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LABORATORY ANIMAL ALLERGY (LAA) AMONG THE ANIMAL FACILITIES’ WORKERS IN A RESEARCH INSTITUTE: A CLINICAL SURVEY

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MASTER OF SCIENCE
(OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT)
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LABORATORY ANIMAL ALLERGY (LAA) AMONG THE ANIMAL FACILITIES’ WORKERS IN A RESEARCH INSTITUTE: A CLINICAL SURVEY

By

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ABSTRACT

Research animal facilities had been identified as a risky environment for the development of Laboratory Animal Allergy (LAA) among the exposed workers. The risk degree is in parallel with the nature of contact, intensity of exposure and individual susceptibility. Early recognition of LAA via active clinical surveillance is imperative before it progresses into occupational asthma with chronic disability. This study aimed to determine the prevalence of LAA among animal facilities’ workers in Institute for Medical Research, Malaysia together with its associated exposure or environmental risk factors. This cross-sectional study recruited a total of 87 workers exposed to animal allergen and 87 control subjects. Self-administered LAA questionnaire contained details of occupational and socio-environmental history as well as lung function test (spirometry) were employed as study tools. Statistical analysis were performed using SPSS version 20, utilizing descriptive analysis, cross tabulation, independent t-test, Mann Whitney U-test and Multivariable Logistic Regression (MLR). More than half of the exposed subjects were reported at least one LAA symptoms (58.6%) and declined ling function (56.3%). Upper respiratory symptoms were the most prevalent LAA symptoms (49.4%). There was significant association between the reported symptoms and abnormal lung profile (p<0.05). In term of lung function values, the mean FEV1, median FVC and mean FEV1/FVC were significantly lower among the exposed group compared to the control group (p<0.001). MLR substantiated that atopic workers, smokers and those did not comply to full PPE regularly upon animal contact were more likely to develop LAA. LAA is
an acknowledged occupational hazard. Therefore knowing the existing prevalence and its risk factors to design an effective LAA prevention program consisted of exposure avoidance as well as exposure reduction which combines the engineering control, administrative control and PPE is of paramount importance.

**Keywords:** laboratory animal allergy, animal workers, research animal facilities, clinical survey
ABSTRAK

Fasiliti haiwan makmal bagi tujuan penyelidikan dan eksperimen adalah berisiko tinggi dan boleh menyebabkan alahan haiwan makmal (LAA) di kalangan pekerja-pekerja makmal. Tahap risiko bergantung kepada sifat pendedahan, intensiti pendedahan dan faktor kecenderungan individu. Mengesan LAA secara awal melalui pengawasan perubatan aktif adalah penting sebelum ianya menyebabkan penyakit asma dan sebarang ketidakupayaan kronik. Kajian ini bertujuan untuk menentukan kelaziman LAA di kalangan pekerja fasiliti haiwan makmal di Institut Penyelidikan Perubatan, Malaysia serta faktor risiko pendedahan pekerjaan dan persekitaran yang berkaitan. Kajian ini merekrut sejumlah 87 orang pekerja yang terdedah kepada alergen haiwan makmal dan 87 orang pekerja yang tiada pendedahan sebagai subjek kawalan. Responden dikehendaki melengkapkan borang soal selidik LAA yang merangkumi sejarah pekerjaan dan pendedahan secara terperinci, serta menjalani ujian fungsi pulmonari (spirometri). Analisa statistic dijalankan menggunakan SPSS versi 20, dengan mengaplikasikan analisa descriptive, cross tabulation, independent t-test, Mann Whitney U-test dan juga Multivariable Logistic Regression (MLR). Melebihi separuh daripada subjek yang terdedah kepada alergen haiwan makmal yang melaporkan sekurang-kurangnya satu simptom LAA (58.6%) dan dikesan penurunan fungsi pulmonary. Majoriti melaporkan simptom saluran pernafasan atasan (49.4%). Perkaitan antara simptom LAA dan penurunan fungsi pulmonary adalah ketara (p<0.05), manakala dari segi nilai fungsi pulmonary, min FEV1, median FVC and mean FEV1/FVC didapati rendah dan signifika dari segi statistic di kalangan subjek
terdedah berbanding dengan subjek kawalan \( p < 0.001 \). Analisa MLR juga mendedahkan bahawa subjek atopik, perokok dan mereka yang tidak mematuhi penggunaan alat perlindungan persendirian (PPE) yang lengkap sewaktu kontak dengan haiwan makmal, adalah lebih cenderung untuk LAA. LAA diperakui sebagai hazad pekerjaan yang major. Justeru itu, pengetahuan mengenai prevalensi sedia ada bersama dengan faktor risiko yang berkaitan adalah penting untuk perekaan program pencegahan LAA yang efektif. Program yang komprehensif perlu merangkumi pengelakan pendedahan atau pengurangan tahap pendedahan menerusi kawalan kejuruteraan, kawalan pentadbiran dan penggunaan PPE yang sesuai.

**Kata kunci:** alahan, haiwan makmal, pengendali haiwan, fasiliti haiwan, survei klinikal
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</table>
# LIST OF ABBREVIATION

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>DOSH</td>
<td>Department of Occupational Safety and Health</td>
</tr>
<tr>
<td>FEV1</td>
<td>Forced Expiratory Volume at one second</td>
</tr>
<tr>
<td>FVC</td>
<td>Forced Vital Capacity</td>
</tr>
<tr>
<td>FEV1/ FVC</td>
<td>The ratio of Forced Expiratory Volume at one second to Forced Vital capacity</td>
</tr>
<tr>
<td>LAA</td>
<td>Laboratory Animal Allergy</td>
</tr>
<tr>
<td>MLR</td>
<td>Multivariable Logistic Regression</td>
</tr>
<tr>
<td>NIOSH</td>
<td>National Institute of Occupational Safety and Health</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Act</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
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</table>
CHAPTER ONE
INTRODUCTION

1.1 Background of Study

The first ever occupational illness induced by laboratory animal was reported in early 1950’s when a case of allergic rhinitis was addressed secondary to occupational exposure to mice (Sorrell, & Gottesman, 1957). The rodents including mice and rat are the most widely used species in medical laboratory research worldwide (Bush, Wood, & Eggleston, 1998). The laboratory animals constantly shed allergens in their body secretions and these allergens are deposited in the air or laboratory materials which make the animal facilities a high risk environment for the development of Laboratory Animal Allergy (LAA) (Jones, 2015).

Knowing the overall prevalence or incidence of Laboratory Animal Allergy (LAA) among the animal handlers is of paramount importance especially for the considerations to design the comprehensive occupational health program in order to reduce the LAA rate. Prevalence gives a measurement on the total number of LAA cases among a specific population at a particular time. Ample of studies had reported the prevalence of 11-44% in the LAA incidence across various populations (Seward, 2001). The average prevalence of 20.9% was revealed in a meta-analysis examining 19 studies (Hunskaar, & Fosse, 1990). On the other hand, the prevalence of 23.1% revealed in a huge cross-sectional study involving a total of 5641 laboratory animal
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APPENDIX A

LABORATORY ANIMAL ALLERGY QUESTIONNAIRE
FOR LABORATORY ANIMAL WORKERS

PART A - Socio-demographic Information
1. Name: ________________________
2. Age: ________________________
3. Gender: male / female
4. Race: Malay/ Chinese/ Indian/ others
5. Educational background: primary/ secondary/ tertiary
6. Address: ________________________

PART B - Employment History
1. Job Title: ________________________
2. How many years/ months in current position: ________________________
3. Number of years employed at this facility: ________________________
4. Prior to employment at this facility, did you work with laboratory animal?
   Yes            No
   If yes, ________ year/s
   Type of animals: ________________________

PART C - Present Job
In the past 12 months, please tick the appropriate :
1. Does your work involve contacting or handling animals?
   Yes          No
2. Does your work involve contacting or handling animals’ excreta, contaminated plant or equipment?
   Yes          No
3. Does you work in an environment with animals or their dander?
   Yes          No
4. Work area: Animal house Laboratory
## PART D- OCCUPATIONAL HISTORY / HISTORY OF CONTACT AND EXPOSURE

1. Describe the duties especially nature of work with animals, their excreta or environment:
   (please tick at the relevant duties)
   - Handling stool or urine
   - Collect blood / Harvest tissue
   - Dissection/ surgical procedure
   - Handling soiled bedding
   - Feeding/ breeding
   - Change bedding/ cleaning of cages
   - Handling carcasses
   - Vaccination/ injection
   - Others:

2. Have you worked with laboratory animals or their excreta in recent 12 months?
   If yes, complete the following:

<table>
<thead>
<tr>
<th>Type of Animal</th>
<th>Duration and frequency of contact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Duration in Years</td>
</tr>
<tr>
<td>Mouse</td>
<td></td>
</tr>
<tr>
<td>Rat</td>
<td></td>
</tr>
<tr>
<td>Hamster</td>
<td></td>
</tr>
<tr>
<td>Guinea pig</td>
<td></td>
</tr>
<tr>
<td>Rabbit</td>
<td></td>
</tr>
<tr>
<td>Goat</td>
<td></td>
</tr>
<tr>
<td>Monkey</td>
<td></td>
</tr>
<tr>
<td>Cat</td>
<td></td>
</tr>
<tr>
<td>Others:</td>
<td></td>
</tr>
</tbody>
</table>

3. Do you use or wear the following items when working with animals at this facility at all the time?

<table>
<thead>
<tr>
<th>Personal Protective Equipment</th>
<th>Use all the time</th>
<th>Easily accessible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protectve eye glasses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical mask</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respirator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lab gown / apron</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gloves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety shoes</td>
<td></td>
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</table>
### PART E - PRESENT SYMPTOMS

1. Do you regularly or frequently have the following symptoms upon animals contact?

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>No</th>
<th>Yes</th>
<th>Year of onset</th>
<th>At work</th>
<th>At home</th>
<th>On vacation</th>
<th>No difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watery/ Itchy eyes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swollen eyes or lips</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skin rashes/ itchiness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stuffy/ congested nose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequent runny nose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequent sneezing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequent cough</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheezing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shortness of breath</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Chest tightness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asthmatic attack</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

2. How soon after exposure to laboratory animals do these symptoms started?
- Less than 10 minutes
- 10 minutes- 1 hour
- 1 to 8 hours
- More than 8 hours

3. How long do these symptoms last?
- Less than 10 minutes
- 10 minutes- 1 hour
- 1 to 8 hours
- More than 8 hours
PART F - HOME ENVIRONMENT/ PAST HEALTH INFORMATION

1. Do you have indoor pets?  
   ___Yes  ___No  
   If yes, what type of animals: ____________________________  
   For how long in years/months: ________________________

2. Do you smoke?  
   ___Yes  ___No  
   If yes, how many cigarettes per day?  
   For how many years?  
   Have you ever been a smoker?  
   ___Yes  ___No  
   If yes, when did you stop smoking?  
   At what age did you start smoking?  
   How many cigarettes per day?  

3. Were you told by doctor that you had allergies to animals?  
   ___Yes  ___No  
   If yes, what type of animal? ____________________________

4. Have you ever received treatment for allergic reaction?  
   ___Yes  ___No

5. Has a doctor ever diagnosed you for having asthma?  
   ___Yes  ___No  
   If yes, at what age did your asthma start?  
   When was your last asthmatic attack?  
   Are you currently taking any medication to control your asthma?  
   ___Yes  ___No

6. Do any of your blood of kin (grandparents, parents and brothers/sisters) have allergies  
   Or asthma?  
   ___Yes  ___No

7. Are you under medical care for any chronic illness?  
   ___Yes  ___No  
   If yes, please specify:

8. Are you on any regular medicine?  
   ___Yes  ___No  
   If yes, please specify:

---------------------------THE END OF QUESTIONNAIRE------------------------

THANK YOU

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CONSENT FORM

Title of research:

LABORATORY ANIMAL ALLERGY (LAA) AMONG THE ANIMAL FACILITIES’ WORKERS IN A RESEARCH INSTITUTE: A CLINICAL SURVEY

To become a participant in this research, you are advised to sign this consent form.

I herewith confirm that I have met the requirement of age and am capable of acting on behalf of myself as follows:

1. I understand the nature and scope of the research being undertaken.
2. All my questions relating to this research and my participation therein have been answered to my satisfaction.
3. I voluntarily agree to take part in this research, to follow the study procedures and to provide all necessary information to the investigators as requested.
4. I may at any time choose to withdraw from this research.
5. Except for damage resulting from negligent or malicious conduct of the researcher, I hereby release and discharge Universiti Utara Malaysia and all participating researchers from all liability associated with, arising out of, or related to my participation and agree to hold them harmless from any harm or loss that may be incurred by me due to my participation in this research.
6. I have read and understood all the terms and conditions of my participation in the research.

I have read the statements above, understand the same, and voluntarily sign this form.

Name of participant:
IC/Passport number:
Phone number:
Signature:

Date:
BORANG KEBENARAN

Tajuk Penyelidikan :
LABORATORY ANIMAL ALLERGY (LAA) AMONG THE ANIMAL FACILITIES’ WORKERS IN A RESEARCH INSTITUTE: A CLINICAL SURVEY

Untuk menjadi peserta dalam penyelidikan ini, anda dinasihati untuk menandatangani borang kebenaran ini.

Dengan menandatangani mukasurat ini, saya mengesahkan yang berikut:

1. Saya memahami skop penyelidikan yang dijalankan.
2. Saya berpuas hati dengan semua soalan dan penglibatan saya dalam penyelidikan ini.
3. Saya secara sukarela mengambil bahagian dalam penyelidikan ini, mengikut segala prosedur dan memberikan maklumat yang bersesuaian seperti yang diminta oleh penyelidik.
4. Saya boleh memilih untuk menarik diri daripada penyelidikan ini.
5. Kecuali bagi kerosakan yang berlaku akibat daripada perlakuan cuai atau niat jahat penyelidik, saya dengan ini melepaskan penyelidik dari Universiti Utara Malaysia daripada segala tanggungjawab yang dikaitkan, yang timbul atau berkaitan dengan penyertaan saya. Saya juga bersetuju untuk melepaskan penyelidik daripada sebarang bahaya atau kerugian yang mungkin disebabkan oleh saya melalui penyelidikan ini.

Saya telah membaca penyataan di atas, memahami, dan secara sukarela menandatangani borang ini

Nama peserta : 
No kad pengenalan : 
No telefon : 
Tandatangan: 
Tarikh : 

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