

Nursing Educational Program for Improving Older Persons' Hydration Status

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Abstract

Background: Dehydration is a serious public health concern occurred due to the imbalance between water intake and loss which increased in the climate change and Egypt's hot weather, lead to the morbidity and mortality rate raise among the older persons. **Aim:** To evaluate the effect of nursing educational program for improving older persons' hydration status. **Subjects and Method:** One group pre-post intervention research design. **Setting:** The study conducted at the (internal medicine and urology) clinics at the Assiut University hospitals. **Sample:** Total number of 130 older persons was included. **Study tools:** Contained four tools; **Tool (I):** Consisted of four parts; personal data, El-Gilany scale for measurement of socioeconomic status, health condition and knowledge of older persons regarding dehydration. **Tool (II):** Dehydration screening. **Tool (III):** Hydration knowledge scale and **Tool (IV):** Hydration facilitators and barriers attitude. **Results:** Mean \pm SD and (range) of participant age: 69.28 ± 7.65 (60-91). It was found that, more than half (56.9% & 53.1% respectively) of them were male and had very low socioeconomic status. There was statistically significant effect of the educational program on the older persons' dehydration status; also there was improvement of older person's hydration & dehydration knowledge and attitude of older persons about hydration facilitators and barriers after the application of the educational program. **Conclusion and recommendations:** These results support that the nursing educational program improved the hydration status, hydration & dehydration knowledge and attitude toward hydration facilitators and barriers among older persons. Continuous educational programs about hydration status of older persons are recommended.

Keywords: Hydration Status, Nursing educational program, Older Persons.

Introduction

A healthy adult requires a balance between water intake and loss; water deprivation arises when this balance is disrupted, leading to a state of dehydration (Anjo, et al., 2020). Dehydration is a serious public health concern that worsens with age and will only get worse as the number of older persons rises. It affects older persons living independently (Bunn & Hooper, 2019). A complicated state that results in a decrease in total body water is one definition of

dehydration. This may be predominantly caused by either a salt and water deficit (salt loss dehydration) or a water deficit (hypernatremia or water loss dehydration) (Paulis, et al., 2018 & Vella, et al., 2021).

There are approximately seven million older persons in Egypt, making up 7.1% of the country's total population. By 2052, this number is predicted to increase to 17.9% (Central Agency for Public Mobilization and Statistics (CAPMAS), 2020 &

Abdullah et al., 2022). Due to age-related physiological changes, such as diminished thirst perception and impaired renal function, older persons are more likely to become dehydrated (**Meade et al., 2020**). Those who suffer from mental illness or stroke are frequently at an increased risk. Dehydration in the older persons is primarily caused by inadequate fluid intake. Dehydration-related deaths can increase to 50% of all deaths (**Shaheen et al., 2018**). Many acute medical conditions, including diminished cognitive function, falls, renal failure, pressure ulcers, tiredness, delayed wound healing, and inadequate management of hyperglycemia in diabetes, are thought to be preceded by dehydration (**Rodrigues et al., 2015**).

Dehydration is commonly characterized by dry mouth and tongue, decreased skin turgor, thirst, headache, lethargy and elevated blood concentrations of osmolality and serum sodium. Longer hospital stays have also been linked to dehydration and the high annual cost estimate for a primary diagnosis of dehydration (**Paulis et al., 2022**). Physical symptoms and clinical evaluation, such as serum or plasma osmolality (a good indicator of water-loss dehydration) and isotope tracers (a contender for the gold standard of measuring dehydration) are used in the diagnosis of dehydration (**Heung et al., 2021**). In order to identify the older persons living in both the community and in institutions who are most likely to suffer from dehydration, a new Dehydration-Screening Tool (DST) is presently being developed. Urine osmolality and the "Hydration Score" produced by the geriatric DST tool are inversely correlated (**Rodrigues et al., 2015**). The nurse plays a crucial role in educating the older persons and those providing care for them about the dangers of dehydration. Rich-

water foods like fruits and other beverages should be introduced, and coffee, tea, soft drinks, alcohol and liquid diet supplements should be avoided. Older persons should be informed that the recommended daily minimum fluid intake for men and women is 2 liters and 1.6 liters, respectively (**Bhanu et al., 2019**). The nurses should record regularly and adequately the hydration status among the older persons by observation and report in order to manage the dehydration among the older persons (**Heung et al., 2021**).

Significance of study:

Dehydration is a common condition that worsens with age in older persons, given the effects of climate change and the increased frequency of heat waves, there will likely be a rise in the number of deaths from dehydration (**Abdullah et al., 2022**). Although the exact frequency of dehydration in the older persons is unknown, it is frequently observed in community settings, with inadequate fluid intake serving as the main risk factor (**Beck et al., 2023**). It is thought to affect over one-third of older persons who live in vulnerable and frail communities (**Paulis, et al., 2018**). It was found that 46% of older persons in long-term care had impending or current dehydration. However, dehydration remains under-diagnosed and prevalent (**Bhanu et al., 2019**). Hydration disturbances are common in old age: The reported prevalence of dehydration in older persons ranges from 19% to 89%, depending on the definition and the population in question (**Deißler et al., 2023**).

Inadequate hydration in the older persons is associated with increased morbidity and mortality. Patients on thickened fluids consumed only 23.4% of their fluid requirements on average. Furthermore, it has

been shown that up to 55% of individuals with dysphagia are at risk of dehydration, which can lead to decreased quality of life and increased healthcare costs (Li et al., 2023). Bunn et al., (2015) in their systematic review reported that as Health education about drinking enough fluids is the most effective way to prevent dehydration. Dehydration in older persons is linked to poor health outcomes, including increased risk of disability and mortality. Prevention may improve health and functional status (Bruno et al., 2021). Dehydration is linked to poor health outcomes for the older persons and is a separate factor in length of hospital stay, readmission, critical care, in-hospital mortality and poor prognosis (Li et al., 2023). It is complex and difficult task in getting older persons to drink. Preventing dehydration in older persons is critical for health professionals working in both hospitals and care homes (Shabana et al., 2022). However, few studies have addressed the knowledge of older persons regarding hydration in health and disease. So, the present study aimed to improve the hydration status of the older persons through nursing educational program.

Aim of the study

To evaluate the effect of nursing educational program for improving older persons' hydration status at Assuit University Hospitals.

Study hypothesis:

Alternative hypothesis

(H1) The nursing educational program will improve the hydration status among older persons at Assuit University Hospitals.

(H2) The nursing educational program will improve hydration knowledge among older persons at Assuit University Hospitals.

(H3) The nursing educational program will improve the dehydration knowledge among older persons at Assuit University Hospitals.

(H4) The nursing educational program will change attitude toward hydration facilitators and barriers among older persons at Assuit University Hospitals.

Subjects and Method

- Subjects

-Research design

One group pre-post intervention research design was used.

-Setting

The study was conducted at the internal medicine clinic at main Assuit University hospital and urology clinic at urology hospital at Assuit University. These two clinics had the largest flow-rate of the older persons with providing medical care and follow-up services.

-Sample and sample size estimation

The total number of the study sample was 130 older persons; this number was taken during six months from internal medicine and urology outpatient clinics. Convenient sample was used to include both sex, older persons aged 60 years and above, alert, able to communicate and had dehydration which assessed by Dehydration-Screening Tool.

-Tools of the study

In order to collect the necessary data the researchers used a structured interview questionnaire which composed of four tools as following:

Tool (I): Included four parts:

Part (1): Personal data: Included (7) questions as: Name, mobile phone number, age, sex, marital status, residence and Body Mass Index (BMI) of the older persons which calculated after measuring weight and height, then divided weight in kg by square height in meter (kg/m²).

Part (2): El-Gilany scale for measurement of socioeconomic status (El-Gilany et al., 2012): It used to assess socio-demographic characteristics includes: Seven domains, educational and cultural domain for both (husband and wife), occupation, family, economic, family possessions, home sanitation and health care domain.

Scoring system: The socioeconomic status was assessed by using a scale comprised from seven domains with a maximum score of 84 and a higher score indicating better socioeconomic status. Socioeconomic scores were classified into four levels, scores < 42 (very low), 42 < 63 (low), 63 < 4.17 (moderate) and 4.17-84 (high social level). The socioeconomic status original scale was valid and reliable ($r=0.93$).

Part (3): Health condition: This part included (3) questions about chronic disease such as (diabetes mellitus, hypertension, heart disease, respiratory disorder, urinary tract infection and kidney disease....etc.), previous history of dehydration and previous history of hospital admission due to dehydration.

Part (4): Knowledge of older persons regarding dehydration:

This involved (13) questions: Definition, causes, signs & symptoms, age-related changes causing dehydration, most serious dehydration symptoms, degrees of dehydration, symptoms of mild, moderate & severe dehydration, complications, prevention, healthy drinks & food to prevent dehydration in summer and drinks & food should be avoided to prevent dehydration (Shabana et al, (2022), Feliciano and Lag, 2021 and Bruno et al., 2021).

Scoring: Poor = <50%, average = from 50 to less than 75% and good = $\geq 75\%$ (6).

Tool (II): Dehydration-Screening Tool (DST)

It was used to assess the hydration status of the older persons (before and after the program application). The tool developed by Vivanti et al, (2010) which is composed of 11 items included; four physical signs of dehydration (drop on systolic blood pressure, tongue dryness, skin turgor and body weight) and seven items about thirst sensation, pain and mobility. This tool was used in the first contact to assess the dehydration status of the older persons to include them in the current study.

-Scoring of the tool

The responses to the items were codified using one point assigned to every item that described the absence of a characteristic or symptom related to dehydration (and no points if the characteristic or symptom was present), as following:

- No dehydration = <6
- Dehydration = ≥ 6 (Vivanti et al, 2010).

Tool (III): HyKS (Hydration Knowledge Scale)

It was developed by Veilleux et al., (2019) to assess knowledge of older persons about hydration status; this scale includes 16 questions about hydration and fluid intake such as: older adults feel less thirsty than younger adults even when equally dehydrated, eight glasses of water per day is not a rule that applies to everyone, hot and humid environments don't change the amount of fluid needed..etc. These items were administered on a 5-point likert scale from (-2 = definitely inaccurate, -1 = probably inaccurate, 0 = Not sure, 1 = probably accurate and 2 = definitely accurate) (Veilleux et al., 2019).

Scoring of the tool

1. Number correct can be scored by:

Giving 1 point for each of the following items marked as either probably accurate (a rating of 1) or definitely accurate (a rating of 2): Items 1, 3, 5, 8, 10, 13, 14, 16).

b. Giving 1 point for each of these items marked as -2 (definitely inaccurate) or -1 (probably inaccurate): Items (2, 4, 6, 7, 9, 11, 12, 15).

- Items were first scored as correct or incorrect (i.e., for items that described accurate or true hydration information, a score of 1 was given for an answer of “probably accurate” or “definitely” accurate, and 0 for other responses; for items that described inaccurate or false hydration information a score of 1 was given if a person said “probably inaccurate” or “definitely inaccurate” with a score of 0 for other responses) and then a total number of items correct was calculated for each person.

2. An overall knowledge score (from -16 to 16) can be calculated by

a. Reverse scoring all of the “inaccurate” items (2, 4, 6, 7, 9, 11, 12, 15).

b. Summing the reverse scored items with the rest of the items.

c. A “perfect” score would be 16, which would be if each item were answered correctly and definitively (Veilleux et al., 2019).

3. Older persons with higher mean indicated that they had good dehydration knowledge, while those with low mean indicated that they had poor knowledge regarding dehydration.

Tool (IV): Attitude toward Hydration Facilitators and Barriers (H-FAB)

It was developed by Veilleux et al., (2019) to assess attitudes of older persons about hydration status: This tool includes 18 questions about attitudes of older persons

toward hydration and drinking fluid. The word “fluids” includes water, milk, juice, soda, tea, coffee, sports drinks and energy drinks. These items were administered on a 5-point likert scale from (1= Not at all like me, 2= Not much like me, 3= somewhat like me, 4= Mostly like me and 5= Very much like me). Each category included barriers (e.g., “I don’t drink fluid when it’s not easily accessible”) and facilitators (e.g., “I’m more likely to drink fluids if I have a bottle with me”) (Veilleux et al., 2019).

-Scoring of the tool

1. Reverse score items 1, 8, and 12

2. Calculate averages for each subscale:

a. Lack of Effort Barrier: 1R, 7, 8R, 13

b. Physical Barrier: 4, 10, 15

c. Lack of Container Barrier: 5, 12R, 16

d. Social Facilitator: 2, 6, 11, 17

e. Monitoring Facilitator: 3, 9, 14, 18

Veilleux et al., 2019).

3. Older persons with higher mean indicated that they had positive attitude, while those with low mean indicated that they had negative attitude toward hydration facilitators and barriers.

-Tool (I) part 4, Tool (II), Tool (III) and Tool (IV) were used twice pre/post the application of health education program.

Method

The current research proceeded as following:

Approval

An official approval obtained from the Faculty of Nursing Dean, Assuit University to the directors of the out-patients clinics at Assuit University Hospitals. This letter included permission to carry out the study and an explanation of its aim and nature.

-Ethical considerations

Obtaining approval of the scientific research ethical committee of Faculty of Nursing.

Before data collection, the older persons informed about the aim and the nature of the study. Also, they were assured that the information will remain confidential and will be used for purpose of research only. The participants informed that participating in the study is voluntary; they have the right to withdraw from the study at any time without providing any rationale.

-Tools' development

Tools' Validity

Validity of the tools: Checked and revised by panel of five experts from nursing sciences at Assuit University who reviewed the instruments for clarity, relevance, comprehensiveness, understanding and applicability.

Tools' reliability

Reliability was estimated by α Cronbach's test to test internal consistency and its result was: The socioeconomic status original scale was valid and reliable $r= 0.93$, dehydration knowledge= 0.85 , Dehydration-Screening Tool $r= 0.88$, Hydration Knowledge Scale $r=0.90$, $p < .001$ and for Hydration Facilitators and Barriers $r = 0.80$.

-Pilot study

A pilot study was conducted on (13) older persons to assess the clarity and applicability of the tools. This number was included in the study because there were no modifications in the study tools.

-The Nursing educational program

This program was designed by the researchers based on reviewing current national and international literature. This program was carried out with four phases:

A) Assessment phase: The researchers explained the nature and purpose of the study to the older persons and asked them for their agreement of participation subsequently assessment of their dehydration status by

Dehydration-Screening Tool; the person who had dehydration and met the inclusion criteria was included in the study.

B) Planning phase: This phase included the arrangement for the conduction of the program such as: Teaching place, time, sessions, methods and materials.

- **Teaching place:** The program was conducted in out-patient clinics' lecturing room or in the available place.

- **Teaching Time:** The time of the program was coordinated between the older persons and the researchers.

- **Sessions:** The contents of the program divided into two sessions.

- **Teaching methods and materials:** The researchers used simple teaching methods as: Lecture, discussion. The used media included power point presentation, pictures and handouts regarding dehydration prepared by the researchers and distributed to every older person at the end of the program.

C) Implementation phase: Based on the findings of the assessment, the nursing educational program was applied for older persons who had dehydration (no=130).

-The first session: In order to improve health, the researchers stressed the value of staying hydrated at the start of the session. Then the researcher performed pretest using all the study tools except (**Tool II**), after that the older persons received the basic knowledge about dehydration included; definition, causes, signs& symptoms, age-related changes causing dehydration, most serious dehydration symptoms, degrees of dehydration and symptoms of (mild, moderate & severe dehydration).

-The second session: began with revision of the previously given information then knowledge about complications, prevention, drinks & food to prevent dehydration.

Following that, the researchers gave out handouts and illustrative pictures and then summarized the program's contents for ten minutes. The researchers followed the older person's adherence with instruction of dehydration prevention and arranged for the time of follow up to conduct the post-test by mobile phone.

D) Evaluation phase: One month later; the researchers arranged the time of follow up with the participants through phone call when they came to out-patients clinics for follow-up visit to perform the post program test and to evaluate the effect of the nursing educational program on improving the older persons' hydration status by using the pretest questionnaire (Tool (I) part 4, Tool (II), Tool (III) and Tool (IV)).

-Field work: Data collection began on May 1st, 2023, and continued for seven months, ending at the end of November 2023. In the aforementioned outpatient clinics, the researchers conducted two daily meetings with an average of two to three individuals per day; each interview lasted approximately thirty to forty-five minutes. The researchers filled out the structured form and completed the pretest after introducing themselves, going over the goal, duration and activities of the study and getting oral consent during the initial contact. The pretest involved two sessions of explanation of the educational program's contents.. Posttest was done after one month and providing handout booklet in Arabic language for all the participants at the end of the program

Statistical analysis

The data were tested for normality using the Anderson-Darling test and for homogeneity variances prior to further statistical analysis. Categorical variables were described by number and percent, where continuous

variables described by mean and standard deviation. Chi-square test and fisher exact test used to compare between categorical variables where compare between continuous variables by t-test and Anova Test. A two-tailed $p < 0.05$ was considered statistically significant all analyses were performed with the IBM SPSS 20.0 software.

Results

Table (1): Presents that nearly two-thirds (64.6%) of the older persons were aged 60-70 years old, more than half (56.9%) were male, the majority (85.4%) of them were married, more than one-third (33.9%) read and write and more than half (53.8%) were from rural area.

Figure (1): Declares that more than half (53.1%) of older persons were at very low socio-demographic level and slightly more than one-fifth of them (21.5%) at moderate socio-demographic level.

Figure (2): Demonstrates that more than two-fifths (47.7%) of the older persons had normal weight, (37.7%) were overweight and (14.6%) were obese.

Figure (3): Proves that more than half (52.0%) of the older persons had Diabetes Miletus, slightly more than half (51.2%) had hypertension, slightly more than two-fifths (41.6%) had kidney diseases and more than two-thirds (72.0%) had urinary tract infections.

Figure (4): Represents that more than two-thirds (70.8%) of the older persons had history of the dehydration.

Figure (5): Confirms that (13.1%) of the older persons had previous history of hospital admission from dehydration

Table (2): Clarifies that there was statistical significance differences between geriatric dehydration screening of the older persons

before and after the nursing educational program application p-value <0.001.

Table (3): Reveals that there was improvement of the older persons' hydration knowledge after the health education program application p-value <0.001.

Table (4): Clears that there was increase of older persons' knowledge regarding dehydration after the health education program application with p-value 0.001.

Table (5): Shows that the application of the education program significantly affected on the attitude of older persons toward hydration facilitators and barriers and its subscale p-value <0.001.

Table (6): Indicates that there weren't statistical significance relation between older persons' BMI, history of chronic diseases, previous history of dehydration and previous history of hospitalization from dehydration with the geriatric dehydration screening tool before/after the application of the nursing education program p-values= 0.366, 0.428, 0.954 and 0.486 respectively.

Table (7): Denotes that there was statistical significance effect of older persons' gender on

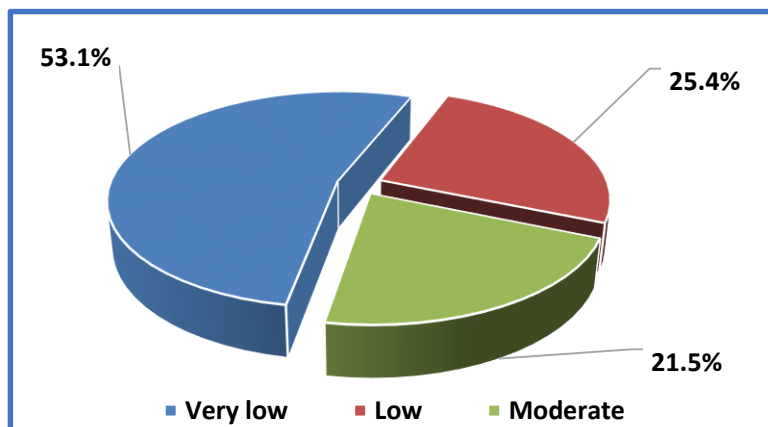
their hydration knowledge after the application of the education program p-value= 0.005. While there wasn't relate to their age, marital status and socioeconomic status p-values= 0.980, 0.178 and 0.345 respectively.

Table (8): Signifies the presence of statistical significance relation between older persons' total score of knowledge regarding dehydration before the program application with their gender, socio-demographic status, educational level, residence and previous history of hospitalization due to dehydration after the application of the educational program p-values= 0.007, 0.046, 0.013 and 0.000 respectively.

Table (9): Specifies that there was improvement of the older persons' attitude toward hydration facilitators and barriers after the application of education program with effect of their gender p-value= 0.005 and no effect of their age, gender, marital status and socio-demographic class respectively p-values= 0.345, 0.090, 0.488.

Table (1): Distribution of older persons' personal data at Assuit University Hospitals

Personal data	No. (n=130)	%
Age group (years):		
60-70	84	64.6
More than 70	46	35.4
Mean \pm SD (range):	69.28 \pm 7.65 (60-91)	
Gender:		
Male	74	56.9
Female	56	43.1
Marital status:		
Single	4	3.1
Married	111	85.4
Widow	12	9.2
Divorce	3	2.3
Educational level:		
Illiterate	21	16.1
Read and write	44	33.9
Primary	6	4.6
Preparatory	13	10
Secondary "3-5" years	23	17.7
Intermediate 2 year Institute	12	9.2
University	11	8.5
Residence:		
Rural	70	53.8
Urban	60	46.2

**Figure (1):** Distribution of socio-demographic class among older persons' at Assuit University Hospitals (no. = 130).

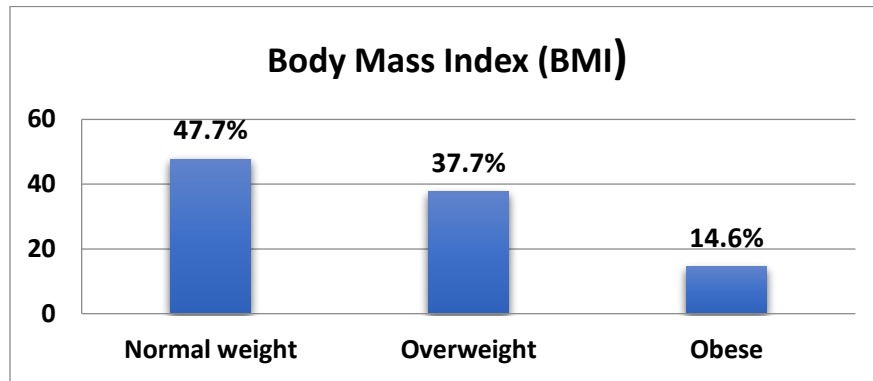


Figure (2): Distribution of older persons' body mass index at Assuit University Hospitals (no. = 130).

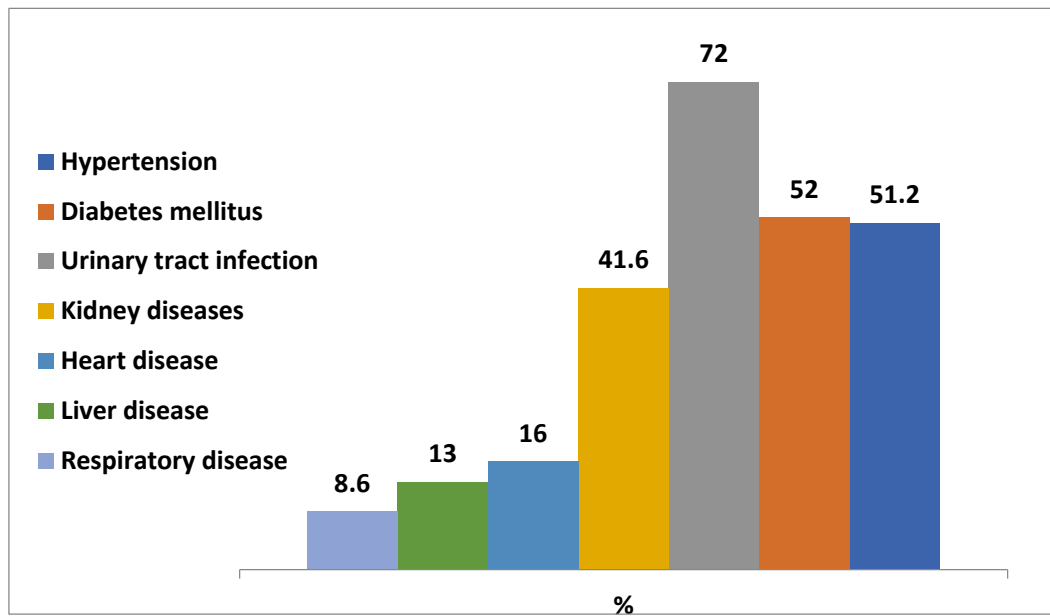


Figure (3): Distribution of older persons' chronic illness at Assuit University Hospitals (no. =130).

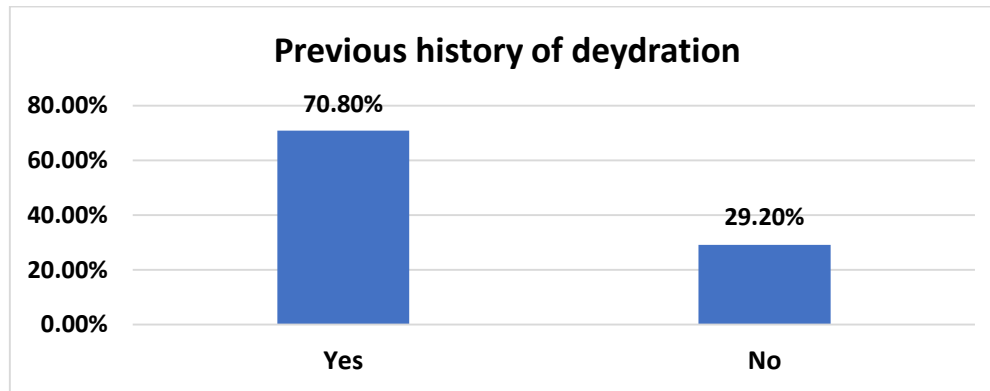


Figure (4): Distribution of older persons' previous history of dehydration at Assuit University Hospitals (no. =130).

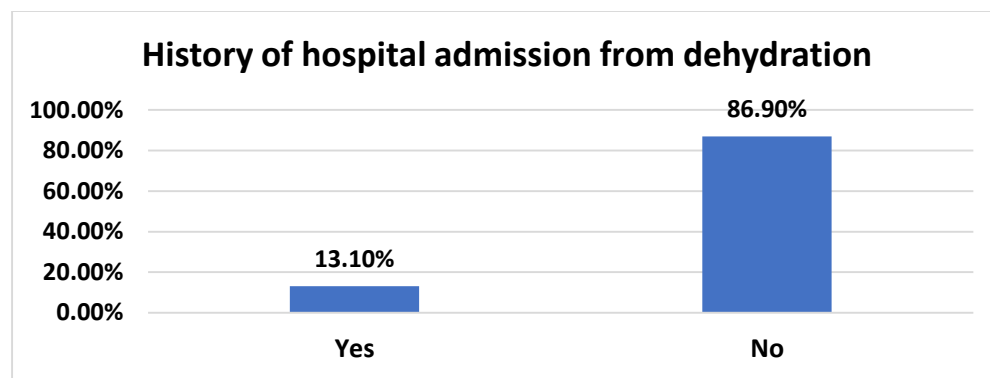


Figure (5): Distribution of older persons' previous history of hospital admission from dehydration at Assuit University Hospitals (no. = 130).

Table (2): Geriatric dehydration screening of the older persons before and after the health education program application at Assuit University Hospitals

Geriatric Dehydration Screening	Max Score	Before (n=130)		After (n=130)		X ² /T	P value
		No	%	No	%		
No dehydration	<6	28	21.5	116	89.2	120.35	<0.001**
Dehydration	≥6	102	78.5	14	10.8		
Mean± SD(range)	11	6.93±1.83(2-11)		3.98±1.52(0-11)		T=14.12	<0.001**

- Chi square test for qualitative data between the two groups

Paired Sample T-test quantitative data between the two groups

*Significant level at P value < 0.01

0.01

Table (3): Hydration knowledge of the older persons before and after the health education program application at Assuit University Hospitals

HyKS Hydration Knowledge	Pre (n=130)	Post (n=130)	Mean DF	T	P. value
	Mean± SD	Mean± SD			
	4.69±1.32	14.8±1.44			

Paired Sample T-test quantitative data between the two groups *Significant level at P value < 0.01

Table (4): Total score of older persons' dehydration knowledge before and after the health education program application at Assuit University Hospitals

Dehydration knowledge	Max Score	Before (n=130)		After (n=130)		X2/T	P value
		No	%	No	%		
Poor	<50%	103	79.2	8	6.2	153.7 7	<0.001 *
Average	50 to less than 75%	19	14.6	31	23.8		
Good	≥75%	8	6.2	91	70.0		
Mean± SD(range)	85	22.51±19.68(5-81)		65.5±11.3(32-82)		21.60	<0.001 *

- Chi square test for qualitative data between the two groups

Paired Sample T-test quantitative data between the two groups *Significant level at p-value < 0.01

Table (5): Mean of hydration facilitators and barriers attitude of older persons before and after the health education program application at Assuit University Hospitals

Hydration Facilitators and Barriers	Max Score	Before (n=130)	After (n=130)	Mean DF	T	P. value
		Mean± SD	Mean± SD			
Lack of effort barrier	20	9.57±2	16.29±1.81	-6.72	-28.45	<0.001*
Physical barrier	15	5.95±2.12	10.75±1.61	-4.80	-20.54	<0.001*
Lack of container barrier	15	5.95±1.75	10.99±1.88	-5.04	-22.37	<0.001*
Social facilitator	20	9.37±1.84	15.94±2.02	-6.57	-27.43	<0.001*
Monitoring facilitator	20	10.62±2.31	17.54±1.78	-6.92	-27.06	<0.001*
Hydration Facilitators and Barriers	90	41.47±4.92	71.52±4.99	-30.05	-48.91	<0.001*

Paired Sample T-test quantitative data between the two groups *Significant level at P value < 0.01

Table (6):- Relation between geriatric dehydration screening and health condition of the older persons before and after the health education program at Assuit University Hospitals

Health conditions	Geriatric dehydration screening (n=130)									
	Before					After				
	No dehydration		Dehydration		P. value	No dehydration		Dehydration		P. value
	No	%	No	%		No	%	No	%	
BMI:										
Normal Wight	10	35.7	52	185.7	0.155	53	45.7	9	64.3	0.366
Overweight	11	39.3	38	135.7		46	39.7	3	21.4	
Obese	7	25.0	12	42.9		17	14.7	2	14.3	
History of chronic illness										
No	0	0.0	5	17.9	0.232	5	4.3	0	0.0	0.428
Yes	28	100.0	97	346.4		111	95.7	14	100.0	
Previous history of the dehydration										
No	11	39.3	27	96.4	0.187	34	29.3	4	28.6	0.954
Yes	17	60.7	75	267.9		82	70.7	10	71.4	
Previous history of hospitalization due to dehydration										
No	25	89.3	88	314.3	0.675	100	86.2	13	92.9	0.486
Yes	3	10.7	14	50.0		16	13.8	1	7.1	

Chi square test for qualitative data between the two groups
0.05

*Significant level at P value <

Table (7): Relation between hydration knowledge scale with older persons' socioeconomic data before and after the program application at Assuit University Hospitals

socioeconomic data	N	Hydration Knowledge Scale (n=130)			
		Before		After	
		Mean± SD	Range	Mean± SD	Range
Age (years):					
60-70	84	4.67±1.31	2-8	14.8±1.56	9-16
More than 70	46	4.74±1.34	2-9	14.8±1.2	13-16
		T= 0.29 P value= 0.765		T= 0.02 P value= 0.980	
Gender:					
Male	74	4.86±1.34	2-9	15.11±1.29	9-16
Female	56	4.46±1.26	2-8	14.39±1.53	10-16
		T= 1.73 P value= 0.086		T= 2.88 P value= 0.005*	
Marital status:					
Single	4	4.75±0.5	4-5	13.5±0.58	13-14
Married	111	4.65±1.35	2-9	14.89±1.43	9-16
Widow	12	5.17±1.34	4-8	14.58±1.51	12-16
Divorce	3	4.33±0.58	4-5	14±1.73	12-15
		F= 0.63 P value= 0.596		F=1.67 P value= 0.178	
Socio-demographic class:					
Very low	69	4.86±1.25	3-9	14.96±1.17	12-16
Low	33	4.48±1.09	3-7	14.52±1.87	9-16
Moderate	28	4.54±1.67	2-8	14.75±1.46	11-16
		F= 1.14 P value= 0.324		F= 1.07 P value= 0.345	

Independent T-test quantitative data between the two groups –

One-way Anova T-test quantitative data between the three groups or more *Significant level at P value < 0.05

Table (8): Relation between knowledge of older persons regarding dehydration, personal data and dehydration history before/ after the health educational program at Assuit University Hospitals

Items	Knowledge of older persons regarding dehydration (n=130)													
	Before						P. value	After						P. value
	Poor		Faire		Good			Poor		Faire		Good		
	No	%	No	%	No	%		No	%	No	%	No	%	
Gender:														
Male	52	50.5	17	89.5	5	62.5	0.007*	3	37.5	15	48.4	56	61.5	0.230
Female	51	49.5	2	10.5	3	37.5		5	62.5	16	51.6	35	38.5	
Socioeconomic class:														
Very low	47	45.6	15	78.9	7	87.5	0.017*	4	50.0	13	41.9	52	57.1	0.547
Low	31	30.1	1	5.3	1	12.5		3	37.5	10	32.3	20	22.0	
Moderate	25	24.3	3	15.8	0	0.0		1	12.5	8	25.8	19	20.9	
Education:														
Illiterate	15	14.6	2	10.5	4	50.0	0.046*	2	25.0	2	6.5	17	18.7	0.050*
Read and write	29	28.2	12	63.2	3	37.5		2	25.0	10	32.3	32	35.2	
Primary	4	3.9	1	5.3	1	12.5		0	0.0	1	3.2	5	5.5	
Preparatory	12	11.7	1	5.3	0	0.0		2	25.0	7	22.6	4	4.4	
Secondary	21	20.4	2	10.5	0	0.0		1	12.5	4	12.9	18	19.8	
Institute	11	10.7	1	5.3	0	0.0		1	12.5	6	19.4	5	5.5	
University	11	10.7	0	0.0	0	0.0		0	0.0	1	3.2	10	11.0	
Residence:														
Rural	50	48.5	12	63.2	8	100.0	0.013*	3	37.5	18	58.1	49	53.8	0.582
Urban	53	51.5	7	36.8	0	0.0		5	62.5	13	41.9	42	46.2	
Previous history of dehydration														
No	33	32.0	4	21.1	1	12.5	0.352	2	25.0	5	16.1	31	34.1	0.160
Yes	70	68.0	15	78.9	7	87.5		6	75.0	26	83.9	60	65.9	
Previous hospitalization due to dehydration														
No	94	91.3	17	89.5	2	25.0	0.000*	7	87.5	27	87.1	79	86.8	0.998
Yes	9	8.7	2	10.5	6	75.0		1	12.5	4	12.9	12	13.2	

Chi square test for qualitative data between the two groups

**Significant level at P value < 0.05*

Table (9): Relation between hydration facilitators & barriers attitude and older persons' socio-demographic data before and after the program application at Assuit University Hospitals

socio-demographic data	N	Hydration Facilitators and Barriers Attitude (n=130)			
		Before		After	
		Mean± SD	Range	Mean± SD	Range
Age group (years):					
60-70	84	41.17±4.95	27-53	71.15±5.22	54-81
More than 70	46	42.02±4.86	32-55	72.17±4.52	60-80
		T= 0.94	P value= 0.345	T= 1.11	P value= 0.267
Gender:					
Male	74	42.19±5.15	30-55	72.57±4.81	54-81
Female	56	40.52±4.45	27-51	70.13±4.93	57-79
		T= 1.94	P value= 0.055	T= 2.83	P value= 0.005*
Marital status:					
Single	4	40±7.87	33-51	71.75±2.06	70-74
Married	111	41.18±4.73	27-53	71.48±5.15	54-81
Widow	12	43.17±5.13	37-55	72.25±4.39	66-79
Divorce	3	47.33±3.51	44-51	69.67±4.93	64-73
		F= 2.21	P value= 0.090	F= 0.22	P value= 0.879
Socio-demographic class:					
Very low	69	41.65±5.11	30-55	71.49±4.95	54-80
Low	33	41.91±3.74	34-48	72.52±5.01	61-81
Moderate	28	40.5±5.64	27-53	70.39±5	60-79
		F= 0.72	P value= 0.488	F= 1.38	P value= 0.255

Independent T-test quantitative data between the two groups -

One-way Anova T-test quantitative data between the three groups or more

**Significant level at P value < 0.05*

Discussion

It's essential for human health and wellbeing to drink enough water. Dehydration is a complex health problem frequently found in older persons that can have negative consequences on health, such as delirium, confusion, infection, constipation, kidney failure, drug toxicity, pressure ulcers, delayed wound healing, and stroke. At the moment, little is known about older persons' attitudes and knowledge about hydration and dehydration. So the current study aimed to evaluate the effect of nursing educational program for improving older persons' hydration status.

Arroyo et al., (2021) stated that there are factors related to poor fluid intake among older

person's personal and social factors. Therefore, the socio-demographic characteristics of the older persons was assessed and revealed that nearly two-thirds of them were aged 60-70 years old with mean 69.28±7.65, more than half were male, the majority were married, more than one-third read and write and more than half were from rural area. Also, more than half of the older persons were at very low socio-demographic class. Uyanik and Dağhan, (2021) recorded that more than one-third of the participants were aged ≥75, the majority of them were male and single, nearly two-thirds had primary & secondary education. Also, Shabana et al, (2022) reported that one-third of the sample were aged 65–70, more than

half were male, more than two-thirds were married and more than half can read. This wasn't congruent with **Atciyurt et al., (2024)** who recorded that the mean \pm SD age was 79.9 ± 7.7 years and majority of participants were female.

Increased body mass index is also associated with lower levels of total body water (**Feliciano & Lag, 2021**). The current study revealed that more than two-fifths of the older persons had normal weight and more than one third were overweight. This was agreed with **Uyanık and Dağhan, (2021)** who found that more than one-third of the study participants were overweight and obese. Assessment of the nutritional status of the older persons is very crucial especially because the well-recognized link between malnutrition and dehydration.

Aging is a complex process that impacts all organs, including the kidney, and is typified by a progressive loss of function. The kidney's anatomical changes with age include decreased mass, interstitial fibrosis, progressive nephrosclerosis, and impaired homeostatic and compensatory regulatory function. Older persons are also more vulnerable to dehydration brought on by chronic illnesses. It should be highlighted that older persons frequently take multiple medications for different conditions, and the cumulative side effects of these medications may make dehydration more prevalent (**Masot et al., 2018 and Vella, et al., 2021**). It was identified by the current study's findings that more than half of the older persons had Diabetes Miletus, slightly more than half had hypertension, slightly more than two-fifths had kidney diseases and more than two-thirds had urinary tract infections.

Jana & Chattopadhyay, (2022) stated that over one-third of all chronic diseases were caused by diabetes and hypertension, which

were the most prevalent illnesses. Previous episodes of dehydration, the presence of the previously mentioned nonspecific symptoms, (comorbid) illnesses and their associated risks (e.g., medication use), recurrent infections (e.g., frequent urinary tract infections caused by irritation in the bladder's mucous membranes, which is often attributable to concentrated urine), dietary changes, potential (increased) social vulnerability, and climate-related factors (e.g., heat waves) are all indicative of risk factors of dehydration.

In the presented data more than two-thirds of the older persons had history of the dehydration. **Parkinson et al., (2023)** indicated in their review and meta-analysis that quarter of non-hospitalized older persons were dehydrated. Dehydration can be caused by age-related physiological factors, such as diminished thirst perception and decreased kidney function in terms of urine concentration in the older persons. A common psychological factor that raises the risk of dehydration with age, aside from physiological changes, is cognitive impairment.

Nurses must be aware of the risk factors for dehydration in order to prevent dehydration in older persons; they must start treatment early, and stop the condition from getting worse and possibly avoidable hospitalization (**Shabana et al., 2022**). One of the most significant risk factors for dehydration is a history of hospitalization from dehydration; the proposed results pointed to that less than one quarter of the older persons were had previous history of hospital admission from dehydration.

Edmonds, (2021) recorded that dehydration in older persons is associated with increased mortality, poorer course of illness and increased costs for health services. Dehydration screening tool designed to give a fair idea about hydration in older persons based

only on history taking alone (**Dhar et al., 2023**). In the pre-education the majority of the older persons were had dehydration. Likewise, **Shabana et al., (2022)** reported that more than half of the study participants were had moderate dehydration. **Arroyo et al., (2021)** reported in the data from nursing home residents that, the biggest risk factor for dehydration over a six-month period is generally poor oral intake, as reported in this study. Over one-third of residents experienced dehydration. The majority of nursing home residents, according to another study, drank less than 1500 ml per day, which is less than the daily recommended amount of fluids. The current finding revealed that there was statistical significance effect between geriatric dehydration screening of the older persons before and after the health education program application. The same result reported by **Uyanık & Dağhan, (2021)** who discovered that the daily water intake and dehydration risk score significantly improved as a result of the hydration management program. As well as; **Wilson et al., (2019)** recorded that interventions to optimize the hydration of older persons can be effective.

Dehydration raises the risk of constipation, dental cavities, kidney stones, and urinary tract infections. Increased hydration knowledge is associated with the reduction of kidney stone recurrence (**Shaheen et al., 2018**). Based on the results of the current study; there was inadequacy of the older persons' hydration knowledge which improved after the nursing educational program application. This finding supported the study hypothesis. This finding aligned with **Picetti et al., (2017)** who found that there were significant deficiencies in hydration health literacy among older persons. This may be related to that the older persons

not the target group for hydration education program.

The community has a significant impact on the general health of older persons, including the sharing of important knowledge about proper hydration practices. It may be better to prevent than to cure: older persons are made aware of the value of drinking water, and dehydration and its and its complications can be prevented (**Dhar et al., 2023**). The aim of the current study was to increase the consumption of fluids by older persons and to prevent or reduce their risk of dehydration. The first step in achieving a change in behavior is increasing knowledge and awareness; in the current study it was recorded that older persons' knowledge in pretest was poor while there was increase of their knowledge regarding dehydration after the nursing educational program application with p-value 0.001. This finding supported the study hypothesis.

In the same line **Uyanık & Dağhan, (2021)** concluded that the hydration management program significantly increased older persons' awareness of the value of maintaining a fluid intake; **Tyrwhitt-Drake et al, (2014)** found that there was lack of the participants' knowledge. Similarly, after an educational intervention by **Konings et al., (2015)** to increase fluid consumption among individuals living in the community, it was reported that knowledge and awareness of the individuals increased, and that education and fluid intake monitoring methods together were more effective in increasing fluid consumption. in the same regard; **Shabana et al., (2022)** stated that more than one third of the older persons had low knowledge about dehydration. In the opposite side; **Shaheen et al., (2018) & Albasheer et al., (2021)** recorded that the participants exhibited good knowledge of dehydration. Moreover; **McCotter et al.,**

(2016) stated that knowledge had improved following the application of the education package.

From the current results was observed that the application of the education program significantly affected on the attitude of older persons toward hydration facilitators and barriers and its subscale which supported the study hypothesis. This can be caused by the change which happened in their knowledge regarding hydration and dehydration.

In referral to the relation between socio-demographic data with hydration knowledge; it was found that there was statistical significance effect of older persons' gender on their hydration knowledge after the application of the education program. This could be explained by that women tend to know more knowledge than male. While there wasn't relate to their age, marital status and socioeconomic status. This can be attributed to that the participants had almost the same age and socio-demographic class. The same observation reported by **Puto et al., (2021)** who confirmed that socio-demographic factors have a significant impact on the older persons with special focus on older women. In the same regard, **Mohamed et al, (2021)** found that socioeconomic status was found to be as significant predictors.

The presented data showed the presence of statistical significance relation between older persons' total score of knowledge regarding dehydration before the program application with their gender, socio-demographic status, educational level, residence and previous history of hospitalization due to dehydration after the application of the educational program. The level of education had a significant impact on care dependency. This study validated the relationship between education and knowledge, demonstrating that

older individuals with higher educational attainment also exhibit higher levels of knowledge. Comparable outcomes were attained by **Gobbens & Remmen, (2019) & Puto et al, (2021)**.

Concerning the relation between the older persons' socio-demographic data and their attitude before and after the education program it was reported that there was positive change of the older persons' attitude toward hydration facilitators and barriers with effect of their gender. Female older persons tend to have positive attitude toward health issues.

Conclusion

The present results supported the study hypothesis that the nursing educational program improved the hydration status, hydration knowledge, dehydration knowledge and attitude toward hydration facilitators and barriers among older persons at Assuit University Hospitals.

Recommendations

1. In the community, the older persons should be knowledgeable about the risks and effects of dehydration through continuous health education programs.
2. To encourage older persons to drink more water, leaflets and visual aids should be given to them in various contexts.
3. Health education about the using of healthy food and drinking fluids reminding alert applications is highly needed.
4. Periodic health examinations of the older persons' hydration status are recommended.
5. Further researches to study the associated risk factors with older persons' dehydration and its impact on health should be conducted.
6. For generalization of the study results larger sample size is advised.

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Conflict of interest

Not present

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References

Abdullah K., Esmat O., Hasaneen S., Ibrahim W. Health Risks Related to Climate Changes among Older Adults, *Egyptian Journal of Health Care, 2022 EJHC*, 13 (3): 678-690.

Albasheer O., Hakami A., Al Faqih A., Akkam I., Soraihy S., Mathary A., Alharbi A., Yaqoub M., Alotayfi M. Awareness of dehydration state and fluid intake practice among adults population in the Jazan Region of Saudi Arabia, 2019, *journal of nutritional science*, 2021, 10 (e84): 1-7.

Anjo, I., Amaral, T., Afonso, C., Borges, N., Santos, A., Moreira, P., Padrão, P. Are hypo hydrated older adults at increased risk of exhaustion? *Journal of Human Nutrition and Dietetics*, 2020, 33, 23–30.

Arroyo S., Zhou L., Harliny I., Zheng Y., Zhang D., Lim S. An exploratory study examining the adequacy of water intake among the elderly inpatients, *Annals of Clinical Medicine and Research*, 2021, 2 (2): 1-4.

Atciyurt K., Heybeli C., Smith L., Veronese N., Soysal, P. The prevalence, risk factors and clinical implications of dehydration in older patients: a cross-sectional study, *Acta Clinica Belgica*, 2024, 79:1, 12-18, DOI: 10.1080/17843286.2023.2275922

Beck A., Bech C., Knudsen A., Munk, T. Malnutrition and dehydration in older adults - how are the overlap between the two conditions? *Clinical Nutrition Open Science*, 51 (2023) 72e79.

Bhanu C., Avgerinou C., Kharicha K., Bauernfreund Y., Croker H., Liljas A., Rea J., Kirby-Barr M., Hopkins J.,

Walters K. ‘I’ve never drunk very much water and I still don’t, and I see no reason to do so’: a qualitative study of the views of community-dwelling older people and carers on hydration in later life, *Age and Ageing* 2019; 49: 111–118.

Bruno C., Collier A., Holyday M., Lambert K. Interventions to Improve Hydration in Older Adults: A Systematic Review and Meta-Analysis, *Nutrients*, 2021, 13(10): 3640.

Bunn D., Hooper, L. Signs and symptoms of low-intake dehydration do not work in older care home residents –DRIE diagnostic accuracy study. *Journal of the American Medical Directors Association*, 2019, 20(8): 963–970.

Bunn D., Jimoh F., Wilsher S., Hooper L. Increasing Fluid Intake and Reducing Dehydration Risk in Older People Living in Long-Term Care: A Systematic Review, *JAMDA* 16 (2015) 101e113.

Central Agency for Public Mobilization and Statistics (CAPMAS), (2020):<https://www.capmas.gov.eg/Pages/Publications.aspx>.

Deißler L., Wirth R., Frilling B., Janneck M., Rösler A. Hydration Status Assessment in Older Patients. *Deutsches Ärzteblatt International | Dtsch Arztebl Int* 2023; 120: 663–9.

Dhar M., Mittal K., Pathania M., Kalra S. Dehydration in Elderly: Revisiting the Assessment and Management Strategies. *J Assoc Physicians India*, 2023; 71(12):47–50.

Edmonds C., Foglia E., Booth P., Cynthia H., Gardner M. Dehydration in older people: A systematic review of the effects of dehydration on health outcomes, healthcare costs and cognitive performance. *Archives of Gerontology and Geriatrics*, 2021, Vol. 95, 104380.

El-Gilany A., El-Wehady A., El-Wasify M. Updating and validation of the socioeconomic status scale for health research in Egypt. *East Mediterr Health J*; 2012, 18(9):962-968.

- Feliciano, L., Lag, M.** Dehydration in Older Adults. In: Gu, D., Dupre, M.E. (eds) *Encyclopedia of Gerontology and Population Aging*, 2021, Springer, Cham. https://doi.org/10.1007/978-3-030-22009-9_808.
- Gobbens R., Remmen R.** The effects of socio-demographic factors on quality of life among people aged 50 years or older are not unequivocal: comparing SF-12, WHOQOL-BREF, and WHOQOL-OLD. *Clinical Interventions in Aging* 2019;14 231–239.
- Heung V., Ng T., Yee H., Fong B.** Understanding dehydration in the elderly Hong Kong: *Centre for Ageing and Healthcare Management Research (CAHMR Working Paper Series 1(1):* 2021, 1-10.
- Jana A., Chattopadhyay A.** Prevalence and potential determinants of chronic disease among elderly in India: Rural-urban perspectives. *PLoS ONE*, 2022, 17(3): e0264937. <https://doi.org/10.1371/journal.pone.0264937>.
- Konings, F., Mathijssen, J., Schellingerhout, J., Kroesbergen, I., Goede de, J., Goor de, I.** Prevention of dehydration in independently living elderly people at risk: A study protocol of a randomized controlled trial. *International Journal of Preventive Medicine*, (2015), 6 (103): 103. <https://doi.org/10.4103/2008-7802.167617> PMID: 26644904.
- Li S., Xiao X., and Zhang X.** Hydration Status in Older Adults: Current Knowledge and Future. *Nutrients* 2023, 15(11), 2609.
- Masot, O., Lavedán, A., Nuin, C., Escobar-Bravo, M. A., Miranda, J., Botigué, T.** Risk factors associated with dehydration in older people living in nursing homes: Scoping review. *International Journal of Nursing Studies*, 2018, 82, 90-98.
- McCotter L., Douglas P., Laur C., Gandy J., Fitzpatrick L, Rajput-Ray M.** Hydration education: developing, piloting and evaluating a hydration education package for general practitioners. *BMJ Open* 2016; 6:e012004. doi:10.1136/bmjopen-2016-012004.
- Meade R., Notley S., Rutherford M., Boulay P., Kenny G.** Ageing attenuates the effect of extracellular hyperosmolality on whole-body heat exchange during exercise-heat stress, *J Physiology*, 2020; 598(22):5133-5148.
- Mohamed R., Abdel-Salam D., Mohamed F.** Functional Disability and Their Associated Chronic Diseases among Elderly Patients Attending an Egyptian Family Practice Clinic, *The Egyptian Journal of Community Medicine*, 2021, 39(4):1-11.
- Parkinson E., Hooper L., Fynn J., Wilshe r S., Oladosu T., Poland F., Roberts S., Hout E., Bunn D.** Low-intake dehydration prevalence in non-hospitalised older adults: Systematic review and meta-analysis *Clinical Nutrition*, 2023, 42 (8): 1510-1520.
- Paulis S., Everink I., Halfens R., Lohrmann C., Schols J.** Dehydration in the nursing home: Recognition and interventions taken by Dutch nursing staff *J Adv Nurs*; 2022, 78:1044–1054.
- Paulis, S., Everink, I., Halfens, R., Lohrmann, C., Schols, J.** Prevalence and Risk factors of dehydration among nursing home residents: A systematic review. *Journal of the American Medical Directors Association*, 2018, 19(8): 646–657.
- Picetti D., Foster S., Pangle A., Schrader A., George M., Wei J., Azhar G.** Hydration health literacy in the elderly, *Nutrition and Healthy Aging* 4 (2017): 227–237.
- Puto G., Sowińska I., Scisło L., Walewska E., Kamińska A., Muszalik M.** Socio-demographic factors affecting older people's care dependency in their daily living environment according to care dependency scale (CDS). *Healthcare*, 2021, 9, 114. <https://doi.org/10.3390/healthcare9020114>.
- Rodrigues S., Silva J., Severo M., Inácio C., Padrão P., Lopes C., Carvalho J., Carmo I., Moreira P.** Validation Analysis of a Geriatric Dehydration Screening Tool in Community-Dwelling and Institutionalized

Elderly People, *Int J Environ Res Public Health*, 2015; 12(3): 2700–2717.

Shabana M., Habibb N., Helmy I., Mohammed H. Dehydration risk factors and outcomes in older people in rural areas, *Frontiers of Nursing*, 2022, 9(4): 395-403.DOI: 10.2478/fon-2022-0050.

Shaheen N., Alqahtani A., Assiri H., Alkhodair R., Mohamed A., Hussein M. Public knowledge of dehydration and fluid intake practices: variation by participants' characteristics, *BMC Public Health* (2018) 18:1346.

Tyrwhitt-Drake R., Ferragud M., de Andrés R. Knowledge and perceptions of hydration: a survey among adults in the United Kingdom, France and Spain, *Rev Esp Nutr Comunitaria* 2014; 20(4):128-136.

Uyanık G., Dağhan Ş., Effect of a hydration management program on older adults' fluid consumption and dehydration parameters: A Quasi-Experimental study, *Journal of Gerontological Nursing*, 2021; 47 (9): 40-50.

Veilleux J., Caldwell A., Johnson E., Stavros Kavouras S., McDermott B., Ganio M. Examining the links between hydration knowledge, attitudes and behavior, *European Journal of Nutrition*; (2019), 59: 991–1000.

Vella, M., Sciberras Narmaniya, A., Micallef, F. 'Hydration practices in older adult residential care homes: a scoping review', *MCAST Journal of Applied Research and Practice*, 2021, 5(2), 58-85.

Vivanti A., Harvey K., Ash S. Developing a quick and practical screen to improve the identification of poor hydration in geriatric and rehabilitative care. *Arch. Gerontol. Geriatr*, 2010, 50, 156–164.