AN OBSERVATIONAL STUDY OF SKIN HYDRATION WITH ITS RISK FACTORS ON PRURITUS SEVERITY LEVEL IN THE ELDERLY AT SASANA TRESNA WERDHA RIA PEMBANGUNAN NURSING HOME, CIRACAS, EAST JAKARTA, INDONESIA

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ABSTRACT

The increasing elderly population increases the prevalence of health problems associated with the aging of the elderly. Aging causes the alteration of the skin function as a barrier in the elderly, which affects the skin hydration and can be influenced by various factors. Decreasing skin hydration causes dry skin. Dry skin can increase the risk and severity of pruritic skin, which is one of the most common skin problems in the elderly. Pruritus triggers the elders to scratch their skin and could result in opened wounds, which could lead to infection and a lower quality of life. To get a description of the skin hydration along with its risk factors' data distribution (such as age, total daily liquid consumption, daily moisturizer usage frequency, and hot water usage for bathing) on the elders with and without pruritus, as well as on each of the pruritus severity levels of the elders at Sasana Tresna Werdha RIA Pembangunan Nursing Home. This research used an observational-descriptive approach using a cross-sectional method. In total, there are 41 elders at Sasana Tresna Werdha RIA Pembangunan Nursing Home who participated in this research. The sampling technique used was total sampling. The data were collected through interviews using 12-items pruritus severity scale questionnaires and measurements with Large LCD BIA Skin Analyzer for skin hydration values. The data were analyzed using a univariate analysis. Crosstabs will be made between variables to be observed in more detail about the possibilities of interrelationships between the variables. From the 41 elders at Sasana Tresna Werdha RIA Pembangunan Nursing Home, there were 16 elders (39%) without pruritus and 25 elders (61%) with pruritus, which composed of 6 elders (24%) with mild pruritus, 15 elders (60%) with moderate pruritus, and 4 elders (16%) with severe pruritus. The mean of skin hydration of the elders without pruritus was 52.7% and with pruritus was 44.5%. Among the elders with pruritus, the mean of skin hydration of them with mild pruritus was 48%, moderate pruritus was 45.5%, and severe pruritus was 35.6%. This data showed that the population of elders with pruritus was increasing along with an increase in age. Our data also showed that the majority of the elders had a total daily liquid consumption of less than eight glasses and it was increasing along with an increase in pruritus severity level. Further, the data showed that the majority of elders with pruritus never used daily moisturizer and always used hot water for daily bathing. The mean of skin hydration of the elders without pruritus was 52.7% and that of the elders with pruritus was 44.5%. The lowering of the skin hydration level was in parallel with the increase of the pruritus severity of the elders. There was an increase in the population of the elders with pruritus along with an increase in age. The percentage of elders with a total daily liquid

consumption of less than eight glasses was increasing along with an increase in pruritus severity levels. The majority of the elders with pruritus never used daily moisturizer and always used hot water for daily bathing.

Keywords: Skin Hydration, Pruritus Severity Level, Elderly, Age, Liquid Consumption, Moisturizer Usage, Hot Water

INTRODUCTION

Someone who has reached the age of 60 and over is called the elderly (Kurtubi, 2022). The increasing elderly population, along with current development, increases the prevalence of health problems associated with the aging of the elderly. The number of elderly people worldwide is expected to double from 1 billion in 2020 to 2.1 billion in 2050, according to the World Health Organization (WHO, 2022). In Indonesia, the proportion of senior people is approximately 10.48% of the total population, with 51.81% of elderly women and 48.19% of elderly males (Badan Pusat Statistik, 2022).

Aging causes various organ functions to decline in the elderly, such as skin, which serves as a barrier (Lopez-Ojeda et al., 2022). Aging of the skin causes structural and functional changes that disrupt the stratum corneum, causing skin hydration to decrease and leading to dry skin (xerosis cutis) (Camilion et al., 2022; Rawlings & Harding, 2004). Dry skin is one of the reasons why elderly people often have pruritus. Pruritus encourages scratching, which could cause open wounds and infection that lower the elderly's quality of life (Wang et al., 2020).

From the elaboration above, an observational study of skin hydration and its risk factors on pruritus severity level is important as it can affect the elderly's quality of life and can serve as a foundation for studies such as analytical and interventional studies in the future that aim to improve the elderly's quality of life.

LITERATURE REVIEW

As the primary and largest organ for protection, skin serves as the body's first line of physical defense against the outside world, which is called as the epidermal or skin protective barrier. It covers the whole surface of the body and helps maintain adequate skin hydration (Camilion et al., 2022; Lopez-Ojeda et al., 2022). The stratum corneum is the most outer layer of the skin and comprises corneocytes, which act as a mechanical barrier on the epidermis to prevent pathogen invasion and water loss (Murphrey et al., 2022). Water is very important for skin hydration and the skin's ability to retain water depends on stratum corneum. The primary elements that impact the stratum corneum's capacity to retain water are the intercellular lipids within the stratum corneum, which are arranged to create a barrier against trans epidermal water loss (TEWL), and a group of naturally occurring hygroscopic agents in the corneocytes known as natural moisturizing factor (NMF) (Verdier-Sévrain & Bonté, 2007). Other components of the skin that must be in equilibrium for the epidermal protective barrier to be competently permeable are ceramides, free fatty acids, and cholesterol. A deficiency in any of these three components will disrupt the barrier permeability (Wang et al., 2020).

The skin of the elderly will experience a decline in quality, both naturally and due to comorbid diseases, which usually affect skin function (Kurtubi, 2022). Aging increases the likelihood of dry skin by reducing the number of small blood vessels, resulting in a diminished supply of blood and nutrients to the skin. Aging also reduces the number of sweat and sebaceous glands as well as lipid production in the skin. Thinning of the epidermis and elastic fibers that provide dermal support reduces the strength of the barrier layer that protects the skin from water loss (Hurlow & Bliss, 2011). Natural skin moisturizers such as trans-urocanic acid and pyrrolidone carboxylic acid, which are metabolites of filaggrin, are found in lower concentrations in aged skin. A drop in lipid levels is observed in addition to that; ceramide is one type of lipid that has the ability to bind water. The majority of the epidermal protective barrier is made up of the extracellular multilamellar bilayers, which were generated by an enzymatic process from extracellular lipid precursors in the stratum corneum. The stratum corneum can be made more acidic to enhance the barrier's capacity to repair, with 5.0 being the usual ideal pH for this enzyme activity. The amounts of sebum, filaggrin, and secretory phospholipase 2 (sPLA2) can all contribute to an acidic skin. Triglycerides found in sebum will break down into free fatty acids, and secretory phospholipase 2 (sPLA2) facilitates this process by helping phospholipids convert into free fatty acids. Through the filaggrin-histidine-urocanic acid pathway, filaggrin will be broken down into trans-urocanic acid, which has a positive link with skin acidity. Aging reduced the amounts of these three components. According to previous studies, the total lipid levels in the aging stratum corneum drop by over 30% in comparison to the young stratum corneum. Decreased cholesterol production also became one of the primary causes of this decline. Nevertheless, the pH of the skin's surface rises with age, which obstructs the process of barrier repair (Wang et al., 2020).

Another factor that has an effect on barrier permeability is daily liquid consumption. Adequate liquid consumption is important to maintain adequate skin hydration, which is crucial for the epidermal protective barrier (Palma et al., 2015). Generally, 2.0 L of liquid per day for women and 2.5 L of liquid per day for men is considered an appropriate intake (AI) of liquids for the elderly. Given that 20% of liquids are obtained from meals, women require at least 1.6 L of liquids per day and men 2.0 L of liquids per day (Vilmundardóttir & Skúladóttir, 2021). Trans epidermal water loss (TEWL) is a measurement used to illustrate the integrity of the epidermal protective barrier. It measures the amount of water lost from the stratum corneum in the skin (Green et al., 2022). Lack of water and increased TEWL with aging are linked to dry skin or xerosis cutis (Gade et al., 2023; Ibuki et al., 2018). If the skin’s water content falls below 10%, the enzymatic process responsible for desquamation will be impaired, causing the corneocytes to adhere to one another and accumulate on the skin’s surface. As a result, the skin looks rough, dry, scaly, and peeling (Verdier-Sévrain & Bonté, 2007).

Water exposure for prolonged periods caused disturbances in the lipid layer inside the stratum corneum, which caused corneocytes to swell and deposit a large portion of water. This may facilitate the penetration of allergens or extrinsic

irritants and foster the growth of microorganisms. Bathing with high-temperature water causes trans epidermal water loss (TEWL) to increase and disrupt the lipid structure inside the stratum corneum, which may disturb the permeability of the epidermal protective barrier (Herrero-Fernandez et al., 2022).

Complex chemical combinations called moisturizers are intended to increase the water content of the skin and reduce trans epidermal water loss (TEWL), making the skin softer and more pliable (Hurlow & Bliss, 2011). There are different types of moisturizers. Emollients, which fill up gaps between intercorneocyte clusters to improve skin hydration, smoothness, softness, and flexibility, are mostly composed of lipids and their constituents. Another form of moisturizer that is largely oil-based is called an occlusive. It works to keep the skin's water content stable by covering the skin in a hydrophobic layer and preventing trans-epidermal water loss. Humectants, the next type of moisturizers, are made up of hygroscopic substances that transfer moisture from the dermis and humidity into the epidermis to aid in water absorption by the stratum corneum. The correct choice of moisturizer and consistent application are key factors in its effectiveness (Purnamawati et al., 2017). It is advised to moisturize the entire body with at least two ounces (50 g) of a cream body moisturizer, as much as twice a day. Usage of a moisturizer after bathing while skin is moist will help 'trap' the moisture so it can be used to hydrate the tissues (Hurlow & Bliss, 2011).

All of the factors above that disrupts the permeability of the epidermal protective barrier can exacerbate the expression of cytokines and the infiltration of inflammatory cells into the skin. Histamine and cytokines that are produced in excess in the skin create pruritus (Wang et al., 2020). Pruritus is an itchy sensation that can trigger the urge to scratch (Potenzieri & Undem, 2011; Rupert & Honeycutt, 2022). An epidermal 'window' can emerge as a result of scratching. Inhibition of the healing process due to aging causes the epidermal 'window' to open long enough, allowing dangerous substances to enter the skin. This leads to heightened skin inflammation and exacerbates pre-existing inflammatory diseases, including eczema and atopic dermatitis. Persistent skin inflammation can lead to systemic inflammation, which can lead to inflammatory-associated disorders (Wang et al., 2020).

From the elaboration above, an observational study of skin hydration and its risk factors on pruritus severity level is important as it can affect the elderly's quality of life and can serve as a foundation for studies such as analytical and interventional studies in the future that aim to improve the elderly's quality of life.

Problem formulation:

1. How was the description of the skin hydration on the elderly with and without pruritus at Sasana Tresna Werdha RIA Pembangunan?
2. How was the description of the skin hydration on each of the pruritus severity level at Sasana Tresna Werdha RIA Pembangunan Nursing Home?
3. How was the data distribution of the elders' age on each pruritus severity level of the elderly at Sasana Tresna Werdha RIA Pembangunan Nursing Home?
4. How was the data distribution of total daily liquid consumption on each pruritus severity level of

the elderly at Sasana Tresna Werdha RIA Pembangunan Nursing Home?
5. How was the data distribution of daily moisturizer usage frequency on each pruritus severity level of the elderly at Sasana Tresna Werdha RIA Pembangunan Nursing Home?
6. How was the data distribution of daily hot water usage on bathing on each pruritus severity level of the elderly at Sasana Tresna Werdha RIA Pembangunan Nursing Home?

METHODS

This research used a cross-sectional method with an observational-descriptive approach. The research was carried out from December 2023 to January 2024 for an estimated duration of one month at Sasana Tresna Werdha RIA Pembangunan, which was located in Jl. Pusdika No. 8, RT. 08/RW. 07, Kelurahan Cibubur, Kecamatan Ciracas, Kota Jakarta Timur, DKI Jakarta, Indonesia.

Overall, 41 elderly people who reside there had agreed to take part in this research and met the inclusion requirement, that was still be able to be interviewed. This research used the total sampling technique.

The researcher collected the data through direct interviews with questionnaires and measurement with a tool. There were two questionnaires being used in this research. The first questionnaire was for demographics, which included the elder's name, gender, and risk factors for skin hydration. The first risk factor was the elder's age, which was divided into three categories (listed in the result section). The second risk factor was the elders' total daily liquid consumption, which was divided into two categories, e.g. the elders who had total daily liquid consumption of less than eight glasses and them who had total daily liquid consumption of more than or equal to eight glasses. The third risk factor was the elders' daily moisturizer usage frequency, which was divided into the elders who never used moisturizer daily, them who had daily usage of moisturizer frequency less than two times, and them who had daily usage of moisturizer frequency more than or equal to two times. The last risk factor was the elders' daily hot water usage on bathing, e.g. the elders who never used hot water on bathing, them who sometimes used hot water on bathing, and them who always used hot water on bathing. The second questionnaire was the assessment of pruritus severity level, named 12-items of pruritus severity scale. This questionnaire comprised of 12 items for a multidimensional approach to pruritus. These items were categorized into five domains: pruritus intensity, pruritus extent, pruritus frequency and duration, pruritus impact on daily activities and mood, and approach to scratching activities as a response to pruritus. Based on the range, the questionnaire findings were divided into three categories, which was listed in the result section. The measurement of skin hydration was being done using Large LCD BIA Skin Analyzer on the anterior surface of the distal portion of both upper arms, which had less hair, with consideration to minimize interference with the measurement result. The health research ethical committee of the Faculty of Medicine of Tarumanagara University had approved this research with the document number 246/KEPK/FK UNTAR/XI/2023.

The data was organized and analyzed with a univariate analysis

using the statistical package for the social sciences (SPSS) after the collection process is complete. The categorical data will be presented with its proportion in frequency and its percentage, while the numerical data will be presented with its mean and standard deviation if its distribution is parametrical and will be presented with its median and interquartile range if its distribution is non-parametrical. Crosstabs will be made between variables to be observed in more detail about the possibilities of interrelationships between variables.

RESULTS

Table 1. Research Results

Variable	Categorical Data	Numerical Data	
	Frequency (%)	Mean (SD)	Median (IQR)
Total Population	**41 (100%)**		
Elders without Pruritus	**16 (39%)**		
Elders with Pruritus	**25 (61%)**		
Age			
Young-Old	**5 (12%)**		
Middle-Old	**14 (34%)**		
Very-Old	**22 (54%)**		
Gender			
Male	**17 (42%)**		
Female	**24 (58%)**		
Skin Hydration			
Without Pruritus		**52.7 (9.8)**	**59 (14.25)**
With Pruritus		**44.5 (12.8)**	**43 (25)**
Pruritus Severity Level			
Mild	**6 (24%)**		
Moderate	**15 (60%)**		
Severe	**4 (16%)**		
Total Daily Liquid Consumption			
< 8 glasses	**28 (68%)**		
≥ 8 glasses	**13 (32%)**		
Daily Moisturizer Usage Frequency			
Never	**26 (63%)**		
< 2 times	**8 (20%)**		
≥ 2 times	**7 (17%)**		
Hot Water Usage for Bathing			
Never	**9 (22%)**		
Sometimes	**10 (24%)**		
Always	**22 (54%)**		

In total, there were 41 elders in Sasana Tresna Werdha RIA Pembangunan. The majority of the elders had pruritus (61%), and fall into the very-old category (54%). The skin hydration of elders without pruritus was 52.7%, which was higher than the skin hydration of elders with pruritus (44.5%). The majority of elders with pruritus were the elders with moderate pruritus (60%). More than half of the elders at Sasana Tresna Werdha RIA Pembangunan had a total daily liquid consumption of less than eight glasses, which was 28 out of 41 elders with a percentage of 68%. The majority of the elders also never used daily moisturizer, which was 26 out of 41 elders with a percentage of 63%. And more than half of the elders always used hot water for bathing, which was 22 out of 41 elders with a percentage of 54%.

Table 2. The Description of Pruritus Severity Level with Skin Hydration

Pruritus Severity Level	Skin Hydration (%)	Total Frequency (%)
Mild	48	6 (24%)
Moderate	45.5	15 (60%)
Severe	35.6	4 (16%)

Table 3. Classification of Pruritus Severity Level

No.	Interval	Interpretation
1.	3-6 points	Mild
2.	7-11 points	Moderate
3.	12-22 points	Severe

From the table above, it was shown that the skin hydration was decreasing along with an increasing pruritus severity level. The highest skin hydration was 48% at the mild pruritus level, and the lowest was 35.6% at the severe pruritus level.

Table 4. The Description of Pruritus Severity Level with Age

Pruritus Severity Level	Age			Total Frequency (%)
	Young-Old Frequency (%)	Middle-Old Frequency (%)	Very-Old Frequency (%)	
Mild	1 (17%)	2 (33%)	3 (50%)	6 (100%)
Moderate	1 (6%)	7 (47%)	7 (47%)	15 (100%)
Severe	0 (0%)	1 (25%)	3 (75%)	4 (100%)
Total	2 (8%)	10 (40%)	13 (52%)	25 (100%)

Table 5. Classification of Age

No.	Interval	Interpretation
1.	60-69 years old	Young-Old
2.	70-79 years old	Middle-Old
3.	≥ 80 years old	Very-Old

From the table above, it was shown that the majority of the elders were categorized as very-old, with a total of 13 out of 25 elders. There was an increase in the population along with an increase in the elders' age on each pruritus severity level, except for the elders with moderate pruritus, where the total population between the middle-old and the very-old was equal.

Table 6. The Description of Pruritus Severity Level with Total Daily Liquid Consumption

Pruritus Severity Level	Total Daily Liquid Consumption		Total Frequency (%)
	< 8 glasses Frequency (%)	≥ 8 glasses Frequency (%)	
Mild	3 (50%)	3 (50%)	6 (100%)
Moderate	12 (80%)	3 (20%)	15 (100%)
Severe	4 (100%)	0 (0%)	4 (100%)
Total	19 (76%)	6 (24%)	25 (100%)

From the table above, it was shown that the percentage of the elders who had a total daily liquid consumption of less than eight glasses was increasing along with an increase in the pruritus severity level.

Table 7. The Description of Pruritus Severity Level with Daily Moisturizer Usage Frequency

Pruritus Severity Level	Daily Moisturizer Usage Frequency			Total Frequency (%)
	Never Frequency (%)	< 2 times Frequency (%)	≥ 2 times Frequency (%)	
Mild	5 (83%)	1 (17%)	0 (0%)	6 (100%)
Moderate	10 (67%)	4 (27%)	1 (6%)	15 (100%)
Severe	2 (50%)	1 (25%)	1 (25%)	4 (100%)
Total	17 (68%)	6 (24%)	2 (8%)	25 (100%)

From the table above, it was shown that in all of the pruritus severity levels, the majority of the elders never used daily moisturizer.

Table 8. The Description of Pruritus Severity Level with Hot Water Usage for Bathing

Pruritus Severity Level	Hot Water Usage for Bathing			Total Frequency (%)
	Never Frequency (%)	Sometimes Frequency (%)	Always Frequency (%)	
Mild	1 (17%)	0 (0%)	5 (83%)	6 (100%)
Moderate	5 (33%)	4 (27%)	6 (40%)	15 (100%)
Severe	0 (0%)	1 (25%)	3 (75%)	4 (100%)
Total	6(24%)	5 (20%)	14 (56%)	25 (100%)

From the table above, it was shown that in all of the pruritus severity levels, the majority of the elders always used hot water for daily bathing.

DISCUSSION

In this research, it was found that 16 out of 41 elders with a percentage of 39% was without pruritus, and 25 out of 41 elders with a percentage of 61% was with pruritus. The description of skin hydration for the elders without pruritus was 52.7%, which was higher than the skin hydration for the elders with pruritus (44.5%). The description of skin hydration for each pruritus severity level of the elderly in Sasana Tresna Werdha RIA Pembangunan Nursing Home was 48% for mild pruritus, 45.5% for moderate pruritus, and 35.6% for severe pruritus. From this result, it could be observed that the skin hydration was decreasing along with an increase in the pruritus severity level. This finding is in line with the research done by Long (1992), which stated that pruritus severity level is interconnected with skin hydration, and patients with more severe pruritus had lower skin hydration (Long & Marks, 1992). Research done by Debora (2019) also stated that lower skin hydration causes more frequent pruritus complaints (Debora, 2019).

A crosstab between the elders' age and pruritus severity level showed that the majority of the elders were categorized as very-old, which was as much as 13 out of 25 elders with a percentage of 52%. There was an increase in the population along with an increase in age in mild and severe pruritus, except in moderate pruritus, where the population between the middle-old and very-old was equal, which was seven elders with a percentage of 47%. This finding is in line with research done by Fourzali (2019), which stated that older age are more prone to pruritus because of changes from aging in the skin, medication, systemic disease, and psychology (Fourzali & Yosipovitch, 2019). Research done by Putri (2023) also stated that the elderly skin is drier than the younger people and more vulnerable to external environment, which may cause subsequent scratching due to itchy sensation (Putri et al., 2023).

Another observation was done on a crosstab between pruritus severity level and total daily liquid consumption, which showed that the percentage of the elders who had a

total daily liquid consumption of less than eight glasses was increasing along with an increase in the pruritus severity level. It was found that 50% of the elders with mild pruritus, 80% of the elders with moderate pruritus, and 100% of the elders with severe pruritus had a total daily liquid consumption of less than eight glasses. Comparing to research done overseas, there was research done by Hurlow (2011), which stated that adequate liquid consumption helps maintain skin hydration (Hurlow & Bliss, 2011).

A crosstab between pruritus severity level and daily moisturizer usage frequency was observed. The majority of the elders with pruritus never used moisturizer in their daily lives. This was seen in each pruritus severity level, with 83% of the elders with mild pruritus, 67% of the elders with moderate pruritus, and 50% of the elders with severe pruritus never used moisturizer in their daily lives. This finding is in line with research done by Hurlow (2011), which stated minimal usage of moisturizer twice a day helps decrease trans epidermal water loss (TEWL) and maintain skin hydration content (Hurlow & Bliss, 2011).

Observation on a crosstab between pruritus severity level and hot water usage for bathing showed that the majority of the elders always used hot water for bathing in their daily lives. This was seen in each pruritus severity level, that was 83% of the elders with mild pruritus, 40% of the elders with moderate pruritus, and 75% of the elders with severe pruritus. This finding is in line with research done by Fernandez (2022), which stated that water exposure can disturb the skin, especially hot water which can increases trans epidermal water loss (TEWL) (Herrero-Fernandez et al., 2022). It was also known that an increase in trans epidermal water loss (TEWL) will make the skin drier (Rasyid, 2021).

The results of this research showed that the skin hydration of the elders without pruritus was 52.7%, and the skin hydration of the elders with pruritus was 44.5%. The skin hydration for each pruritus severity level of the elderly was 48% for mild pruritus, 45.5% for moderate pruritus, and 35.6% for severe pruritus. Based on previous research, the age and hot water usage for bathing had a positive association with the pruritus severity level, which meant an increase in these two factors would be accompanied by an increase in the pruritus severity level. While skin hydration, total daily liquid consumption, and daily moisturizer usage frequency had a negative association with pruritus severity level, it meant a decrease in these three factors would be accompanied by an increase in pruritus severity level, and the opposite. These results were in line with those previous researches but that did not close the possibility of the existence of another factor that was not being observed by the researcher and that could have an influence on the skin hydration and pruritus severity level data's results and distribution.

CONCLUSION

The results of this research on the elderly at Sasana Tresna Werdha RIA Pembangunan Nursing Home showed that the skin hydration of the elders without pruritus was 52.7%, and the skin hydration for the elders with pruritus was 44.5%. The skin hydration on each of the pruritus severity level were 48% in the elders with mild pruritus, 45.5% in the elders with moderate pruritus, and 35.6% in the elders with severe pruritus. The majority of the elders there were categorized as very-old

and there was an increase in the population of the elders with pruritus along with an increase in the age. The majority of the elders with pruritus had a total daily liquid consumption of less than eight glasses, and the percentage of elders with a total daily liquid consumption of less than eight glasses was increasing along with an increase in pruritus severity levels. The majority of the elders with pruritus never used moisturizer in their daily lives and always used hot water for bathing.

Based on the findings above, researcher hoped that controlling risk factors—such as consuming eight or more glasses of fluid daily, taking a bath without hot water with a maximum of two baths daily, and using moisturizer on a regular basis—can reduce complaints of pruritus in the elderly. Researcher also hoped that the findings in this research can serve as references for future analytical or interventional research that aims to improve the skin hydration content of the elders there, which ultimately will improve their quality of life. Future research can investigate more about this topic with a larger population because this study only included 41 elderly people, which causing the distribution of elderly people in each pruritus category was quite uneven.

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