

## IDENTIFICATION OF HOUSE DUST MITE AND THE RISK FACTOR OF CRONIC ITCH IN ELDERLY

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### Abstract

**Introduction:** Senile pruritus etiology is uncertain. However, well as intrinsic factors, one of the extrinsic risk factors causing pruritus is house dust mites (HDM) as. Aim of this study was to analyze the association between house dust mite density and the pruritus level among elderly residents. **Methods:** This is an observational study with cross-sectional design. The 34 elderly who met the criteria were included in this study. The pruritus level was obtained using questionnaire as to duration, degree, direction, disability, distribution (5D) itch scale based on NRS (numerical rating scale) categories divided into 4 categories (no, low, moderate, and severe itch). House dust mite density was checked using flotation method and the results categorized into low, moderate, and high density. The dust sample was checked for the species by microscope. The preventive activity to prevent the pruritus were also analyzed. The relationship between itch scale, preventive activity with HDM density was analyzed using STATA 17. **Results and Discussion:** A total of 34 elderly was included. Elderly were dominated with women (67.6%), moderate itch scale (38.2%) and moderate HDM density (58.8%). Most of the correlation between itch scale based NRS and preventive activity with HDM density p-value was not significant. But the elderly's habit to clean the mattress was significantly correlated with HDM density ( $p=0.00$ ). The *Dermatophagoides* sp were the dominant mites found in elderly's room. **Conclusion:** Itch scale in elderly were not related with HDM density, but correlated with the habit to clean the mattress.

## INTRODUCTION

A common complaint of elderly is pruritus. The pruritus is related to gender and increases within age (1). In elderly, there are numerous changes both in function and structure, including skin, that cause pruritus (2). Pruritus is a discomforting sensation that triggers the urge to scratch, commonly encountered across various diseases (3-4). Senile pruritus is marked by a generalized itch without primary skin lesion in elderly (2). It can be caused by skin, systemic, neuropathic, psychogenic diseases or mixed etiology (5-6). Not only the complexity of the etiology but also the risk factor of senile pruritus are multifactorial, even the pathophysiology is still unclear (3).

A systematic review showed that the prevalence of senile pruritus is high (21.04%) (2). The prevalence

was various in Asia and Europe population. A study in Egypt showed that the prevalence of senile pruritus in elderly pruritus is 54.2%. A study in Indonesia showed that among xerotic patients 29.1% were elderly (7). and the pruritus was mostly caused by dermatological condition (8). Another study in skin diseases that can cause itch in elderly included eczematous dermatitis, scabies and insect bites (3), but the most common skin lesion that causes pruritus is eczema (33.7%) (8).

The insect that usually causes allergy is house dust mite (HDM). Those insects release an allergen from their feces, which contain allergenic proteins that can trigger allergic reaction in sensitive individuals. Several diseases that could be triggered by mites are allergic rhinoconjunctivitis and atopic dermatitis (9-10). A retrospective cohort study in Brunei showed that IgE specific for

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dust mite such as *Dermatophagoides pteronyssinus*, *Dermatophagoides farina*, *Blomia tropicalis* are the highest and those insects had a correlation with atopic dermatitis (10). Some risk factors related with the high density of HDM are such as the use of cotton bedding, crowded homes, family history, home dampness and the ground floor (11). Other cross-sectional study showed that in elderly people who feel itch, or called chronic pruritus, it correlates with female sex, the history of atopic dermatitis, immobility, rheumatoid arthritis and ischemic diseases (6).

Itching or pruritus in elderly is a common dermatological complaint. It is caused by various factors, including the skin condition, diseases, medication, and environmental allergens like HDM. The prevalence of chronic itch in elderly was found to be high (28.9%). This symptom can disrupt sleep quality and daily activities (12). Several risk factors that are possible for senile pruritus are such as age, less water intake, bathing with soap, bathing too much, smoking, excessive drinking, monophagisme, and contact with animals (2). This condition is mostly reported by geriatric patients and can reduce quality of life of the elderly. Pruritus in elderly can be prevented by several means (6). There are several prevention activities to control the house dust mites (HDM) including personal hygiene (13).

Several studies that explored the relationship between house dust mite exposure and pruritus in some populations have been done, but there has been limited study in elderly population especially in social institutions. A few conditions in elderly that relate with allergic conditions include allergic sensitization, skin barrier function, and coexisting conditions. Based on the information, early detection and proper management are needed to improve elderly quality of life. Despite these multiple etiologies and risk factors and the impact of pruritus for the elderly, no studies have assessed the house dust mites and itch symptom within elderly population. This study aims to investigate the type of house dust mites and to assess the relationship between house dust mite density and elderly risk factor with itch scale.

## METHODS

### Study design

This was an observational study with a cross-sectional design. This study has received ethical clearance from the Research Ethics Committee of the Faculty of Medicine, Universitas Islam Indonesia with number 12/Ka.Kom.Et/70/KE/X/2023.

### Population and Sample

The study was conducted from July to December 2023 at Tresna Werdha Nursing Home, Yogyakarta. We approached 75 elderly aged over 55 staying in a social institution, among whom 35 agreed to participate in this study, but only 34 elderly met the inclusion criteria. The inclusion criteria were males or females, aged over 55 years, residing for at least 6 months, literate and providing signed informed consent. Exclusion criteria were those who were unable to understand the study procedure, incomplete data, and had a chronic skin lesion.

### Itch Scale Analysis

The level of pruritus in participants was identified using the 5-D pruritus scale questionnaire (14). This is a tool to assess the severity and impact of itching (pruritus) on subjects' daily lives. This questionnaire had 5 dimension questions to check the pruritus scale, including duration, degree (intensity), direction, disability (impact on daily life) and distribution (location and spread) of the itching.

The degree scale was used to evaluate the severity or intensity of itching experienced by elderly. The duration was to assess the duration or persistence of the itching in 24 hours. The direction was to determine whether itching was getting better, worse, or staying over time. The disability was to evaluate the impact on daily activities, sleep, social functioning, and overall quality of life. The distribution was to identify the locations of itching on the body and evaluate the spread or distribution across different body regions.

The domains of duration, degree, direction, and disability consisted of five categories, but the distribution domain had 16 lists of pruritus location. Based on 5-D itch scale results the scores were ranged from 5 to 25 points. The minimum score was 5 indicating no itchiness and the maximum was a score of 25 indicating severe itchiness. Further, the score was categorized into four categories using numerical rating scale (NRS). The categories were 0 for no itch, 1-3 for mild pruritus, 4-6 for moderate pruritus, 7-8 for severe pruritus and  $\geq 9$  for very severe pruritus (14).

### The House Dust Mite Identification and the Density Analysis

The dust samples were collected using a dust collector device. Before collecting the materials, the elderly were told to avoid vacuuming the bed, carpets, curtains, and not to change the bed sheet for 3-5 days.

Dust samples were collected in every room of the elderly. The sampling locations were the beds, curtains, and carpets of each subject. Dust samples were collected with a high power vacuum cleaner for at least two minutes in an area 1 m<sup>2</sup> from different areas including bed, mattress, and upholstered furniture (14-15). The collected dust was placed in separate plastic containers labeled with the collection date and subject code.

The examination of the collected dust samples was conducted at the Parasitology laboratory of the Faculty of Medicine, Universitas Islam Indonesia. Each dust sample from each subject was weighed to get the total numbers of dust for each subject. Then the dust was weighed again to obtain 0.1 grams of dust and placed into a 15 ml centrifuge tube. House dust mites were isolated using flotation methods (14-15). The dust was soaked in 50 ml of 70% alcohol solution for centrifugation. After allowing it to stand for 24 hours, the formed supernatant was discarded. Subsequently, the saturated NaCl was added to the centrifuge tube until full, forming a meniscus on the tube's surface. The coverslip was placed on the top of the centrifuge tube and left for one hour. After one hour, the deck glass was placed on a glass object to be examined under binocular microscope in 40x magnification (®Olympus Cx23) and the pictures were taken by Optilab. Any arthropods found in the dust were then identified using an identification key guide to check the genus of the arthropod.

**Risk Factor of Pruritus Analysis**

The risk factor to prevent itch in elderly was assessed with five questions, such as shower frequency, emollient application after shower, the room cleaning frequency, the mattress materials, cleaning the mattress, changing the bed sheet, and cleaning the curtains. The shower frequency was to evaluate the shower frequency in elderly t potentially exacerbating dry skin and itching. The emollient application question was to evaluate applying moisturizing in elderly that could contribute to skin dryness. The room and mattress cleaning frequency was to evaluate frequency of room cleaning that can lead to the accumulation of dust. The mattress material was to evaluate the suitable materials t conducive for house dust mite growth. The bed sheet changes were to evaluate the potential accumulation of dust, sweat, dead skin cells, allergens, and irritants on bedding. Cleaning the curtains was to evaluate the harboring of allergens, dust mites, and irritants into the air.

**Data Analysis**

The elderly demographic characteristics, the itch scale, house dust mite density and risk factor of

pruritus in elderly were presented in tables. The data were analyzed using STATA version 17. The relationship between the variable and the significance statistical level of this study was p-value < 0.05.

The number of floating mites on the slide was counted to analyze the house dust mite density according to the formula below. The house dust mite density was classified into three categories, <100 mites/gr for low density, 100-500 mites/gr for moderate density, and >500 mites/gr for high density.

$$\text{The HDM density} = \frac{\text{total dust weight (gr)}}{0,1} \times \text{The number of HDM in 0.1 gram of dust}$$

**RESULTS**

Based on Table 1, about 34 elderly were included in this study which was dominated with women 67.6%, the average age was 73 years, ranging from 57 to 90 years old. Most of the elderly complained of moderate itching 13 (38.2%) especially elderly aged 61-80 years 25 (73.5%). However, five elderly complained of severe itching 5 (14.7%) dominated with elderly women, although age and gender did not have a significant relationship with itch scale (p>0.05).

**Table 1. The Demographic Characteristic of the Subject and the Relationship with Itch Scale Based on NRS Categories**

Characteristics	Itch scale				Total (%)	p-value (%)
	No (%)	Low (%)	Moderate (%)	Severe (%)		
<b>Age</b>						
<61	1 (14.3)	1 (11.1)	1 (7.7)	0	3 (8.8)	0.52
61-70	1 (14.3)	2 (22.2)	6 (46.2)	3 (60.0)	12 (35.3)	
71-80	2 (28.6)	5 (55.6)	5 (38.5)	1 (20.0)	13 (38.2)	
>81	3 (42.9)	1 (11.1)	1 (7.7)	1 (20.0)	6 (17.6)	
<b>Gender</b>						
Men	2 (28.6)	5 (55.6)	3 (23.1)	1 (20.0)	11 (32.4)	0.37
Women	5 (71.4)	4 (44.4)	10 (76.9)	4 (80.0)	23 (67.6)	
<b>Total</b>	7 (20.6)	9 (26.5)	13 (38.2)	5 (14.7)	34 (100.0)	

NRS: Numerical rating scale

Table 2 shows that most of the elderly feel the pruritus less than 6 hours/day 19 (55.9%), but 7 (20.6%) of them feel the itch all day. The degree of the pruritus was various, but mostly mild to moderate (32.4-35.3%). The direction of pruritus was also various from much better and a little bit better (35.3-38.2%). Most of the elderly felt no change of disability in daily activities (sleep activity, social activity, work activity), and the pruritus location was dominated with 0-2 locations (64.7%). Only one elderly complained of the pruritus over 14 locations (2.9%).

**Table 2. The Characteristic of Itch Scale in Elderly**

Characteristic of Pruritus	Total (%)
<b>Duration of pruritus (hrs/day)</b>	
<6	19 (55.9)
6-12	6 (17.6)
12-18	1 (2.9)
18-23	1 (2.9)
All day	7 (20.6)
<b>Degree of pruritus</b>	
Not present	5 (14.7)
Mild	12 (35.3)
Moderate	11 (32.4)
Severe	1 (2.9)
Unbearable	5 (14.7)
<b>Direction of pruritus</b>	
Completely resolved	1 (2.9)
Much better, but still present	12 (35.3)
Little bit better, but still present	13 (38.2)
Unchanged	7 (20.6)
Getting worse	1 (2.9)
<b>Disability</b>	
<b>Sleep activity</b>	
Never affects	12 (35.3)
Occasionally delays falling asleep	6 (17.6)
Frequently delays falling asleep	10 (29.4)
Delays falling asleep and occasionally wakes up at night	6 (17.6)
<b>Leisure/social activity</b>	
N/A	16 (47.1)
Never affects	11 (32.4)
Rarely affects	5 (14.7)
Occasionally affects	2 (5.9)
<b>Housework/work activity</b>	
N/A	19 (55.9)
Never affects	8 (23.5)
Rarely affects	5 (14.7)
Occasionally affects	2 (5.9)
<b>Distribution of pruritus</b>	
0-2 location	22 (64.7)
3-5 location	11 (32.4)
>14 location	1 (2.9)

Table 3 shows that the house dust mite density was dominated with moderate density 20 (58.8%) followed with high density 11 (32.4%). Table 3 shows that 2 elderly (40.00%) complained of severe itch and high density of house dust mite, but 4 elderly (57.1%) had high density of house dust mite but no itch sensation (57.1%). Itch scale based on NRS categories shoed no significant relationship with house dust mite density  $p=0.44$  ( $p<0.05$ ).

**Table 3. The Relationship between Itch Scale Based on NRS Categories and HDM Density**

HDM Density (%)	Itch scale				Total (%)	p-value (%)
	No (%)	Low (%)	Moderate (%)	Severe (%)		
Low	1 (14.3)	0	2 (15.4)	0	3 (8.8)	0.44
Moderate	2 (28.6)	7 (77.8)	8 (61.5)	3 (60.0)	20 (58.8)	
High	4 (57.1)	2 (22.2)	3 (23.1)	2 (40.0)	11 (32.4)	
Total	7 (20.6)	9 (26.5)	13 (38.2)	5 (14.7)	34 (100.0)	

HDM: House dust mites

Based on Table 4 the elderly shower frequency was 1-2 times/day 15 (44.1%), most of the elderly did not use moisturizing cream 29 (85.3%), clean the room every day 21 (61.8%), use cotton mattress 33 (97.1%), change bed sheet every week 22 (64.7%), and clean the curtains in 1-2 weeks 28 (82.3%). Table 4 shows that risk factors such as shower frequency, moisturizing use, room cleaning, mattress type, changing the bed sheet, and cleaning the curtains were not related with house dust mite density ( $p>0.05$ ), but the elderly habit to clean the mattress was significantly related with house dust mite density ( $p=0.00$ ).

**Table 4. The Relationship between Risk Factor with HDM Density**

Risk Factor	House Dust Mite Density				p-value
	Low (%)	Moderate (%)	High (%)	Total (%)	
<b>Shower frequency</b>					
1/day	1 (33.3)	10 (50.0)	4 (36.4)	15 (44.1)	0.81
2/day	2 (66.7)	8 (40.0)	5 (45.5)	15 (44.1)	
>2/day	0	2 (10.0)	2 (18.2)	4 (11.8)	
<b>Moisturizing used</b>					
Yes	0	3 (15.0)	2 (18.2)	5 (14.7)	0.73
No	3 (100.0)	17 (85.0)	9 (81.8)	29 (85.3)	
<b>Room cleaning</b>					
Every day	2 (66.7)	14 (70.0)	5 (45.5)	21 (61.8)	0.76
Twice a week	1 (33.3)	2 (10.0)	2 (18.2)	5 (14.7)	
Weekly	0	3 (15.0)	3 (27.3)	6 (17.6)	
Monthly	0	1 (5.0)	1 (9.1)	2 (5.9)	
<b>Mattress type</b>					
Cotton mattress	0	1 (5.0)	0	1 (2.9)	0.70
Others	3 (100.0)	19 (95.0)	11 (100.0)	33 (97.1)	
<b>Cleaning the mattress</b>					
Yes	0	5 (25.0)	9 (81.8)	14 (41.2)	0.00
No	3 (100.0)	15 (75.0)	2 (18.2)	20 (58.8)	
<b>Change bed sheet</b>					
Every week	2 (66.7)	12 (60.0)	8 (72.7)	22 (64.7)	0.06
Every two weeks	0	3 (15.0)	1 (9.1)	4 (11.8)	
Every three weeks	0	5 (25.0)	2 (18.2)	7 (20.6)	
Monthly	1 (33.3)	0	0	1 (2.9)	
<b>Cleaning the curtains</b>					
Never	1 (33.3)	2 (10.0)	2 (18.2)	5 (14.7)	0.64
Every one week	1 (33.3)	6 (30.0)	6 (54.5)	13 (38.2)	
Every two week	1 (33.3)	11 (55.0)	3 (27.3)	15 (44.1)	
Monthly	0	1 (5.0)	0	1 (2.9)	
<b>Total</b>	<b>3 (8.8)</b>	<b>20 (58.8)</b>	<b>11 (32.4)</b>	<b>34 (100.0)</b>	

HDM: House dust mites

Based on the house dust mite identification in every dust of each subject, the arthropod was dominated with *Dermatophagoides sp.* *Dermatophagoides sp* are characterized with eight short legs, oval-shaped body, translucent or whitish with slight creamy appearance (Table 5). The identification results indicate the presence of other types of arthropods which are random and require for further identification. The body is segmented into head, thorax, and abdomen, but the segments are clearly visible, as shown in Figure 1.

House dust mite density is various within range 6-1.612 mite/gr. The average of house dust mite in this study was 150.8 mites/gr. This level of house dust mite density was considered moderate. Table 5 shows that more than 50% house dust mite density of the elderly's room was low 21 (61.76%), and only 3 elderly had high density of HDM 3 (8.82%). The highest of the HDM density was in Jolotundo (1,612 mites/gr), and the lowest was in Talkondo (6 mites/gr).

**Table 5. House Dust Mites Density Based on Elderly's Room**

Elderly's Room	Range of HDM (g/0.1 dust)	House dust mite density			Total	Species
		Low	Moderate	High		
Talkondo	6-270	3	2	0	5	<i>Dermatophagoides pteronyssinus, Blomia tropicalis</i>
Sapto	8-27	2	0	0	2	<i>Dermatophagoides pteronyssinus</i>
Jolotundo	15-1612	3	0	1	4	<i>Dermatophagoides pteronyssinus, Acarus spp</i>
Godomadono	25-110.5	1	1	0	2	<i>Dermatophagoides pteronyssinus</i>
Grojokan sewu	175.5	1	0	0	1	<i>Dermatophagoides pteronyssinus</i>
Pagombakan	8-253	1	1	1	3	<i>Blomia tropicalis</i>
Andong	7-783	5	1	1	7	<i>Dermatophagoides pteronyssinus, Acarus spp</i>
Wukir	45-231	1	2	0	3	<i>Dermatophagoides pteronyssinus</i>
Giri	18-225.5	4	3	0	7	<i>Dermatophagoides pteronyssinus, Blomia tropicalis</i>
Total		21	10	3	34	



**Figure 1. Example of *Dermatophagoides pteronyssinus* Identification at Elderly's Room (40x magnification)**

**DISCUSSION**

The average of house dust mites in this study showed a moderate density (150.8 mites/gr). Those results could indicate a higher concentration of house dust mite in the environment. House dust mite density in this study was higher than other study that showed low density of house dust mite. The difference in this result is caused by the study location, where this study was located in a social institution dominated with elderly, but other study was done in residents' homes (16). However, other studies located in dormitories with dense numbers of residents showed higher house dust mite density compared to low numbers of residents (17). Some studies showed that a higher house dust mite density can be found in locations where there are quite a lot of residents or a crowded home with the HDM density ranged between 20-1,840 mites/gr (18).

The house dust mites were found in every material of the elderly's' room, such as mattress, pillows, carpets, and floor. This result was in accordance to other study, which revealed that mattress and carpets were the most potential materials where house dust mites could be found (15). The house dust mites could induce several symptoms such as sneezing, nasal congestion, coughing, wheezing, pruritus or allergic skin reaction (19). The pruritus or allergic skin reaction diseases would significantly increase because most people spend their time indoors. For elderly who stay in social institutions, most of their activity is spend in the bedroom. Besides that, the humidity of the environment condition was optimal for mite growth (18).

The house dust mite could induce allergic reaction, atopic dermatitis, sensitized asthmatic reaction, and rhinitis allergy (15,17). Based on the results and the impact that can be caused, efforts to manage and

control the house dust mite are needed. Allergens avoidance measures are such as using dust-proof mattress and pillow cover, washing bedding regularly in hot water, vacuuming frequently, and maintaining the indoor humidity below 50%. This action could reduce the presence of house dust mite (20). A study showed that daily vacuuming mattresses could significantly reduce HDM (21). Mite allergens from carpet or mattress can be removed using vacuum cleaners, but not for the live mites. This is because the mites can cling to almost any surface with their gripping tools on their feet (22). A study showed that a house without house dust mites was associated with a healthy house (13).

This study showed that only one elderly used a cotton bed. The mattress type was not related with the house dust mite density ( $p=0.70$ ), and the elderly who don't use a cotton mattress, showed the use of a cotton mattress is related to house dust mite density. Non-breathable materials of a mattress or a mattress that retains moisture can create a conducive environment for mites to grow and proliferate. Opting for the breathable, hypoallergenic, and moisture mattress materials will reduce not only the pruritus skin irritation but also help the elderly to increase the quality of sleeping. Some mattress types could be a suitable environment for the mite such as innerspring mattress, cotton mattress, and hybrid mattress. The house dust mite can be managed by cleaning, vacuuming, controlling the humidity, temperature regulation and encasements.

House dust mite identification in this study showed the genus of *Dermatophagoides* as an arthropod found in dust of the elderly's' room. This result was the same as other study that showed the same genus (17). Some species of *Dermatophagoides* which often found were *Dermatophagoides pteronyssinus* and *Dermatophagoides farina* (15). Both of them are primarily found in an indoor environment, particularly in bedding, mattress, pillows, carpets, and dust-collecting area within homes. The *Dermatophagoides sp* positive sample from dust samples in this study were obtained from bed, carpets, and floor. Based on other study, those locations were the most potential materials sources to find house dust mites (22).

Mostly of the elderly 20 (58.8%) were not cleaning their mattress. This study shows that cleaning mattress behavior of elderly was related to house dust mite density ( $p=0.00$ ). Even though the elderly had cleaned the mattress, the mite density was ranging from moderate to high. This could be due to other factors causing high levels of house dust mite in their mattress. However other behaviors were not related with house dust mite density. In addition, the elderly's' ability to clean properly needs

to be ensured. Mites still can be found in a mattress even though have been cleaned regularly because the mite can penetrate deep into the mattress, the limited mobility of the elderly, and inadequate cleaning methods. To clean the mattress, vacuum cleaners can be used, but, as done for some elderly people, placing carpets, beds, and pillow in the sun to clean and dry were also effective ways to kill the mite (22). These methods are effective for several reasons because the mites are sensitive to heat, the ultraviolet radiation has germicidal properties, the sunlight can remove moisture of the mattress for mites' growth, and sunlight has natural and chemical properties that can break down the mites.

This study demonstrates that house dust mite density was not related with pruritus in elderly ( $p=0.44$ ). Several factors could contribute to those results, such as the multiple allergen exposure, individual sensitivities, underlying skin conditions, coexisting health conditions, and environmental factors. To confirm whether the definite etiology of elderly itching in this study was caused by insect or not needs further research. Additional examination is needed to prove this, such as skin prick test and Ig E test (9). Those examinations are specific to detect the allergen sensitization that induces pruritus caused by antigen of the insect (9).

The use of moisturizer by the elderly in this study was a minimum of five (14.75). Even among the elderly who experience severe itching, most of them (9, 81.83%) did not use a moisturizer. The failure to apply moisturizing emollients or lotion especially after showering or bathing can contribute to skin dryness, impaired barrier function, and increase the sensation of itching. Other study showed that a person with house dust allergy had lower levels of moisture and sebum (23). This condition was reinforced by other information which states that elderly who have itch symptoms have lower skin hydration levels compared to elderly who do not complain of itch (24). Those conditions induce dry-skin. The primary cause of dry skin-induced itch is the decline of skin barrier function. Further, a lot of mediators, receptors and channel are involved in itch signals (25). Applying emollients could maintain the moisture, soothe dry skin and reduce itchiness in elderly.

Moisturizer can play a crucial role in reducing pruritus in elderly by addressing dryness, restoring skin barrier function, reducing inflammation, protecting the skin, promoting skin renewal, and offering psychological comfort. The regular use of moisturizer can reduce the pruritus because it contains collagen that is effective to maintain the skin structural coherence, protect the skin barrier and reduce skin symptoms (22,25). Besides that abnormal dermal-epidermal barrier, immune system

changes related to age, or central and peripheral neuropathy could be responsible in the pruritus mechanism (26). This study suggests choosing a suitable skin moisturization for elderly to prevent the skin barrier disruption and improving quality of life for elderly.

The results of this study show that the majority of elderly who complain of mild pruritus say that it does not interfere their sleep activity (26). The data were supported by other data in this study, where the duration of itching in elderly was mostly less than six hours. This result was analogous with other study which shows that sleep disturbance was felt by elderly who have generalized pruritus during the night (27). Most common body predilections where elderly experienced itch were legs, back, scalp, and arms, as shown in this study. Our study showed that most of the elderly who experienced itch were women. This result was similar with other study that itch symptom was dominantly experienced by females rather than males (25). In women, several physiological changes occur, such as a decrease in estrogen hormone levels. This hormone accelerates many skin changes that are important to protect the cutaneous barriers (28). Several conditions that can induce itch in elderly are skin condition, insect bite, psychological factors, environmental factors, weather, immunity, infection, medication, chronic conditions, and comorbidities of several diseases. Unfortunately, the comorbidity was not assessed in this study.

This study had several limitations that we have already explained. For generalization, this study may not reflect the itch or pruritus symptoms and the relationship with house dust mite in elderly population. Further studies are needed with bigger sample size and variation of location to investigate the different environments. Further study may combine varying methodologies, sample size or population to answer the inconsistency of the results. This is a short-term study, making it difficult to assess the potential confounders such as coexisting allergens, environmental condition, lifestyle factors, and individual sensitivity. The biology of dust mite is complex, including various species, life stage, and the interaction with the environment. It is necessary to understand the complexity and the implication for human health.

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#### CONCLUSION

In conclusion, this study found no significant relationship between the house dust mite density and the risk factors with and itching in elderly, but cleaning the mattress could reduce the house dust mites. Another good habit that potentially reduces the HDM was changing the bed sheet. Additionally, *Dermatophagoides sp* were the dominant insect found as house dust mite. Based on this study, future research should investigate the house dust mite density, allergen exposure, and pruritus in elderly over time. Further research about the biological and pathophysiology mechanism that linking the house dust mite exposure and pruritus development need to be done. Because of the multifactorial of etiology and risk factor of pruritus in elderly, is needed to develop personalized and precision medicine approaches.

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