

## Self-reported Hydration in Diabetic and Hypertensive Elderly

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### Abstract

**Background:** Although the importance of the hydration for health of diabetic and hypertensive elderly have been extensively exposed, there is little information about the self-reported hydration among this group. This study attempts to fill this gap in the literature by studying the self-reported hydration among elderly in Brazil.

**Methodology:** It was conducted a cross-sectional study through interviews with 405 elderly attended at a Brazilian primary care for arterial hypertension and/or mellitus diabetes. The variables addressed were: gender, age in years, presence of caregivers in doctor visits, prevalence of chronic diseases and questions for the hydration assessment. Association Pearson's chi-square test and a significance level of 5% were adopted.

**Results:** The elderly that described feel thirst regularly ( $p=0.00$ ), an appropriated water intake idea ( $p=0.00$ ) and younger age ( $p=0.04$ ), reported a higher water intake. The presence of the caregiver and older age ( $p=0.03$ ); and older age assisted by a caregiver and drinking at least 6 glasses of water/day ( $p=0.02$ ) were also associated.

**Conclusions:** Thirst, appropriate intake idea, younger age and a caregiver for the older age were associated with the report of higher intake of water. Several factors may be associated with water intake and should be considered when analyzing strategies for hydration of the elderly.

**Keywords:** Health services for the aged; Drinking; Diabetes mellitus; Hypertension

### Introduction

#### Background

Water is the greater amount of body component present in cells, tissues and organs, and it is necessary for the proper functioning body, since it is essential for the triggering of regulatory mechanisms of various cellular critical functions. The human body is unable to produce enough water for proper metabolism and not by ingestion of food to meet the body's needs, being essential consumption of at least 2 liters (6-8 cups) of water per day [1]. For the elderly, hydration becomes a focal point for health. There are some factors that make them more apt to dehydration compared to young adults [2]. There can be cited: physiologically lower water reserves, decreased thirst reflex, renal function changes, hormonal changes, the use of some drugs that are commonly used by this age group as well as physical difficulties such as mobility, which requires the presence another individual to help, as a caregiver [2-4].

Chronic non-communicable diseases, especially hypertension (AH) and diabetes mellitus (MD) and its complications, are now major public health problems with high prevalence among older people. In

Brazil, approximately half of the elderly aged 60 years and over have diagnosis of hypertension. The prevalence of diabetes also increases exponentially with age, from 0.5% in those 18-24 years old to 21.4% in those 65 years or older [5]. Family Health Program (FHP) is a community-based program of primary care, created by the Brazilian public health system that provides preventive care, health promotion and the treatment of health conditions. One of its strategy is the Hiperdia that consists in registering and monitoring all the community patients with Arterial Hypertension (AH) and Diabetes Mellitus (DM) [6].

The appropriate hydration in patients with such comorbidities reflected in a decrease of complications. It relates to preventing a number of diseases such as urological, infectious, bronchopulmonary and other disorders [7,8]. Dehydration, on the other hand, is associated with serious conditions as thromboembolic events, hyperglycemic states of diabetes, bladder cancer, nephrolithiasis, increased risk of falling, mental confusion, kidney failure and various infectious processes, resulting in high morbidity and mortality in elderly [9,10]. Considering the importance of water in maintaining the health of the diabetic and hypertensive elderly, and the scarcity of studies concerning about this topic, this study was conducted in order to evaluate the self-reported hydration among elderly diagnosed and under treatment on primary care for AH and MD.

## Methodology

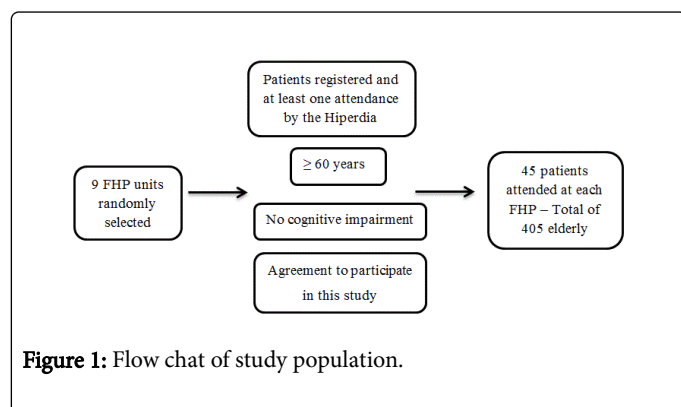
### Study setting

This study was conducted through interviews with elderly assisted in Hiperdia Program (with focus on hypertension and diabetes treatment) in Teresina, State of Piauí, Brazil, in the period from 2014 to 2016. Through the draw, there were adopted 9 units of FHP and the sample was simple random probability, consisting of 45 seniors for each unit.

All participants provided written informed consent and the Research Ethics Committee approved this research (CAAE 15722913.6.0000.5210).

**Study design:** It was conducted a descriptive, quantitative and cross-sectional study.

**Study population:** The study population was consists of 405 elderly, in order to meet the design of 384 subjects to estimate the key parameter-care for the elderly with an error margin of 5% and 95% confidence level. The sample was obtained according the flowchart in the below given (Figure 1).



### Inclusion criteria

As inclusion criteria, elderly aged equal or greater of 60 years were selected, regardless of gender, registered in Hiperdia Program, which had already at least one attendance by the program, without cognitive impairment and who agreed to participate in this study.

### Exclusion criteria

Subjects with following conditions were excluded for study: (1) age<60; (2) did not registered in Hiperdia Program or not attended at

least once by the program; (3) having cognitive impairment, and (4) did not agree to participate in the study.

### Data assessment and statistical analysis

Subjects were interviewed through structured questionnaire. The variables addressed were: gender, age in years, presence of caregivers in doctor visits, prevalence of chronic diseases, and questions for the hydration assessment as regarding about thirst, daily intake of water and education received by health care provider about the appropriate amount of water to be ingested per day.

A questionnaire was developed including the following questions: (1) Do you feel thirsty during the day? ( ) yes ( ) no; (2) Do you drink enough water during the day? ( ) yes ( ) no; (3) How many glasses of water do you drink each day? ( ) less than 6 glasses of water a day ( ) at least 6 glasses of water a day; (4) Have you received any guidance about hydration from a health professional? ( ) yes ( ) no.

A pilot study was conducted with 45 elderly from one FHP randomly chosen to evaluate the methodology proposed for the study, but not included in the sample. During pilot testing, average administration time was determined to be ~4 minutes (range: 2 min 15 sec 5 min). After this initial study, it was not necessary to make changes in the initial methodology.

The statistical analyses were performed by commercial software STATA version 13 (College Station, Texas, USA). Comparisons between continuous variables were performed by association Pearson's chi-square test and a p-value of equal or less than 0.05 was considered as statistically significant.

## Results

There were interviewed 405 elderly people, which 290(71.60%) were women. The average age was 68.48 years, and 317(78.27%) aged 60 to 75 years, and 88(21.73%), aged 76-90 years. Among the respondents, 390(96.30%) were hypertensive, 111(27.41%), diabetic and 96(23.70%) had both morbidities. It was observed that 148(36.54%) of the participants had a caregiver. When asked if they are thirsty during the day, 269(66.42%) seniors said yes. Most elderly, 318(78.52%) reported drinking enough water during the day, evaluating their fluid intake as appropriate. In addition, 255(62.96%) of respondents reported drinking at least 6 glasses of water a day, which is the minimum indicated by the Brazilian Ministry of Health [1]. Regarding guidance from health professionals about the need for correct intake of water, it was observed that 280(69.14%) of the elderly said that they had been orientated (Table 1).

Distribution of elderly respondents		n	%
Gender	Women		71.60
	Men		28.40
Age group (years)	≤ 75	317	78.27
	>75	88	21.73
Comorbidities	Hypertension	390	96.30
	Diabetes	111	27.41

	Hypertension+Diabetes	96	23.70
Caregiver	Yes	148	36.54
	No	257	63.46
Thirsty sensation	Yes	269	66.42
	No	136	33.58
Water intake (qualitative)	Appropriate	318	78.52
	Inappropriate	87	21.48
Water intake (quantitative)	<6 glasses/water/day	150	37.04
	≥ 6 glasses/water/day	255	62.96
Professional guidance on water intake	Yes	280	69.14
	No	125	30.86

**Table 1:** Distribution of elderly respondents according to age group, gender, comorbidities, caregiver assistance, feeling thirsty, qualitative and quantitative self-report of water intake and previous guidance received by health care professional regarding fluid intake. Brazil, 2016.

There was a significant statistical relationship between the sensation of thirst and correct intake of water, 197(73.23%) of individuals who reported being thirsty actually reported drink more than 6 glasses of water a day (p value=0.00). Among 318 seniors who rated their water intake as appropriated, 229(72.01%) reported drinking number equal or greater than to 6 glasses of water a day, also statistically significant (p value=0.00), punctuating a positive relationship between self-reported quality and quantity water intake.

reported drink at least 6 cups of water per day, a result similar to the group who said they had never received information about it (p=0.3). In general, the presence of caregiver showed no significant association with higher water intake (p=0.22). Among the younger respondents, 60.88% reported drinking equal or more than 6 glasses of water a day while 47.72% of the more than 75 years elderly answer drinking the same quantity of water (p value=0.04) (Table 2).

Relating guidance from health professionals and water intake: among the 280 elderly who reported receiving guidance, 176(62.86%)

Water intake (quantitative)						Total		p*
Variables		<6 glasses/water/day		≥ 6 glasses/water/day				
		n	%	n	%	n	%	
Thirsty sensation	YES	72	26.77	197	73.23	269	100	0.00
	No	76	55.88	60	44.12	136	100	
Water intake (qualitative)	Appropriate	89	27.99	229	72.01	318	100	0.00
	Inappropriate	59	67.82	28	32.18	87	100	
Professional guidance on water intake	Yes	104	37.14	176	62.86	280	100	0.3
	No	44	35.20	81	64.80	125	100	
Caregiver	Yes	53	35.80	95	62.86	148	100	0.22
	No	117	45.55	140	54.44	257	100	
Age group	≤75	124	39.12	193	60.88	317	100	0.04
	>75	46	52.28	42	47.72	88	100	

**Table 2:** Distribution of the self-report water intake according to the feeling thirsty, caregiver assistance, previous guidance received by health care professional regarding fluid intake, qualitative water intake and age group. Piauí State, Brazil.

Half of the patients (44/88) from the group up to 75 years presented a caregiver, while only 32.81% of the patients younger than 75 years were assisted (p value=0.03). Among elderly above 75 years assisted by a caregiver, 77.27% reported drinking at least 6 glasses of water/day,

compared to only 18.18% from the group without caregiver (p value=0.02). Under 75 years, caregiver assistance was not remarkable for water intake (p value=0.42) (Table 3).

Age group	Caregiver	Water intake (quantitative)				Total		P
		<6 glasses/water/day		≥6 glasses/water/day		n	%	
		n	%	n	%			
≤75	Yes	43	41.35	61	58.65	104	32.81	0.42
	No	81	38.03	132	61.97	213	67.19	
	Total	124	39.12	193	60.88	317	100	
>75	Yes	10	22.73	34	77.27	44	50	0.02
	No	36	81.82	8	18.18	44	50	
	Total	46	52.27	42	47.73	88	100	

**Table 3:** Distribution of the self-report water intake according to the age group and caregiver presence assistance. Piauí State, Brazil.

## Discussion

One of the most important aspects of the health of elderly is hydration, which has been often neglected and it is subject to a number of physiological changes in the body caused by elderly [11]. Nevertheless, there is a paucity of studies that address the water intake in the elderly people. The available data are alarming: in an European review, there was noticed that institutionalized elderly have insufficient water intake by 96%, and more than half of these elderly people drink less than 1.5 liters of water daily [12]; in Brazil, 62% of elderly women attending in a center of attention to the elderly, reported drinking fewer than four glasses of water per day [13].

Most of the elderly were female, aged up to 75 years, and AH was more prevalent than MD, according to studies concerning about use of health services among Brazilian older adults [5]. Younger individuals, more than older ones, reported a daily intake of at least 6 glasses of water a day. Being thirsty was also associated with higher water consumption, what could be expected. However, about one third of elderly respondents reported do not feel thirst. It was also noticed that most of respondents had already received professional guidance on proper water intake. However, the water consumption reported by such individuals was similar to those who reported had never received information. It is noteworthy that in the present study, there was a greater number of elderly people up to 75 years and that only elderly without cognitive impairment were selected, which impacted on the small number of caregivers. However, analyzing the group over 75 years, this average assisted by a caregiver was of 50%, while among younger than 75 years was of 32.81%. More interesting, caregivers influenced in higher water consumption among elderly over 75 years.

Although age alone is not an independent risk factor for dehydration, converging age-related factors along with personal hydration habits can contribute to risk for dehydration in older adults [14,15]. Besides, although there are standard daily values for fluid intake in adults, the requirement varies across countries and applies to people in general. Remarkable, standards do not factor the activity level or health status of the older adult into their recommendations [16]. AH e MD may also predispose patients to dehydration, not only

by reducing the thirst and fluid intake [17]. The AH therapy involves dehydration related medications such as Angiotensin-converting-enzyme-inhibitors and diuretics [18].

Studies show that older adults with attentive and dedicated caregivers, who participate in the consultations, are better assisted and have better outcomes in the treatment. In the literature, there are positive results regarding the caregiver's relationship with the use of medication and involvement in consultations for the elderly [19,20] and as predictive factor of health-related quality of life in hypertension and diabetes [21].

This study adds in three important points. The first one highlights the role of the caregiver on water intake among the elderly aged over 75 years. Therefore, the elderly's difficulties as physical disabilities, cognitive and even changed suction, make them thus more dependent on a caregiver to the practice of daily activities, including water intake [22,23]. Thus, it is believed that the assistance of a caregiver may be essential in overcoming these hurdles and this seems to be the first study that brings out the importance of the caregiver to the consumption of water for the older people up to 75 years.

The second point is about thirst. Although being thirsty was associated with higher water consumption, about one third of elderly reported do not feel thirst. Importantly, the study was conducted in a region that over the course of a year, the temperature typically varies from 23°C to 37°C, which could suggest that because the individuals are in a region that can reach high temperatures, they may feel thirst, however, it is known that older individuals have different physiological responses to the thirst even when considered healthy adults [16]. Age-related changes in receptivity to osmotic and hypovolemic stimulation and hormonal changes in sensitivity to antidiuretic hormone and increased secretion of atrial natriuretic peptide seemed to explain thirst alterations in men 65 years or older. There is sparse information on thirst in older women [16].

The third point is regarding the inefficiency of professional guidance on proper water intake, which points to the need for better conscientious strategies for the elderly and their caregivers about the subject, considering that more complex factors might interfere with the

water intake. The literature reports that the water consumption in the elderly is also associated with behavioral question. The location where the individual ingest the drink, the time of day, the color of the containers provided, the amount, the temperature of the beverage and easy access seem to be directly associated with the ingestion [24,25].

This study has some limitations. Its cross-sectional nature does not allow establishing differentiation between periods of greater or lesser water intake and factors involved in such variations, therefore it was obtained only a section of the elderly behavior. Additionally, this study was based on a self-report water intake. There are no studies involving validity of self-reported fluid intake, however studies on the prevalence of chronic diseases based on self-reported morbidity has had positive results. Although these studies have some positive characteristics such as speed in getting information and low cost; there are also some disadvantages as the appearance of bias related to: 1) the respondent know the information of interest; 2) their ability to remember it; and 3) their desire to inform it [5,26].

## Conclusion

This study showed that most of the elderly reported ingest the amount of water recommended by the Brazilian Ministry of Health. Although, studies involving validity of self-reported fluid intake are important to ratification of this situation. Younger age, thirst and appropriate intake idea were positively associated with the result of the self-reported drinking of at least 6 glasses of water. Caregiver was more frequent in the elderly age group above 75 years, which would have been important to the increased water intake. This indicates that several factors may be associated with the ingestion of water and should be considered when analyzing strategies for hydration of the elderly.

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