

Factor Analysis of Improving Water Drinking for the Elder People: An Explorative Study in China

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Abstract—This research aims to manifest impacting factors of water drinking for the elder people in China in order to propose creative strategies for improving their water drinking. Unlike food intake, drinking water is usually ignored by the elderly and their caregivers. In this research, we intend to propose innovative strategies to promote a habit of water drinking for the elderly in order to meliorate the deficiency of water drinking for the elderly. We conducted questionnaire survey through internet website and analyzed relevant factors through paired sample t-test analysis, chi-square analysis and explain the significant factors impacting water drinking to the elderly. There are mainly three research findings. Firstly, we reiterate the explanatory function of KAP theory, which copes to the scenario of water drinking for the elderly, enlightens us a positive way to cultivate a healthy behavior for the elderly. Secondly, the actual behavior of water drinking for the elderly is closely related to their knowledge and attitude toward water drinking. However, the caregivers' knowledge and attitude are insignificant to influence the actual practice of water drinking for the elderly. This conspicuous finding is meaningful because it shows that self-health-management for the elderly should be emphasized, rather than only relying on caregivers. Thirdly, we found the concept of hygiene and health is almost taken account of by all of the elderly. The elderly who has stronger inclination to take health products also has positive correlation of water drinking. Hence, it proclaims that the health promotion and education regarding of water drinking for the elderly is necessary because they have high motivation to sustain their well-being. According to our findings, consequently, we suggest that paying attention to the strategy on self-health-management for the elderly is an essential way to meliorate the lack of drinking water for the elderly.

Index Terms—elder people, water intake, self-health-management

I. INTRODUCTION

Corresponding with the increase of the age, dehydration gradually becomes a health threaten to human being. It appears chronic dehydration phenomenon because the moisture inside the cell reduces 30% to 40%. [1] Apparently, it can be seen the furrow on the skin after the middle age due to gradual reduce of the water in the skin cell. In general, people who do not like to drink water, usually appear dryer skin and obvious wrinkles earlier. For the elderly, particularly, lacking a

healthy habit of water drinking leads to dehydration and higher risk of disease invasion. In some worse cases, the elderly who remain on the condition of insufficient body fluid result to chronic constipation and other long-term health problems. The most important of all, due to insufficient water drinking, the elderly may become susceptible to many parasites, bacteria and fatal virus because of lower metabolic function. Therefore, adequate supplement of water to the elderly is necessary and the teaching of water drinking takes supreme role for taking care for the elderly. In particular, few caregivers pay attention to the importance of water drinking for the elderly. Actually, properly providing water to the elderly is superior to other sustenance and there is no substance can be substituted for water to the need of the elderly. In this way, water drinking is a significant issue both to the elderly and the caregivers for the elderly.

Even though the value of water drinking is recognized by people, it still needs a proper strategy to promote the concept of water drinking for the elderly. Accompanying with the increase of age, the elderly become physically blunt to feel thirsty and easily ignore to replenish enough water in their daily life. Therefore, most of the elderly may suffer from the risk of dehydration and other disease because of insufficient water drinking. It is important to take account of water drinking with proper frequencies for the elderly either through reminding the caregivers or the older people per se. For the elderly, apparently, it is a better to cultivate an active habit to drink water as a health promotion strategy for escaping the risk of health problems. Hence, as an exploratory study, we aim to propose some creative strategies to spawn this health promotion plan-water drinking for the elder people in this research.

II. LITERATURE REVIEW

A. Water Intake for Health

Water is an indispensable component of the human body. The main element of the human body is water, which accounts for about 70% of the weight of the body. Water, as one of the seven essential nutrients for sustaining human life, plays an incomparable role in maintaining the normal physiological activity of the body [2], [3].

Water drinking has been seeing as a good strategy to promote health. As one of an important health promotion

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tactic, water drinking manifests a widely hygiene protective factor to prevent decayed tooth and breast cancer [4], [5]. Moreover, for some chronic diseases, such as hypertension, sufficient plain water consumption is a useful way to help maximize the function of the body organs, in order to work optimally, so that the body metabolism will run well and normal [6]. Even though the eminent function of water intake is vastly recognized, there are several barriers to improve the habit for water drinking. Sugar-Sweetened Beverages (SSBs) is popular, particularly for the children, and it supplants regular daily water intake to lead to negative consequences for health. Some scholars, therefore, aim to increase water in pre-school children for modulate their preference for water, habit to drink water and try to decrease the barriers to drinking water with unhealthy drinking habits [7].

In other words, it is able to facilitate water intake and modulate water drinking habit through proper health promotion strategies. According to Franks et al. denoted that sustainable increased water consumption can be achieved in children with unhealthy drinking habits by influencing representations, changing material affordances, and providing social regulation [8]. In this way, water intake not only is an ideal concept for improving health, but a practical health promotion based on theory and empirical activities. Therefore, it is beneficial to take account of a proper strategy to improve water intake for health.

B. Impacting Factors of Water Drinking for the Elderly

Water intake is beneficial to the healthy life for human beings. As mentioned above, water consumption is essential to health and sustains physical function. Yet, particularly for the elderly, water intake is usually ignored by both older people and their caregivers. Even though there are several studies explored health promotion strategies to emphasize the significance of water intake, they are inclined to focus on children, students, young people, etc. [4], [8]. There are few research findings take account of this issue for the elderly and their caregivers. In fact, the feeling of thirst as a physiological signal, which is a mechanism of self-protection, facilitates maintenance and balance of the water in the body. When the water in the body is insufficient or excessively consuming, the osmosis pressure of the extracellular fluid increases to stimulate the hypothalamus, which is a penetrating pressure receptor to notice the feeling of thirst in the brain [9]. Spontaneously, the hypothalamus produced excitement transmitted to the cerebral cortical layer and therefore the body could feel thirsty and actively replenish water. In addition, the signal in hypothalamus generates anti-diuretic hormone, which results to synthetic function from pituitary to the renal tube and collection tube to promote the reabsorption of water [10]. Consequently, this biomedical function leads to reduce the amount of urine and the osmosis pressure of extracellular fluid.

Nevertheless, due to the aging process, the elder people become insensitive in their metabolic system and organs functions [11]. Hence, the elder people could not feel thirsty immediately because of their declined

function of sensation [12]. The elder people, compared with younger people, they are inclined to be ignored the feeling of thirst and cause to less water intake.

Not only the reduced sensitivity, but also the natural decline with aging process accelerated the risk increase of the shortage of water in the body. Accompanying with the aging process, the water in the body is gradually decreasing little by little. The component of water in the body is about 80% to 85% in infant stage, yet it declines to the range about 70% to 75% in adults. Unfortunately, in the old-aged phase, the water in the body dramatically decreases to the range about 50% to 60% [1]. In other words, age is an important impact factor for the water component of the body. In this way, to pay attention to the water intake for the elderly is essential work in the strategy of health promotion, particularly to the elderly people under the background of the aging society.

The declined water component in the body is caused by the atrophy of the muscles, which store 70 percent of the body's water. Accompanying with the increase of age, the water contents is also getting decrease due to less liquid to store in the muscles [1]. Moreover, because of the declined function of the kidney, it makes the elder people prone to loss body fluids and hardly to feel thirsty. As a result, elder people are more likely to be dehydrated. Apparently, it demonstrates that the proportion of dehydration is increased accompanied with the increase of the age. There are about 20% to 30% elder people may suffer from the risk of dehydration and its proportion is continually increasing with the aging process. [3] So the elder people is a population with higher risk of dehydration because they are more difficult to notice their physiological state.

Rather than relying on the elder people's subjective feeling of thirst to replenish water, but also promoting their water intake through health education, intervention, and health promotion strategies to establish their habits for drinking water is essential work in the long-term care field for the elder population. To establish a proper habit of water intake is a useful and effective care plan to reduce the relevant problems caused by lack of drinking water. In this research, we plan to explore the impact factors of water drinking for the elderly in order to propose a proper health promotion strategy to promote water intake for the elderly.

C. The Significance of Water Intake for the Elderly in China

In recent years, china's population aging problem has become more prominent, as of 2018, China's 65-year-old and above the proportion of the population reached 11.9% [13]. And although the living conditions of the rich and powerful people in China are improving day by year, life expectancy in China is increasing year by year, but because of the unhealthy living habits, the incidence of chronic diseases is increasing year by year, so it is urgent to raise the awareness of health care for the elderly. The importance of water as one of the most basic elements of life support is well known, but it is often forgotten in the diet. According to statistics, more than half of the chinese daily consumption of boiled water

does not meet the recommended amount of Chinese dietary nutrition guidelines, the average consumption of boiled water for the elderly is 736 ml, and the 2016 Chinese dietary guidelines suggest that the daily drinking water of the elderly should be not less than 1200 ml. Although there is no direct evidence that adequate drinking water can play a role in disease prevention in the elderly, studies have shown that frequent dehydration in the elderly increases the risk of certain diseases and even worsens the condition, such as stroke, diabetes, myocardial infarction, kidney failure, etc. [1], [14].

China's health promotion campaigns for the elderly mainly focused on sports, nutritional intake, yet lacking interests to pay attention to the issue of drinking water. Therefore, to promote the concept of water intake for the elderly and relevant health education are also insufficient, resulting in the elder people and their caregivers easily neglect to drink enough amount of water as their basic healthy behavior. For the elderly to maintain a balance of body fluids is a prerequisite to ensure good health, so it is particularly important to prevent water shortage in the elderly. In contemporary China, we need to propose innovative strategies to promote the concept of water intake for the elderly and establish water drinking habit for the elderly to improve their health.

III. METHODOLOGY

A. Theoretical Model

In this research, based on the Knowledge-Attitude-Practice (KAP) theory, we examined the elder people and their caregivers' knowledge regarding water intake. Knowledge is generally defined as comprising three forms: (1) declarative, or knowing what, (2) procedural, or knowing how, and (3) conditional, or knowing when and why [15]. The influence of the knowledge of water intake is the initiation to adopt further healthy activities. In this part, we mainly investigate the elder people and their caregivers' knowledge regarding the essence of water for the health.

The concept of attitude is ambiguous and contradictory. Some scholars disputed that attitude is a psychological condition consisted by behavioral sense and cognitive [16] [17]. However, Thurstone argued that attitude affect for and against psychological object rather than behavioral object [18]. So, attitude is prone to be a subjective concept because it is viewed as the sum or aggregate of all feelings and dispositions toward a particular concept, idea, or action.

In this research, we incline to adopt more popular definition of attitude, which is also agreed by many contemporary psychologists, including cognitive, affective, and conative [19]-[23]. Hence, in our investigation, the attitude is examined as a cognitive regarding the relations between water intake and health for the elderly. We explored the belief or idea associated with water intake and its influence on the health for the elderly as a particular psychological object.

Practice means realistic actions which can be observed by practical behaviors. In this research, we investigate the

elder people and their caregivers' behaviors of water intake. Not only the practice of drinking water, but also the amount of water intake was investigated because sufficient water supply is a key to the health for the elderly.

Although behavior is an observable action, we adopt a constitutive definition: the way in which a person, organism, or group responds to a certain set of conditions [15]. This definition manifests that behavioral data in this research were collected through questionnaire by self-report surveys. Either self-report by the elder people or caregivers' observation is the main approach to collect behavioral data. Self-report surveys or frequency reports is vastly adopted by many relevant research [24].

KAP theory provides a basis to explain health behavior changes, which is widely used in relevant research in the field of health promotion. Water intake for the elderly is a rudimentary work to promote their health. In this research, we adopt KAP theory to examine the factors influencing the water drinking for the elder people in China. In this way, we could further propose a proper strategy to promote water intake for the elder people in China.

B. Data Collection

In this research, data collection includes the elder people and their caregivers. The inclusion criteria of the elder people who are aged 65 years old and above with clear consciousness. They are able to understand and communicate with the surveyor and consent to participate in this survey. In addition, we collect data through questionnaire from internet, so the interviewees must have capability to use internet through web connected devices. On the contrary, the exclusion criteria in this research is the elder people who are not able to use internet to finish the questionnaire. Besides of the elder people, we also collected the caregivers' ideas regarding water intake for the elder people because they are physically and psychologically familiar to our target group-the elder people. Therefore, to explore caregivers' knowledge, attitude and practices is also meaningful to explain their relations to the realistic water intake for the elderly. Moreover, the findings could provide further analysis to the role of caregivers in the health promotion strategy for the elder people. In this research, totally 100 questionnaires were sent out, and eventually valid questionnaires are 77. Consequently, the questionnaire response rate is 77%. Regarding the questionnaire design, we adopted expert validity to confirm the reliability and validity of the questionnaire. Thus, the accuracy and consistency of this survey could be confirmed in this research.

IV. RESEARCH FINDINGS AND DISCUSSIONS

A. Overview on Data Analysis

According to the data analysis, we found the actual consumption of water of the elderly significantly related to six factors, and the P value <0.05 showed they achieved statistically significant. Table I shows the six factors and their results of statistical analysis.

TABLE I. FACTORS IMPACTING WATER INTAKE FOR THE ELDERLY WITH STATISTICAL SIGNIFICANCE

Items	t-test	P-value
1. Education of the elderly	14.393	0.001
2. Knowledge of water intake habit	40.956	0.027
3. Ideal amount of water intake per day	42.313	0.000
4. Agree to the significance of water intake	30.496	0.007
5. GNC/Health products intake	1.755	0.039
6. Present water intake for the elderly	40.956	0.024

The six significant factors include the education of the elderly, knowledge of water intake habit, ideal amount of water intake per day, agree to the significance of water intake, GNC/health products intake, and present water intake for the elderly. These factors are apparently able to attribute to three categories: knowledge, attitude, and practices. Firstly, education of the elderly and knowledge of water intake habit belongs to the category of knowledge. It means that some parts of knowledge influence to the water consumption of the elderly. Secondly, both items, ideal amount of water intake per day and agree to the significance of water intake shows that the interviewees' attitude to the water intake. On the one hand, they have an ideal concept of daily water intake, so they have clear attitude to drink water for their health. On the other hand, whether or not they achieve to a certain amount of water consumption, they show their attitude to agree to the significance of water intake. Hence these two factors belonged to the attitude impacted the water drinking for the elderly. Finally, GNC/Health products intake and consciousness of present water intake for the elderly exhibit the practices of water intake, which further improves water drinking for the elder people. GNC/Health products intake, particular for the elderly per se, is a significant factor to improve water intake for the elder people. There are a few elder people who are prone to intake nutrition foods or healthy products usually have an inclination to drink water. In other words, pro-health activities amplify water consumption of the elder people and they intrigue water intake for the elderly. In addition, it shows that present water intake for the elderly is another significant factor in the category of health practice. In means that the practice of water intake for the elder people is affected by the present consumption of water intake. Therefore, it is meaningful to increase the present water intake as a health promotion action to intrigue virtuous circle for improving water intake for the elder people. In consequence, these six significant factors interweaved together and cooperated to influence the amount of water intake for the elderly in different aspect of knowledge, attitude and practice respectively.

B. Factor Analysis of Water Drinking for the Elderly

The causes of the lack of drinking water for the elderly can be categorized into two aspects: extrinsic factor aspect and intrinsic factor aspect.

1) Extrinsic factor

The public neglect leads to lack of awareness of drinking water among the elderly is a common social

phenomenon. According to the China Research Center on Aging (2019), there are proximately 29.6% of the elder people in China have not been to school, and it is merely 41.5% of the elder people finished their primary school education [25]. There is close relationship between the concept of health and the level of education [26]. In other words, the overall level of education of the elder population in China is lower due to their limited education years. Therefore, the elder people in China have limited knowledge regarding health maintenance, as well as knowledge of water intake. The higher level of education, the higher likelihood to equip relevant health knowledge and use information technology to obtain health information is the pivotal point for promoting water drinking for the elder people. In China, under this circumstance, the elder people who have limited education results to poor knowledge of water drinking, particularly have scarce information regarding water drinking for their health, become an apparent extrinsic factor of lacking water intake for the elder people.

The source of knowledge of water intake for health is not merely related to primary education, but closely related to the elder people's environment of daily life. In fact, the elder people can receive relevant health knowledge and information of water consumption through multiple ways if we build up a healthy and aged friendly environment. We can cultivate an idea of health promotion regarding water intake through health care workers, cross-generation activities, and saturate relevant knowledge and information of water intake to all kinds of social media for the elderly, such as newspapers, books, television, and so on. In this way, the health concept of water intake for health can be paid attention by the public and thereby, the lack of drinking water for the elder people would be gradually meliorated.

2) Intrinsic factors

Intrinsic factors mean some reasons resource from the elderly per se, include the elder people's attitude, recognition and belief of the water intake for health. According to Table I, several intrinsic factors really impacted the amount of water consumption of the elder people, such as ideal amount of water intake per day and their agreement to the significance of water intake. In other words, if the elder people and their caregivers are not properly convinced by the hygiene education or health promotion to believe the important role of water intake, the elder people and their caregivers may easily ignore it and result to a risk of water dehydration.

Fortunately, GNC/Health products intake impacted the elder people's water intake. In the elder people's opinion, GNC/Health products are seemed beneficial to their health maintenance, and this conception positively promote their water intake. At the same time, present water intake for the elderly also influences the amount of water consumption for the elderly, too. Therefore, it means that these intrinsic factors also can be beneficial to promote water intake for the elderly. As long as the elder people believe water intake is good for their health, they are inclined to actively drink water and follow the health promotion strategy in practice.

C. Strategies for Improving Water Drinking

According to KAP theory, water intake as a healthy activity needs to be educated and recognized by the elder people and their caregivers, and then it is able to be practiced later. Therefore, the strategies for improving water drinking should be circled around the knowledge dissemination, health information diffusion, and alteration people's attitude toward water intake for health.

Increasing the propaganda campaign of water intake for the public is a pivotal work. It is imperative to integrate regional medical resources, such as hospital, clinics, and home-based medical care servers, and social resources in communities, such as elderly home, daycare center, and elderly care facilities, to increase the propaganda campaigns of water intake for promoting the awareness of health promotion. There are miscellaneous strategies to increase the propaganda campaign for promoting the importance of water intake for the elder people, for example, knowledge education, health lectures, and interactive activities. Moreover, public media plays an important role for promoting the hygiene education and health promotion, too. The government can strengthen the publicity of health promotion through mass media to increase health knowledge of the public. Particularly, for the elder people and their caregivers, it is essential to acquire health knowledge of water intake through television programs, newspapers, and public service advertisements, etc. Cooperating with all kinds of institutions through multiple ways, it is possible to increase the propaganda campaign of water intake for the public. Spontaneously, this result provides a solid base to improve water intake for the elder people.

In addition, it is inevitable to take account of the role of caregivers for the elder people. In fact, the notice of water intake from the caregivers is also important to the water consumption for the elderly. In other words, not only the elder people per se, but also their caregivers need to be educated and paid attention to acquire health knowledge of water intake. Therefore, health promotion strategy for the elder people has to expand its scope to reach the caregivers for the elderly. The caregivers' knowledge and attitude toward water intake is also imperative to the health promotion plan to improve water drinking for the elder people.

V. CONCLUSION

This research is an explorative study regarding water intake for the elder people in China. Even though we found the probable hindrances of water intake for the elderly, they are able to be overcome through well-planned health promotion strategies. According to KAP theory, on the one hand, we have to focus on the hygiene education and enhance the provision of health information regarding water intake for the elder people to improve their knowledge of health promotion. On the other hand, intrinsic factors which influence water intake for the elderly have been explored and we can convert their attitude and belief toward water intake for health. In basic, we have to connect the relationship between water

intake and their health because the elder people really concern their health status. In this way, the recognition of water intake could be built up and further impact the realistic practice for the elderly.

In conclusion, water intake for the elder people is a significant issue to promote their health status, particularly under the rapid aging trend of contemporary Chinese society. Basing on the findings in this research, in the future, to prove the effectiveness of improving water drinking for the elder people through further studies is essential work later.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Hubert C. Y. Liu conducted the research and took mainly part of writings; Cheng Chung Tsai contributed his precious ideas and comments for improving this research. Both authors had approved the final version.

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