenience sampling technique, one of the non-probability sampling methods, was used. People aged ≥ 65 y who consented to participate in the study and did not have any mental problems or health problems that could limit fluid intake, such as heart failure and kidney disease, were included in the study. First, the researcher administered the Standardized Mini Mental State Examination on the participants or the Modified Mini Mental State Examination for uneducated People (MMSE-I) on uneducated participants to assess their mental state. Eleven participants were excluded from the study because of their low scores in the Standardized Mini Mental Test (SMMT), two were excluded because of fluid restriction, and five were excluded because they had Alzheimer's disease or dementia.

Measures: As data collection forms, Standardized Mini Mental Test or Modified Mini Mental Test for the Uneducated Individuals and the water consumption questionnaire for older adults people were used.

The Mini Mental State Examination (MMSE): The MMSE was developed by Folstein et al., (1975) and adapted for Turkey by Gungen et al., (2002). This scale is composed of 11 items under the following five main headings: orientation, registration, attention and calculation, recall, and language.

The Pearson coefficient was 0.99 and Kappa was 0.92(Folstein, Folstein, & McHugh, 1975; Gungen, Ertan, Eker, Yasar, & Engin, 2002) .

Modified Mini Mental State Examination For Illiterate People (MMSE-I): The Mini Mental Test modified by Babacan et al., (2016) for illiterate people (MMSE-I) was strongly correlated with the Clinical Dementia Rating (CDR) (−0.82, p = 0.000)(Ur-Özçelik et al., 2016). The cut-off point of the scale was specified as 23/24 points. The internal consistency of MMSE-I was 0.70. The subsections of the test consisted of six questions about time orientation, spatial orientation, registration, attention, recall, and language.

Data Collection/procedure

Pre-application of the research: A preliminary application was conducted on 10 random individuals aged ≥ 65 y in the city of Ankara in January 2018 to test the comprehensibility and suitability of the questions in face-to-face interviews. However, accurate feedback could not be obtained from these participants in terms of the fluid consumption amount. Therefore, questions about the quantity of fluids consumed were not asked to the subjects in the research group. Data were collected via face-to-face interviews with the older adults registered at the family healthcare center located in the Mudurnu District of the Bolu Province between February 2018 and September 2018. Individuals who agreed to participate in the study were administered the SMMT or the Modified Mini Mental Test Examination as per the literacy status. Those with a score ≥ 24 were included in the study.

Research variables: Independent variables of the research were age, height, weight, sex, educational background, occupation, social security, income status of the family, presence of chronic disease and medication use, daily number of meals, engagement in daily activities, and such descriptive items. Intake of a sufficient quantity of water was a dependent variable of the research. In the current research, sufficient daily water intake was determined to be 1500–2000 mL as per the recommendations of the Turkish Dietary Guidelines. The minimum acceptable level of water intake was 1500 mL, and lower water intake was considered insufficient.

Data Analysis: Normality of the data was analyzed using the Kolmogorov Smirnov test. The data showed normal distribution. Characteristics of the participants were expressed as numbers, percentages, mean, and standard deviation values. Correlations between sufficient water intake and descriptive characteristics, health problems, water consumption characteristics of the participants, and other factors were analyzed using Pearson chi-square test, chi-square test with Yates correction, and Fisher's exact test.

Ethical issues: Before starting the research, with the approval of Necmettin Erbakan University Meram Faculty of Medicine Research Ethics Committee numbered 14567952-050 and dated 12.01.2018, it was approved by the Bolu Provincial Health Directorate, to which Mudurnu Family Health Center is affiliated, numbered 49769843-619 and dated 31.01.2018. Necessary written permission was obtained with the approval dated 10:00. In addition, the study details were explained to the participants and they signed a consent form containing information in line with the purpose of the research. The study in all the phases it was conducted in accordance with the Declaration of Helsinki.

Results

Table 1 shows the descriptive characteristics of the individuals enrolled in the study; 52.9% of the study subjects were women, 70.1% were married, 60.2% were uneducation, and 93.7% had social security. The mean daily water consumption of the participants was 4.0 ± 2.1 glasses and 803,4±4,2 ml average water consumption per day. Majority of the participants (98.6%) had a health problem; the most common health problem was fatigue (81.0%) followed by muscle pain (78.3%) and urinary incontinence (62.9%).

Total 88.2% of the participants preferred medium-sized water glasses, 37.1% drank water when thirsty, and 39.8% drank tap water. We also found that 84.2% of the participants reported that they did not drink water because they disliked its taste (Table 2).

The most preferred drink was tea 88.7% of the participants reported that they preferred tea, while the least preferred drink was mineral water (8.1%). Further, 91% of the total study population, 90.4% of the male subjects, 91.5% of the female subjects, 88.8% of those aged 65–74 y, 94.9% of those aged 75–84 y, 88.9% of

those aged ≥ 85 y, 93.2% of those who were illiterate, 88.9% of high school-university graduates, 89.7% of those who were married, and 93.1% of those who were single did not consume enough water. There was no significant impact of sex, educational background, age group, body mass index, marital status, and social security status on the water intake levels ($p > 0.05$), (Table 2)

Total 95.7% of the participants with urinary incontinence consumed insufficient amounts of water; a significant correlation was found between urinary incontinence and the amount of water consumption (p:0.003). Moreover, 95% and 90.2% of those with constipation and hypertension drank insufficient amounts of water, respectively, and 92.9% of those who used < 4 drugs and 86.5% of those who used > 4 drugs had insufficient water intake. sufficient water consumption was a significantly associated with fear of frequent urination (p:0.004), being at a distance from water sources (p:0.008), forgetting to drink water (p:0.003), disliking the taste of water (p:0.001).

Table 1. Descriptive characteristics of the participants

Characteristics		**n**	**%**
Age group	65–74 y	134	60.6
	75–84 y	78	35.3
	≥ 85 y	9	4.1
Sex	Female	117	52.9
	Male	104	47.1
Marital status	Married	155	70.1
	Single	66	29.9
Educational background	Illiterate	133	60.2
	Only literate	29	13.1
	Elementary School graduate	50	22.6
	High School-University Graduate*	9	4.1
Social security	Yes	207	93.7
	No	14	6.3
Characteristics		**X̄ ± SD**	
Age (y)		72.0 ± 6.2	
Height (cm)		159.9 ± 9.5	
Weight (kg)		74.9 ± 13.4	
BMI (kg/m^2)		29.3 ± 5.2	
Number of individuals in the household		2.8 ± 1.6	
Number of chronic diseases		1.7 ± 1.3	
Daily number of medications taken		2.9 ± 2.3	
Daily amount of water intake (glasses)		4.0 ± 2.1	
Average water consumption per day (mL)		803.4±4.2	

*University graduates were included in the high school group because the number of university graduates was low (2).

Table 2. Water consumption characteristics of the participants

Characteristics		n	%
Type of Water Glass	Plastic Water Glass	12	5.4
	Medium-sized Water Glass	195	88.2
	Large-sized Water Glass	14	6.3
When do you drink the highest amount of water?	In the morning	15	6.8
	Between meals	28	12.7
	During meals	11	5.0
	After meals	28	12.7
	Whenever I get thirsty	82	37.1
	Whenever it comes to my mind	53	24.0
Source of the Water Consumed	Tap water	88	39.8
	Spring water	84	34.0
	Bottled water	28	12.7
	Treated water	21	9.5
Do you wake up at night to drink water?	Yes	86	38.9
	No	136	61.1
Relationship of the amount of water intake with other factors*	Disliking the taste of water	186	84.2
	Consumption of salty foods	152	68.8
	Reminders by other people	146	66.1
	Presence of visual stimulus	113	51.1
	Forgetting to drink water	108	48.9
	Fear of frequent urination	95	43.0
	Being distant from water sources	76	34.4
	Having pain	45	24.9
	Unpleasant psychological feeling	41	18.6
	Inability to hold the water glass	21	9.5

*The research group included participants who provided more than one answer to a question.

Discussion

A study that aimed to determine the water consumption characteristics of the older adults showed that the mean daily water consumption was 4.0 ± 2.1 water glasses, and 91% of the older adults did not consume enough water. Further, the quantity of water intake in the older adults was significantly correlated with the presence of urinary incontinence, fear of urinating, being distant from water sources, forgetting to drink water, and disliking the taste of water ($p < 0.05$).

Water is one of the main elements that are vital for human life. Moreover, the older adults are recommended to consume 1500–2000 mL of water (8–10 water glasses) to meet their daily water requirement (Edmonds et al., 2021). In this research, the mean daily water consumption of the participants was 4.0 ± 2.1 water glasses (Table 1). Various studies have also reported that the older adults consumed < 4 glasses per day lower than their daily recommended amount (Muz et al., 2017; Picetti et al., 2017; Wojszel, 2020). In contrast, Muz et al., (2017) reported that 71% of the older adults subjects drank at least 6 glasses of water every day. Based on a review of the literature, the older adults consume lower than the recommended quantity of water (Muz et al., 2017). In addition to the quantity of water consumed, the types of other beverages that are consumed are also important. It is known than beverages, such as tea and coffee, are diuretics and high intake of such beverages reduces the desire to drink water. In the current research, 88.7% of the participants said that they most frequently preferred to drink tea (Table 2). According to the Turkey Nutrition and Health Survey conducted by the Ministry of Health, the average quantity of nonalcoholic beverages (tea, coffee, carbonated drinks etc.) consumed in Turkey was 486.33 mL and 390.63 mL in men and women aged 65–74 y, respectively, and 400.27 mL and 301.78 mL among men and women aged ≥ 75 y, respectively (Serving, 2018). These results are consistent with the present findings. Among the older adults, the consumption amount of such beverages appeared to be equal to the quantity of water consumed every day. Moreover, the fact that people are unaware that tea, coffee, and other such beverages are not substitutes of water may exert a negative impact on the amount of water consumed.

The quantity of water intake is proportionate to the desire to urinate. The older adults may reduce their water intake because they may find it challenging to visit the bathroom; therefore, they postpone urinating or have urinary leakage. In the current study, sufficient water intake was associated with urinary incontinence, one of the health problems observed in the participants ($p < 0.05$). Muz et al., (2017) found no significant correlation between the daily fluid intake and urinary incontinence ($p > 0.05$) (Muz et al., 2017). However, previous studies have also reported that the older adults consumed less fluids because of urinary incontinence (Wojszel, 2020). Thus, it is believed that the older adults consume less water because they link urinary incontinence to water consumption.

Alterations in the environment where individuals eat and drink also affect the amount of fluid intake (Picetti et al., 2017). In the current study, there was a significant correlation of sufficient water consumption with fear of urination, being distant from water sources, forgetting to drink water, and disliking the taste of water among the older adults ($p < 0.05$). Volkert (2020) reported that environmental factors were associated with low fluid intake (Volkert, 2020). Edmonds et al., (2021) conducted a systematic review called “Increasing Fluid Intake and Reducing Dehydration Risk in Older People Living in Long-Term Care: A Systematic Review”. This review included 19 interventional and 4 observational studies from 19 countries and showed that fluid intake increased because of increased staff assistance with respect to drinking water and going to the bathroom(Edmonds et al., 2021). Therefore, environmental arrangements are believed to have a positive impact on the fluid intake in the older adults. Moreover, previous studies have shown that the older adults consumed less fluids because of lack of appetite, pain, depression, nausea-vomiting, weakness in hand muscles, and compromised cognitive function (Campani et al., 2021; Mugomeri, Chatanga, Khetheng, & Dhemba, 2017; Picetti et al., 2017; Wojszel, 2020). Further, it should be remembered that physical weakness due to aging may have a negative impact on water consumption behavior in the older adults. This may, in turn, lead to a poorer quality of life as

well as various other problems, such as constipation and dehydration.

Conclusions: The mean daily water consumption was 4.0 ± 2.1 medium-sized glasses of water, and most participants (91%) did not consume enough water. We found that lower water intake among the older adults could be associated with many factors, such as fear of urinating, being distant from water sources, forgetting to drink water, and disliking the taste of water. There was a significant correlation of sufficient water intake with fear of urinating, being distant from water sources, forgetting to drink water, and disliking the taste of water ($p < 0.05$). Further studies are needed on water consumption among the older adults to enable steps to encourage increased water intake. It is recommended to use several methods together instead of one method to support fluid status in the older adults, and to conduct more detailed studies at the national level. Diagnosing fluid interventions in older adult individuals in collaboration with a multidisciplinary team, periodically evaluating their nutritional and health status, and monitoring body weight to monitor fluid loss levels are important in the treatment of malnutrition and fluid loss.

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