

Identification of mold on skin and hair of house cat

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Abstract— Cats are one of human's favorite pets. The health and hygiene of cat's skin and hair are one thing that need to be considered. The low levels of hygiene can cause infections for cat. One common cause of the infection is mold. Mold can used keratin from cat's skin and hair to growth and caused an illness for a cat and also pet owners. Therefore, a mold identification on cat's skin and hair are needed. The identification of mold can be done through a methods such as Wood's Lamp, Tape Strip Test and also a culture. A total of 40 fungal isolates were obtained from hair of the 20 cats investigated. Based on the observation of macroscopic and microscopic a suspected mold in spreading of cat's skin and hair has successfully identified. Isolates that has successfully identified are belong to genera of *Aspergillus* sp. (45%), and *Penicillium* sp (30%). These results shows that cats could carry mold that have a large disrupt of human's health and also house cat.

Keywords— Identification, Mold, Cat, *Aspergillus* sp., *Penicillium* sp., Tape Strip Test, Wood's lamp

I. INTRODUCTION

As a pet, cat need a good treatment in order to stay healthy. There are several factors that must be considered for cat such as the hygiene of body and the environmental residence. If the factor less notice, it will cause diseases for the skin and hair of cat [1]. In animals, like cat the diseases could due to microorganism pathogen in skin or hair of cat. One of the microorganisms that is often found on skin and hair of cat is mold. Molds are fungi that commonly found in indoor and outdoor environment [2]. The presence of mold on skin and hair of cat will cause symptoms like itching, excessive grooming, hair loss and ring worm [3]. Exposed to mold can also cause severe disease such as respiratory disease, skin irritation and nasal stuffiness for both human and animals.

There are some kind of simple methods which used to detect the presence of microorganisms on skin and hair cat, like tape strip, wood's lamp method, and also fungal culture. These are common method that usually used in veterinary care to detect the presence of microorganisms. This study was conducted to identify mold that growth on skin and hair of house cat and also to become sources of information for people related to mold that capable of causing disease and potentially contagious to human and other animals.

II. MATERIALS AND METHODS

Questionnaire

Questionnaire were distributed to 20 pet owners that brings their cats to the veterinary and aims to be an information regarding the identity of cat and the intensity of care either cat itself and environmental cleanliness.

Cytology Observation

Cytology observation were conducted with two separated methods which is wood's lamp method and tape strip method. The study with wood's lamp method is to examine the presence of mold in hair of cat with exposure of ultra violet. As of tape strip is to detect the presence of spore in cat's skin by embedded the tape on cat skin and observed with microscope in scale up 100x. The studies were run at the laboratory at the veterinary clinic.

Culture Observation

A total 40 samples were collected from 20 cats in veterinary clinic. Each sample corresponds to the result of wood's lamp method. After being diluted with NaCl, each samples moves onto the media. The mycological analysis were undertaken by means of visualization of fungal structures by macro and also microscopic characteristics of the colonies. The characteristic of the colonies were obtained after inoculation of the specimen onto Sabouraud Dextrose Agar supplemented with chloramphenicol 250 mg. The media were kept at 37°C and the observation of fungal growth was done during 14 days.

Data Analysis

Data analysis of tape strip and wood's lamp method obtained will analyze in descriptive to shows the existence of mold on skin and hair of cat. Meanwhile, for mold culture will be analyzed in descriptive based on macro and microscopic structure of the mold. As for questionnaire, data will be analyze by excel to shows a factor that may influent the occurs of mold growth on skin and hair of cat.

III. RESULTS AND DISCUSSIONS

Cytology Observation

On this study, we used two separated methods tape strip and wood's lamp, to detects the growth of mold on hair and also spores on skin. Between these two methods, tape strip is more trusted method than wood's

lamp. It was because we could see clearly the spores against the microscope while wood's lamp will gives a fluorescence to mark the presences of mold in hair.

On woods lamp we could see the presence of mold in hair by green light after being exposed to UV (Figure 1a.). It is happens because mold used tryptophan in animal's hair in their growth so their metabolites will fluorescence differently under the illumination of woods [4]. While in tape strip method, the signs of mold shows by the presence of spores in microscope (Figure 1b.).

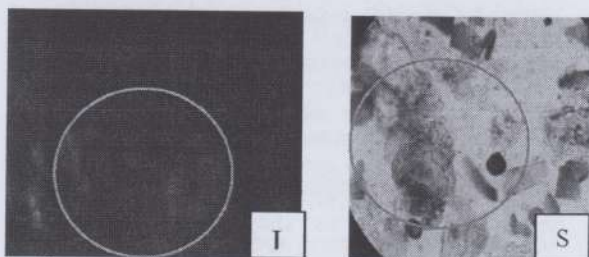


Figure 1. Positive wood's lamp (a) and positive tape strip (b)

Table 1. Cytology results

Wood's lamp	Tape Strip	Total	Percentage (%)
+	+	11	55
+	-	3	15
-	+	5	25
-	-	1	5
Total		20	100

(+) sign shows the presence of mold, (-) sign shows the absence of mold

Cytology observation on the existence of mold shows the varied results (Table 1.). A total of 55% house cat gives positive outcome to these two method being used. This result show there is a correlation between mold on the skin and the hair of house cat. 15% showed negative on tape strip but positive on wood's lamp. This result might happens because of the presence of protein content on food. The high content of protein capable of causing phosphorescence on the skin and hair of cat when presented by ultra violet [5]. So, it gave false positive on wood's lamp method. A total 25% shows positive results in tape strip but negative in wood's lamp. On tape strip method we could see clearly the presence of spore on microscope, it indicates there was a false negative on wood's lamp. This result could occurs because of several factors like the presence of light in the dark room or the use of shampoo containing iodine [6]. This observation shows the correlation between two methods about the presence of spores and mold on skin and hair of cat. Not every cat in the clinic shows the positive results in both methods occurs because of several factors. Positive results in either methods show the presence of mold that could carry disease for both cat and human.

B. Mold Observation (Culture Observation)

Culture samples were undertaken against 20 cat in veterinary clinic. The hair of each cat were taken using forces then being diluted before planted on the surface of SDA. A total 40 isolates were being identified. The identification shows there are two generas found in the

samples. The isolates that has successfully identified animals, are belong to genera of *Aspergillus* sp.(45%), and *Penicillium* sp. (30%) (Table 2.). The molds that has grown on the media observed based on 6 different categories of morphology. The categories include the following color of the surface, the basal, existence of concentric ring, radials, the texture, and also topography (Figure 2a.). Based on macroscopic observation, isolates that has successfully identified are belong to genera of *Aspergillus* sp. (45%), and *Penicillium* sp. (30%). It is identified by comparing the characteristics of mold growing in the media with the reference from nation laboratories. The results in macroscope observation the being observed with microscope manner. Prior to microscope observation, mold breeding with riddle's method was needed. These methods could give us the clearer structure of mold when observed in microscope.

Table 2. Mold culture

Wood's lamp	Total	<i>Aspergillus</i>	<i>Penicillium</i>
+	14	28	16
-	6	12	2
Percentage		100%	45%
			30%

(*) There is a dilution before culture

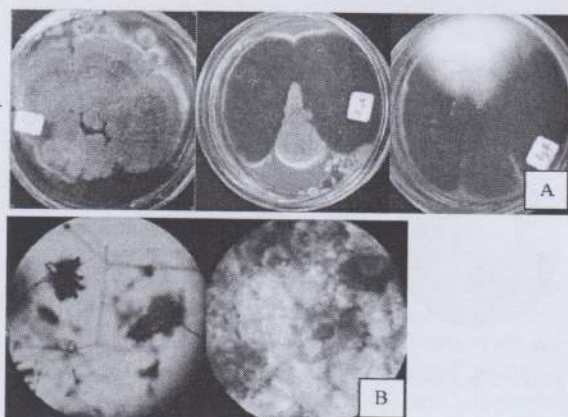


Figure 2. Macroscopic observation of mold (a) and microscopic observation (b)

C. Questionnaire Analysis

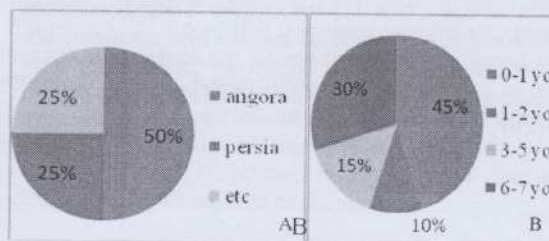


Figure 3. races of cat(a) and ages of cat(b)

Races and ages of cat plays an important roles for mold disperses or infection [11]. Races of cat can affect the disperses of mold by the long of cat's hair. 50% cat in veterinary has an Angora as their race (Figure 3a.). This race has a long hair for almost 5 cm and it could help mold to growth in skin or hair of cat. This data also corresponds with cytology data of cat

with the positive results in both methods. The ages of cat also affect the dispersed and infection of mold by looking at immune phase of cat. A total of 45% cat in veterinary is in their 0-1 years old age (Figure 3b). On that age, cat has low immune system and would make it easy for mold to infect and growth in skin and hair of cat [12].

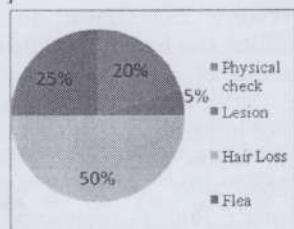


Figure 4. reason cats go to veterinary

Meanwhile, 50% cats in veterinary come because of hair loss as a reason (Figure 4.) A hairloss occasionally caused because of an infection of parasites like mold [13]. The signs of hairloss indicated the presence of mold in skin and hair of cat. The cleanliness of environment and cat also plays a part on the disperses of mold. A total 55% cat in veterinary being bathed for once a month (Figure 5.). This acted is to prevents the dispersed of mold. Although most of the cat was being bathed for once a month, it cant guaranteed no infection nor disperse of mold in cat. The humidity or cleanliness of the environment were the key role of mold growth in cat.

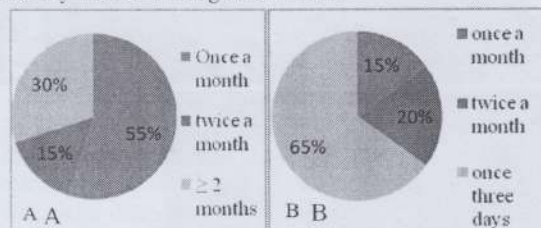


Figure 5. frequencies cat bathed (a), frequencies shelters cleaned (b)

IV. CONCLUSION

This study showed the presence of mold in skin and hair samples of cats. Mold found on the skin and hair of cat is *Aspergillus* dan *Penicillium*. These generas are commonly found in indoor and outdoor environments. *Aspergillus* is a mold known to cause respiratory disease to both human and animals if came into contact directly.

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