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Density of House Dust Mites (HDM) *Dermathopagoides* sp. In Jatimulya Village South Tambun District Bekasi City

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ABSTRACT

Background: House Dust Mites (HDM) are arthropods that trigger allergies such as asthma and rhinitis. The percentage of these animals as the cause of asthma according to WHO data (2013) is around 50% -80%.
Objective: The purpose of this study was to obtain new information about the density of HDM in the city of Bekasi as well as to complement the existing data so that it can be used as a reference in formulating an allergy prevention program caused by HDM.
Methods:This study was designedwith a quasi-experimental study research method using a comparative pre-test post-test non-equivalent control group design.The sample in this study was divided into two groups, namely one control group and one treatment group from the sample selected by purposive sampling. The population studied were students of the Hidayatullah Islamic Boarding School inSurabaya.
Result: This type of research is quantitative descriptive with a cross-sectional research design. The sample in this study were 9 houses of residents of the village of Jati Bulak, RT 001/ RW 003, Jatimulya Village, Tambun Selatan District. The location points for dust sampling for each house are mattresses, carpets and floors. The working procedure of this research includes the pre-analytic stage in the form of preparation of tools and materials, the analytical stage in the form of HDM examination with the sedimentation method, the post-analytic stage in the form of confirmation of HDM identification.
Conclusion:From research result that has been done, it can be concluded that the HDM figures in 9 houses of Jati Bulak villagers RT 001/ RW 003 Jatimulya Village, Tambun Selatan District are in the low category.

Introduction

HDM (House Dust Mite) is an animal belonging to the phylum Arthropoda, class Arachnida and order Acarina. TDR has 2 important species studied in the world of health, namely *Dermatophagoides pteronnyssinus* and *Dermatophagoides farina* (Hohakay *et al.*, 2017). Called House Dust Mites (HDM) because these animals have a habitat in carpet dust, mattresses, and other home furnishings that have never been cleaned (Batti *et al.*, 2013*)*.

HDM is considered to cause health problems because it triggers allergies such

as asthma and rhinitis (Majawati and Joselyn, 2019). According to WHO (2016) of the 235 million people in the world who suffer from asthma, around 50% -80% are caused by HDM, both *Dermatophagoides pteronyssinus* and *Dermatophagoides farina*. The prevalence of HDM is more commonly found in countries with tropical climates, one of which is Indonesia (Subaha *et al.,* 2016).

Seeing the problems and impacts caused by HDM, it is necessary to screen HDM in areas suspected of being the spread of HDM to update data regarding the incidence of HDM in Indonesia. As for several previous studies that underlie this research, among others, research by Walangare *et al*. (2013) in Manado City reported the existence of HDM type Acarus sp. as much as 36.66% in the bedroom and 35.18% in the living room; Ponggalunggu *et al.* (2015) who reported that the most common HDM species found in allergy sufferers were *Dermatophagoides pteronyssinus* on beds, bed floors, and sofas; Widiastawan *et al*., (2015) added data at the same location as Ponggalunggu *et al.* (2015) that the most common family found in Malalayang Manado was Pyroglyphidae with the highest HDM density level in bed dust samples and the lowest on the bedroom floor. Another study by Hohakay *et al.* (2017). ; Arrahmi *et al*. (2019) regarding the HDM density in Jati Village, Padang Timur District, Padang City reported that the overall HDM density reached 13.49 mites/g dust. The highest density found in the bed was 15.1 mites/g dust.

Various studies on the type and density of HDM have been carried out in several cities in Indonesia such as Manado, Padang, Palembang, Pekanbaru, and Jakarta. However, data on the density of HDM in Bekasi City has not been widely published, even though a complete update of data on HDM density in Bekasi City is needed as a basis for determining the incidence of HDM in Bekasi City. The location of this research was carried out in Jati Bulak Village, RW 001 RT 003, Jatimulya Village, Tambun Selatan District, Bekasi Regency. The purpose of this study was to obtain new information about the density of HDM in the city of Bekasi as well as to complement the existing data so that it can be used as a reference in compiling an allergy prevention program caused by HDM.

Methods

This type of research is descriptive quantitative to see the picture of HDM in Kampung Jati Bulak RT 003 Jatimulya Village, South Tambun District, Bekasi Regency. The design of this research is cross-sectional or each study subject is only made one observation. This research was conducted in February-May 2021 with the

sampling location in Jati Bulak, Bekasi City, while the HDM examination was carried out at the Parasitology Laboratory of DIII Technology Laboratory medis of STIKes Mitra Keluarga East Bekasi.

The sample in this study was dust obtained from beds, ventilation, and floors in 9 houses of Kampung Jati Bulak residents RT/RW 001/003 Jatimulya Village, South Tambun District. The variable in this study is an independent variable in the form of HDM density.

The tools used in this research include analytical balance, watch glass, spatula, object-glass, cover glass, test tube, plastic container, carpet, measuring pipette, bulb, beaker, stirring rod, measuring cup, dropper pipette, tube rack, microscope, vacuum cleaner (vacuum cleaner), mask, handscoon, label, and stationery. The materials to be used in this research are dust obtained from rented houses and residents' houses in Kampung Jati Bulak RT/RW 001/003 Kelurahan Jatimulya, Tambun Selatan District, saturated NaCl solution, and aquades.

The way the research works refers to the research of Widiastawan *et al*., (2015) which includes pre-analytic, analytical, and post-analytic stages. The pre-analytic stage includes dust samples taken on mattresses and carpets in 15 rented houses and houses in Jati Bulak Village RT/RW 001/003 Jatimulya Village, Tambun Selatan District using a vacuum cleaner. Dust samples were taken in 1 room and 1 bed in each rented house and resident's house. The vacuum cleaner filter should be replaced or cleaned, after the next object collection. The collected dust is put in an adhesive plastic container and labeled with the object number, date of collection, and object name written on it. The dust sample was taken to the Mitra Keluarga Stikes Laboratory.

The analytical step includes the dust sample being filtered and weighed on the analytical balance of as much as 0.1 grams. The sample was put into a test tube and added saturated NaCl then homogenized. Saturated NaCl is put into a test tube until it fills the tube. The cover glass was placed on the surface of the tube and left for 20 minutes. The cover glass is lifted and placed on the glass object and labeled with the respondent's name, preparation code, and date of manufacture. Then, the preparations were observed under a microscope. The post-analytic stage was carried out by identifying the presence of HDM using the 2013 medical parasitology manual and calculating the HDM density with the following formula.

$$\text{HDM Density} = \frac{Total\ dust\ weight\ (g)}{0{,}1} \text{ x Amount of HDM in 0,1 g dust}$$

Data analysis using descriptive analysis. This means that the data obtained

is described so that information is obtained in the form of a description of the HDM density in Jati Bulak Village RT/RW 001/003 Jatimulya Village, South Tambun District.

Results and Discussion

The identification of HDM in this study was carried out in Jati Bulak Village, RT 003 RW 001, Jatimulya Village, Tambun Selatan District, Bekasi Regency. The number of samples in this study was 27 dust samples taken from mattresses, floors, and carpets. A complete description of the subject, the location of the object, and the level of cleanliness of the house in Kampung Jati Bulak RT 003 RW 001 Bekasi Regency are shown in tables 1 and 2.

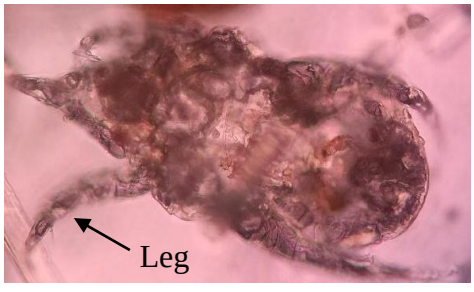
Table 1. Description of research subjects in Jati Bulak Village RT 003 RW 001 Jatimulya Village, Tambun Selatan District, Bekasi Regency

HDM	Allergy/asthma in householders	
	Allergy/asthma	No Allergy/asthma
Positive (+)	1	8
Negative (-)	0	9
Occupants of the house (persons)	Number of houses	Positive HDM
1-2	2	2
3-5	6	6
>5	1	1

Table 2. Description of the location of dust sampling in the homes of residents of Kampung Jati Bulak RT 003 RW 001 Village Jatimulya, South Tambun District, Bekasi Regency

Sampling location	Positive HDM	Negative HDM
Mattress	0	9
Carpet	9	0
Floor	0	9

The results shown in table 1 show that there is 1 HDM positive house with occupants with asthma, while table 2 shows that from the three sampling locations, namely mattresses, carpets, and floors, only carpets were tested positive for HDM. The results of the identification of HDM genus Dermatophagoides sp. on the carpet are shown in the image below



Picture . House Dust Mites, genus Dermathopagoides sp. at 400x magnification.

The results of the calculation of the TDR density on the carpet showed that the highest TDR density was 7.24 mites/gram dust, while the lowest was 4.37 mites/gram dust. The results of the calculation of the average TDR density found in dust samples on the carpet can be shown in table 3.

Table 3. The results of the average density of HDM on carpets in dust samples in Jati Bulak village RT 003 RT 001 Jatimulya Village, Tambun Selatan District, Bekasi Regency

Sample Number	Total Dust Weight (grams)	Total HDM	Mite Density /Gram Dust
1	0,5170	1	5,17
2	0,6850	1	6,85
3	0,4528	1	4,53
4	0,5589	1	5,59
5	0,4368	1	4,37
6	0,6046	1	6,05
7	0,5188	1	5,19
8	0,6962	1	6,96
9	0,7241	1	7,24

Based on the research conducted in Jati Bulak Village, RT 003 RW 001, Jatimulya Village, Tambun Selatan District, Bekasi Regency, it was found that the HDM genus Dermathopagoides sp. with the characteristics of being round and oval, cream and brown, appearing transparent, having setae, and legs. However, the morphology is not visible such as the number of legs, the presence of palps, and calicera. This is due to Dermathopagoides sp. visible with a 400x magnification microscope covered by a sample of house dust. The results of the identification of HDM morphology in this study are following the research of Kawulur *et al*. (2013) which states that the characteristics of HDM are having setae (hair), four pairs of legs, a body in the form of a pouch, measuring between 0.2-0.3 mm, the tips of the legs (tarsus) are short, the body is brown and beige.

Based on table 3 shows that the results of the examination of the carpet dust samples were found to be 9 HDM positive samples. The highest total density was found in carpet sample number 9 with a density of 7.24 mites/gram dust, while the lowest total HDM density was found in carpet sample number 5 with a density of

4.37 mites/gram dust. The total density of HDM found was 9 mites. The results of this study are different from those of Widiastawan *et al. (*2015) who reported that from 96 dust samples taken from beds, bedroom floors, and sofas in Manado City were positive for HDM. The highest HDM density was 36.92 mites/gram dust, bedroom floor 11.41 mites/gram dust, and sofa 15.94 mites/gram dust. Another study conducted by Arrahmi *et al*. (2019) reported that from a sample of 96 houses of 48 residents in Jati Village, Padang Timur District, Padang City, the TDR density on the bed (mattress and sheets) was 15.1 mites/gram of dust and 12 carpets, 02 mites/gram dust.

Based on table 1. shows that out of 9 houses that are HDM positive, only 1 occupant has a history of allergies/asthma. This result is different from Majawati dan Joselyn (2019) who reported that of the 17 houses that were positive for HDM, there were five houses with residents having a history of allergies/asthma, while of the 35 houses that were negative for HDM, only eight houses had a history of allergies/asthma.

Sampling suspected of having HDM was carried out on floors, carpets, and mattresses. The 9 houses sampled that were HDM positive were carpeted. According to Arrahmi *et al*. (2019), the carpet is a HDM habitat because the carpet material with fibers made of wool is a good habitat for HDM, besides that in this study, the carpet was rarely cleaned with a vacuum cleaner. Yu *et al.* (2015) added that mattresses can be the main habitat for HDM because when humans sleep, human skin flakes are left on the mattress, while human skin flakes are a food source for HDM. Therefore, locations such as floors, carpets, and mattresses need to be cleaned regularly. In this study, HDM was only found on the carpet because the frequency of cleaning the floor and mattress was carried out every day, while the frequency of cleaning the carpet was only once a month. This study is different from Majawati dan Joselyn (2019) who reported that among the sampling points such as floors, carpets, and mattresses only carpets there was no HDM found. This is because the frequency of carpet cleaning is maintained properly.

This study still has limitations in the form of a sample size that is too small. In this study, secondary data analysis has also not been carried out regarding the relationship of allergy/asthma with various factors as triggers for allergy/asthma and the researcher's difficulties in taking samples at each house in Jati Bulak Village, RT 003, RT 001, Jatimulya Village, Tambun Selatan District, Bekasi Regency.

Conclusion

This study concludes that among the three points of dust sampling locations, only the mattress found the presence of HDM with the genus Dermatophagoides sp. The HDM density in this study was between 4.53 – 7.24 mites/gram of dust with a low category.

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