A STUDY INTO THE KNOWLEDGE OF CHILDHOOD ASTHMA AMONG PARENTS AND ITS RELATION TO EMERGENCY DEPARTMENT VISIT

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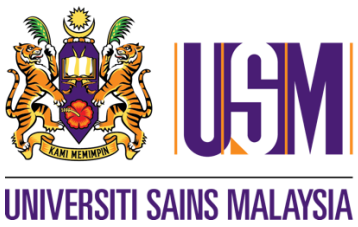

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LIST OF ABBREVIATIONS

ED Emergency Department

USM Hospital Universiti Sains Malaysia

GINA Global Initiative For Asthma

AKQ Asthma Knowledge Questionnaire

ABSTRAK

Latar Belakang

Asma merupakan antara penyebab utama lawatan ke Jabatan Kecemasan di kalangan kanak-kanak. Tahap pengetahuan ibu-bapa mengenai penyakit asma memainkan peranan yang penting bagi memastikan kawalan asma yang optimum.

Objektif

Tujuan kajian ini adalah untuk menilai pengetahuan ibu-bapa dan kaitannya dengan kekerapan lawatan ke jabatan kecemasan di samping meneroka faktor-faktor yang mempengaruhi tahap pengetahuan mereka.

Tatacara

Kajian keratan rentas dilakukan melibatkan semua pesakit yang mengunjungi Jabatan Kecemasan sebuah pusat pengajian tinggi universiti di Kelantan, Malaysia selama 6 bulan pada tahun 2020. Terdapat 231 responden yang terlibat. Soal Selidik Pengetahuan Asma 25 item (AKQ) digunakan untuk menilai tahap pengetahuan ibu bapa mengenai asma kanak-kanak, dan tahap pengetahuan mereka dikategorikan sebagai baik atau lemah. . Keputusan dari kajian kemudian di kaji secara menyeluruh menggunakan analisis deskripsi dan ujian Fisher’s Exact.

Keputusan

Dalam kajian ini, 131 wanita (57.5%) dan 97 lelaki (42.5%) mengambil bahagian. Sebilangan besar anak mereka berumur lebih dari lima tahun (70.2%). Lebih daripada separuh responden (51.5%) yang berpendapatan isi rumah M40 (51.8%) mempunyai pendidikan tinggi. Ibu bapa dengan pengetahuan asma kanak-kanak yang baik (n, % = 224, 97.0%) jauh lebih tinggi berbanding dengan mereka yang kurang pengetahuan. Umur anak adalah satu-satunya faktor sosiodemografi dengan nilai p yang signifikan (p = 0.03) di antara tujuh faktor yang diuji (jantina, usia anak, tempoh masa selepas diagnosis, tahap pendidikan, kumpulan pendapatan isi rumah, sejarah penyakit atopi dan sejarah kemasukan ke wad disebabkan asma). Walau bagaimanapun, tidak ada hubungan yang signifikan antara kekerapan lawatan ke jabatan kecemasan dalam tempoh enam bulan dengan pengetahuan ibu bapa mengenai asma kanak-kanak (p = 0.62).

Kesimpulan

Pengetahuan ibu bapa mengenai asma kanak-kanak adalah faktor penting dalam penilaian dan pemantauan asma kanak-kanak. Penyelidikan ini menunjukkan kaitan pengetahuan yang baik dikalangan ibu-bapa yang mempunyai anak-anak yang lebih muda. Walaupun ibu bapa mempunyai pengetahuan yang baik mengenai asma kanak-kanak, isu yang berkaitan dengan diagnosis, pathogenesis, dan rawatan asma sangat membimbangkan. Untuk memperkukuhkan lagi pendidikan asma dikalangan ibu bapa dan anak-anak, koordinasi yang baik antara professional kesihatan dan intervensi yang disesuaikan dengan budaya diperlukan.

Kata Kunci

Perubatan Kecemasan; American College of Radiology Appropriateness Criteria; Pengimejan Radiologi; Pelajar Pascasiswazah

ABSTRACT

Introduction

Asthma continues to be a major cause of frequent pediatric visits at the Emergency Department (ED). Children with asthma rely on parents to control the pulmonary disease. The level of knowledge of these parents has been found to influence asthma control.

Aim

This study aims to evaluate parental knowledge and its relation to emergency department visits and explore factors associated with knowledge level.

Methods

A cross-sectional study was conducted involving all patients visiting the Emergency Department of a tertiary center in Kelantan, Malaysia, for six months in 2020. There were 231 respondents involved. A 25-item Asthma Knowledge Questionnaire (AKQ) was used to evaluate the parental level of knowledge about childhood asthma, and knowledge levels were categorized into good and poor knowledge. To analyze the associations, a descriptive test and Fisher's Exact test were used.

Results

In this study, 131 women (57.5%) and 97 men (42.5%) participated. Most of their children were over five years of age (70.2%). More than half of the respondents (51.5%) in the middle class or M40 household income group (51.8%) with higher education. Parents with good childhood asthma knowledge (n, % = 224, 97.0%) were significantly higher compared to those with poor knowledge. Child age was the only sociodemographic factor with a significant p-value ($p = 0.03$) among the seven factors tested (gender, child age, the time period after diagnosis, education level, household income group, family history of atopy disease, and history of admission due to asthma). However, there is no significant association between the frequency of visits to the emergency department within six months and parental knowledge of children's asthma ($p = 0.62$).

Conclusion

Parental knowledge of childhood asthma is an essential factor in the assessment and monitoring of childhood asthma. This research has a significant association of good knowledge with parents having younger children. Although the parent has relatively good knowledge of childhood asthma, the issues relating to diagnosis and pathogenesis of the condition and treatment are very worrying. To strengthen asthma education for parents and children, good coordination between healthcare professionals and a culturally adapted intervention is needed.

Keywords

Childhood asthma; Asthma, parents, Knowledge; Children

CHAPTER 1: INTRODUCTION

1.0 INTRODUCTION

Asthma is a common chronic medical illness affecting any age group. Across the globe, in many nations, including Malaysia, it causes significant morbidity and mortality. Three characteristics that describe this chronic lung disease are (1) transient airflow obstruction that leads to shortness of breath, typically reversible with or without treatment; (2) airway inflammation and (3) hypersensitivity of the airways to a range of triggers that precipitate breathing difficulty.

A cascade of physiological processes occurs at the bronchial level causing thickening and narrowing of the airway's wall in asthma. This includes the proliferation of smooth muscle and glands, infiltration by various cells, and edema. Numerous cells infiltrate, predominantly neutrophils and eosinophils. In severe asthma, mucous plugging occurs inside the lumen, and extensive mucous plugging is the prominent finding in the lung of patients dying from an acute asthma exacerbation. There is still evidence of inflammation in the airway walls in patients with mild asthma who had been asymptomatic for months. This indicates that the inherent vulnerability is still present and will re-emerge when exposed to the correct stimulus. (Holgate et cetera, 2008).

An asthma diagnosis is based on history, physical examination, and relevant radiological and laboratory testing. If asthma was not previously known, a preliminary diagnosis could be made by exploring its distinctive characteristics; wheezing, chest tightness, shortness of breath, and cough. The symptoms are usually recurrent,

nocturnal in nature but equally frequent in the early morning or induced by exercises, irritants, allergens, or viral infections (GINA, 2018)

The symptoms and signs of asthma, however, differ significantly from person to person, and the lack of typical symptoms does not rule out the diagnosis of asthma. The frequency and duration of the attack are immensely variable whereby some may experience one or two episodes per year lasting for few hours and some can last for weeks, while some patients may only have one or two attacks a year that last for a couple of hours, while others may have weeks of attack. Some patients can present with chronic symptoms (Ernst et al., 2010).

Many factors may trigger asthma attacks, but the most potent among the more common ones is inhaled allergens. Similar to other factors, it triggers airway inflammation and hyperresponsiveness. Allergens typically include pollen, fungal spores, animal dander, and household arthropods (e.g., house dust mites, cockroach). Other triggers include respiratory tract infections, inhalation of cold or dry air, strenuous exercise, air pollutants, psychological factors, and non-steroidal anti-inflammatory drugs, notably aspirin (Vernon et al, 2012).

There has been a better understanding of childhood asthma in the last thirty to forty years. A variety of successful and safe therapies have been established during the same period. And amid advances in identifying and treating childhood asthma, its morbidity is still on the rise, as evidence by their regular emergency department visits. 7.14% of Malaysian children suffered from childhood asthma, 32.1% had visited the

emergency department for acute exacerbation, and 81.7% had an unplanned return visit (MOH, NHMS, 3rd Report, 2019).

Mismanagement and suboptimal use of asthma preventive medications are among the factors which cause an increase in asthma incidence. Both can be attributed to under-diagnosis and under-treatment by the treating physician and parent's low level of compliance. The effectiveness of prescribed medical treatment for a specific patient mostly depends on both parents' and patients' knowledge, attitude, and awareness towards the disease.

However, parents' understanding of asthma in children assumes a much more significant role in encouraging patients to comply with the medication and the degree to which patients engage in their care, thus indirectly reducing morbidity and mortality.

1.1 PROBLEM STATEMENT

Acute exacerbation of childhood asthma in the emergency department is a very common case scenario that emergency room physicians deal with every day. Over the past few years, the utilization of the emergency department's resources in Hospital Universiti Sains Malaysia (USM) to treat this acute disorder has grown extensively, owning to its ever increased prevalence. Simultaneously, overcrowding of emergency rooms is also contributed by this group of patients. Most of them need close monitoring for worsening of disease course thus causing deprivation of human resources and beds that can be otherwise deployed for more severe cases.

Parents of the asthmatic child mainly demonstrate an inadequate knowledge of childhood asthma. There is often a gap of knowledge that differs from one parent to another, which can be dependent on their sociodemographic profile. Even though some of them are well equipped with asthma knowledge, only a few translate them into practice to prevent, recognize and treat acute exacerbation of asthma at home.

1.2 RESEARCH QUESTION

i. What is the level of knowledge of childhood asthma for parents with asthmatic children?

ii. Why is there a difference in parent's level of knowledge?

iii. What is the relationship between parent's level of knowledge in childhood asthma and the patient's frequency of emergency department (ED) visit?

1.3 OBJECTIVES

1.3.1 General objective

To analyze parent's knowledge of childhood asthma and the frequency of emergency department visits.

1.3.2 Specific objectives

i. To determine the level of parents' knowledge of childhood asthma

ii. To determine the factors associated with the level of parents' knowledge of childhood asthma.

iii. To determine the association of parents' knowledge of childhood asthma and the child's frequency of emergency department visits.

1.4 RESEARCH HYPOTHESIS

Hypothesis 1

H_0: There are no factors associated with the level of asthma knowledge among parents.

H_1: There are factors associated with the level of asthma knowledge among parents

Hypothesis 2

H_0: There is no relationship between parent's knowledge of childhood asthma and frequency of emergency department (ED) visit.

H_1: There is relationship between parent's knowledge of childhood asthma and frequency of emergency department (ED) visits.

1.5 JUSTIFICATION OF STUDY

This study is to explore the adequacy of childhood asthma knowledge in parents so targeted initiatives can be implemented to tackle the vulnerable areas through awareness and education as to mitigate morbidity, school absenteeism, to ensure optimum growth and development, maximum engagement in physical activities, and to improve parental and child quality of life. Better control of childhood asthma achieved by reducing parents' knowledge gap will also reduce overcrowding in the

emergency department apart from reducing asthma morbidity and healthcare costs. Furthermore, based on the studied associated factors affecting knowledge level of childhood asthma, a more personalized measure targeting parent and child with a different sociodemographic profile can be devised. The outcome of this study can be used as the basis of parental guidelines for the prevention of future asthma exacerbation at home and its sequalae

1.6 LITERATURE REVIEW

All asthma guideline shares one standard recommendation where there is a particular emphasis on the family's involvement in managing childhood asthma. It is reported to influence significantly the severity of childhood asthma (Al-Anazi et al, 2015). Besides, various factors such as the parents' knowledge and attitude towards asthma, educational level, financial status, healthcare status, and treatment regime were found to affect the family's management of asthma children. A study in China identified those parents with weak compliance to treatment regimens were concerned about the medicine's effect on their children's development. Statistically, 23.98% of parents were worried about the medication's possible adverse effect on their children's intellect (Zhao et al, 2013).

Comparably, in Pakistan, a research evaluating asthma knowledge among parents of asthmatic children uncovered numerous misunderstandings regarding asthma triggers, and up to 37 percent of participants thought asthma could be transmitted from one person to another via respiratory droplets (Hazir et al , 2013) In Saudi Arabia, a study

to evaluate the understanding and awareness among mothers of asthmatic children discovered that mothers had gaps in their understanding of asthma whereby most of them had very little to none knowledge on how the disease works and the possible complications it can bring about (Al-binali et al, 2010). Another related study, conducted out in 2013 in Riyadh, Central Saudi Arabia, to analyze the knowledge of the caregiver and its connection to the control of asthma among children, showed that the incidence of uncontrolled asthma was three times greater in children of respondents who had misconceptions about the correct time to withhold asthma medication. They claimed that medicine must be halted after coughing and an acute asthma attack is over (Binsaeed et al, 2014)

A subsequent study done in the emergency unit at King Saud Bin Abdulaziz University, Saudi Arabia to explore parents and guardians perception towards asthma in their children reported that almost all respondents were asthma conscious (Al-anazi et al, 2015) One of the latest research in Riyadh, Saudi Arabia, to investigate parents' views and behaviours towards childhood asthma found that most participants were worried about the side effects of inhaled steroids, and 32% were worried about asthma drug dependency. This problem became even more evident among the parents with a low level of education (Abu-shaheen et al, 2016)

In the earlier research performed in Colombia, parents of children who had repeated visits to ED in the preceding six months were more likely to realize that their children's asthma exacerbations were severe enough to go to the primary care provider and that asthma drugs would only be given when children started to develop

symptoms; and, similarly, they were less likely to believe that taking medication in between attack would prevent exacerbation. This represents parents' lack of understanding and skepticism about the chronicity of asthma and the need for long-term asthma medication administration, even though the child is asymptomatic (CE. Rodriguez et al, 2008).

Generally, because children rely on their parents and caregivers to manage their asthma, these caregivers' level of expertise can also be critical in delivering quality asthma treatment to children with the condition, thereby reducing the number of visits to emergency departments.

This research aims to examine parents' awareness and attitudes about their children's asthma, the variables correlated with education and awareness connection with the number of visits to the emergency room. We split the population into parents of children who had three or more ED visits in the preceding six months and those with fewer than three ED visits.

Previous research exploring the same subject vary from this study either in the environment (outpatient environment relative to emergency department [ED] setting in our study) or in the venue (all of these studies were carried out outside of Malaysia)

1.7 CONCEPTUAL FRAMEWORK

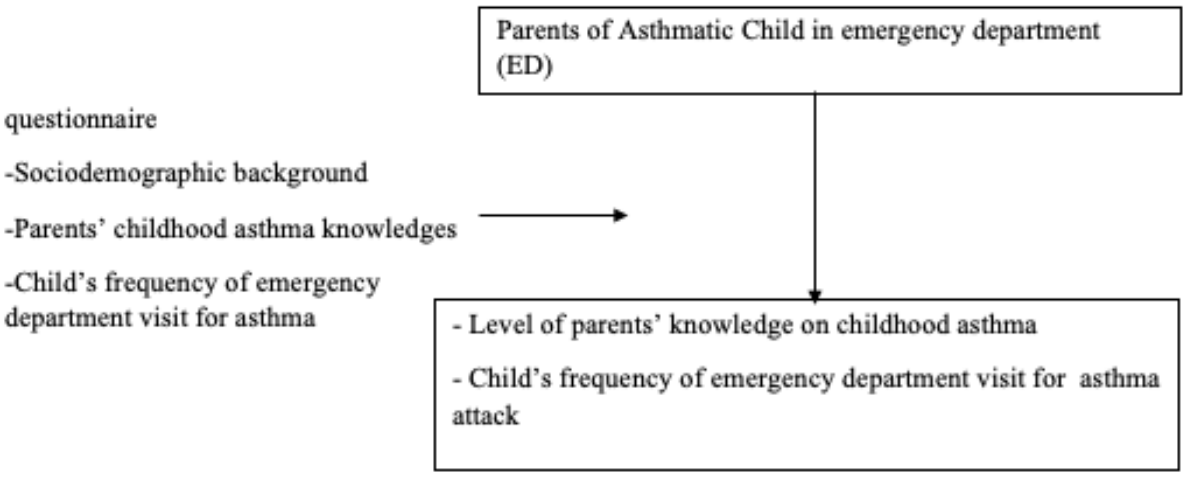

Figure 1: The Conceptual Framework

CHAPTER 2: STUDY PROTOCOL

2.0 RESEARCH METHODOLOGY

This research's main objective is to explore parents' knowledge of childhood asthma and the frequency of emergency department visits. Several methods and mechanisms were adopted in drawing up this study in conjunction with obtaining a significant result. This chapter describes the methods used in meeting the objectives of this study. As known, research methodology refers to an explanation about research design, methods to collect data, sampling design, and statistical technique for analysis of data. These methodology elements must be appropriately selected to reflect a reliable result to fulfill the research objectives.

2.1 RESEARCH DESIGN

Research design can be defined as a plan for collecting and utilizing data so that desired information can be obtained with enough precision or so that a hypothesis can be adequately tested.

This study will be a cross-sectional study. It will involve data of a target population to be gathered at a defined time. Other than that, the researcher will be using descriptive and quantitative (inferential) methods. Both mentioned methods effectively gain useful and relevant information, which later will be used in getting a reliable result.

2.1.1 Descriptive Statistics

This study will use a descriptive method. A descriptive method refers to the technique used to observe and obtain data through questionnaires that describe the population's characteristics that already exist and determine the reasons that contribute to those characteristics.

Descriptive analysis will be used to evaluate the frequency and percentage of the level of childhood asthma knowledge among parents

2.1.2 Quantitative (Inferential) Analysis

This study will also use the quantitative approach as a research design. The quantitative method is a measurement, which generates numerical for a statistical review. Therefore, after constructing the set of questionnaires, it will be disseminated to all selected respondents. The results of this process could then be used to examine the association between independent and dependent variables.

In this study, the quantitative (inferential) analysis will be used to identify the association between knowledge of childhood asthma among parents and sociodemographic factors as well as the frequency of emergency department (ED) visits.

2.2 SAMPLING DESIGN

Sampling design is the specific planning that consists of the study area, study population, sampling frame, sampling technique, and sampling size.

According to (Lohr, 2009), the reason for sampling design is to understand the population's characteristics.

2.2.1 Study area:

Emergency Department Hospital Universiti Sains Malaysia

2.2.2 Study population

The reference/target population for this study is the parents of asthmatic child in Kelantan

This study's source population is the parents of asthmatic children who seek treatment in the Emergency Department HUSM for acute asthma exacerbation.

The study participant for this study is the parents of asthmatic children who fulfill the inclusion and exclusion criteria during the study period.

2.2.3 Study duration

The study is going to be performed from December 2018 to May 2019 (6 months).

2.2.4 Subject criteria

2.2.4.1 Inclusion criteria:

i. Parents with an asthmatic child aged 2 to 12 years old.

ii. Parents of a child with an established asthma diagnosis.

2.2.4.2 Exclusion criteria:

i. Parents of a child with underlying cardio or bronchopulmonary disease.

ii. Parents of newly diagnosed asthma within six months.

2.2.5 Sampling Technique

This study will use the convenience sampling technique.

2.2.6 Sample size calculation

Sample size calculation is only done for second and third objectives:

1.Sample size calculation for objective 2

The sample size was calculated by applying two proportions approach using the Sample Size Calculator (Ariffin, 2017)

The parameter used to calculate the sample size are:

P_o: Proportion of exposure among those with poor knowledge

P_1: The expected proportion of exposure among those with good knowledge

Significance level (α) = 0.05

Power of test ($1 - \beta$) = 0.80

Table 1: Sample size calculation

Variable	**P_0 (%)**	**P_1 (%)**	**Calculated sample size per group (n)**	**Calculated sample size per group with 20% drop-out rate (n_c)**	**Required sample size (n_c x 2)**
Gender					
Male					
Female	28.1 (Kuti and Omole, 2016)	50.0	77	96	192
Age of children (years)					
< 5					
≥ 5	43.8 (Kuti and Omole, 2016)	70.0	55	69	138
Time since diagnosis (years)	37.5 (Kuti and Omole, 2016)	60.0	76	96	192
< 2		30.0	85	106	212
2 – 5	12.5 (Kuti and Omole, 2016)				
> 5					

Parent's level of education					
Primary					
Secondary	31.3 (Kuti and Omole, 2016)	55.0	67	85	170
Post-secondary	31.3 (Kuti and Omole, 2016)	55.0	67	85	170
Socioeconomic class					
Middle					
Upper	43.8 (Kuti and Omole, 2016)	65.0	85	107	214
Family history of asthma					
Atopy					
Asthma	18.7 (Kuti and Omole, 2016)	50.0	35	44	88
Previous admission of asthma					
No					
Yes	21.9 (Kuti and Omole, 2016)	50.0	45	56	112

The sample size required to determine factors associated with the level of parents' knowledge is 214 subjects.

2.Sample size calculation for objective 3

The sample size was calculated by applying two proportions approach using

Sample Size Calculator (Ariffin, 2017)

The parameter used to calculate the sample size are:

P_o: Proportion of good knowledge among those with ≥ 3 visits within 6 months = 46.7% (Rodriguez-Martinez CE et. al, 2008)

P_1: Expected proportion of good knowledge among those < 3 visits within 6 months = 70.0%

Significance level (α) = 0.05

Power of test ($1 - \beta$) = 0.80

Calculated sample size per group (n) = 69 subjects

Calculated sample size per group with 20% drop-out rate (n_c) = 87 subjects

Required sample size (n_c x 2) = 174 subjects

The required sample size to determine the association between knowledge and frequency of visits within 6 months is 174 subjects.

From the calculated sample size, the highest calculated sample size is 214 subjects. Thus, 214 subjects are required to fulfill the objectives of the study.

2.3 DATA COLLECTION METHOD

Data collection is the process of gathering and measuring information on variables of interest in establishing a systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes. The researcher will approach participants individually, and explanations will be given regarding the study. The researcher will approach the participant during their convenient free time. A validated questionnaire (Appendix I) will be handed to them if they consent to participate in the study. It will be self-administered by the parent-patient pair assisted where necessary by trained study assistants. They are expected to complete the questionnaire and handover the questionnaire to the trained study assistants. They are expected to complete the questionnaire individually in the researcher's presence and hand over the answered questionnaire to the researcher.

After the questionnaires from all participants are submitted to the researcher, a detailed correct option will be delivered to the participant. Documents will be kept in a safe place and will be destroyed after 5 years post-study, according to standard record-keeping procedure.

2.3.1 Primary Data

In this study, the researcher will use primary data. Primary data is data collected firsthand for subsequent analysis to find solutions to the purpose of the study. Primary data sources are gathered from the questionnaire and are designed to get information about the level of knowledge of childhood asthma among parents.

2.3.2 Questionnaire Design

The questionnaire was designed in 2015 from a study in Wesley Guild Hospital (WGH), Ilesa, Nigeria. Parental level of knowledge about childhood asthma was assessed using a 25-item Asthma Knowledge Questionnaire (AKQ) with adequate internal consistency (cronbach's alpha of 0.69). knowledge levels were categorized into good and poor knowledge. Good knowledge is denoted by a score of more than 12, while poor knowledge is less than 13. An email was sent to the author of the study requesting permission to use the questionnaire, which he granted permission.

The structured questionnaire was divided into two sections;

i. Sociodemographic information of the respondents; age, sex, ethnic group, education level, history of asthma, and income level

ii. Asthma knowledge (4 domains with a total of 25 questions): symptoms, pathogenesis, childhood asthma trigger, disease's course, diagnosis, and treatment

The questionnaire will be translated into Bahasa Malaysia, and a back translation into English will be performed to compare content and structure. Face validation will be done to validate the questionnaire. The questionnaire will also undergo test-retest to measure its reliability.

2.4 DEFINITION OF OPERATIONAL TERM

2.4.1 Established asthma diagnosis

According to GINA (Global Initiative For Asthma) guideline 2018, an establishment of asthma diagnosis in children is based on identifying both a characteristic pattern of respiratory symptoms such as wheezing, shortness of breath (dyspnea), chest tightness or cough, and variable expiratory airflow limitation. A positive family history of allergic disorders or the presence of atopy or allergic sensitization provides predictive support.

2.4.2 Frequency of visit

Respondents are divided into two groups with different visit frequency. those parents with a child who had three or more ED visits in the previous 6months and those with less than three ED visits (CE. Rodriguez et al, 2008)

2.5 PROCEDURE OF DATA ANALYSIS

Data entry and all statistical analysis will be done by using IBM SPSS Version 22. To fulfill the objectives of this study, kappa statistics, descriptive analysis, and Fisher's exact test will be applied.

2.5.1 Test-retest (kappa statistic)

The stability of Malay version AKQ was tested by performing a test and retest at two-time points. Thirty respondents were involved for this purpose. Kappa

statistic was evaluated to measure the degree of agreement. According to (McHugh, 2012), Cohen's Kappa can be interpreted as:

- ≤ 0 (no agreement)
- 0.01 – 0.20 (none to slight)
- 0.21 – 0.40 (fair)
- 0.41 – 0.60 (moderate)
- 0.61 – 0.80 (substantial)
- 0.81 – 1.00 (almost perfect)

2.5.2 Data exploration and cleaning (Descriptive analysis)

Data exploration and cleaning process was done before further analysis to minimize flaws in data analysis. The data was screened for any missing value, duplicated or wrong entry. Correction was done for any wrong or duplicated entries. During the analysis, listwise deletion, the default method in SPSS, was applied for any missing values.

Descriptive analysis was done to determine the frequency and response percentage of each item. Minimum, maximum, and mean (SD) of the score were reported. The frequency and corresponding percentage for each sociodemographic information of the respondent also was reported.

2.5.3 Objective 1 (Descriptive analysis)

Descriptive analysis also was done to evaluate frequency and percentage of the level of children asthma knowledge among parents. A bar chart was created to compare the frequency and percentage of poor and good knowledge.

2.5.4 Objective 2 and 3 (Fisher's exact test)

The assumptions (Kim, 2017) of the test that should be met as follow:

- Independent samples
- Two variables are categorical
- If expected count of less than five is less than 20%, Pearson's chi-squared test applied; If expected count of less than five is 20% and above, Fisher's exact test applied

To fulfill the second objective, univariable association between sociodemographic factor and knowledge of children asthma among parents was done by performing Fisher's exact test.

Test hypothesis for second objective:

H_o: There is no significant association between sociodemographic factor and knowledge of childhood asthma among parents

H_1: There is a significant association between sociodemographic factor and knowledge of childhood asthma among parents

A contingency table between knowledge level category (poor and good) and each sociodemographic factor was done, and expected count was evaluated. For all seven factors, the expected count of less than five was more than 20%. This situation violated the assumption of applying Pearson's chi-squared test. Thus, Fisher's exact test was applied. Frequency and corresponding percentage within poor and good knowledge group, together with the p-value, were reported. A significant p-value of less than 0.05 ($p \leq 0.05$) indicates a statistically significant association between the two variables.

Test hypothesis for third objective:

H_o: There is no significant association between knowledge of childhood asthma among parents and frequency of emergency department visits within six months

H_1: There is a significant association between knowledge of childhood asthma among parents and frequency of emergency department visits within six months

Contingency table between frequency of emergency clinic visits within six months (less than 3 times and 3 times above) and knowledge level was done to achieve third objective. The association between these two variables was tested by performing Fisher's exact test since the expected count of less than five was more than 20%. Frequency and corresponding percentage within frequency of visits group, together with the p-value, were reported.

A significant p-value of less than 0.05 ($p \leq 0.05$) indicates a statistically significant association between the two variables.

2.5.5 Additional information

Any contingency table with zero cell should be paid attention to before running logistic regression. Otherwise, some numerical problems may arise, such as the value of the point estimate for odds ratio become zero or infinity (Hosmer et al, 2000). A few strategies suggested, such as combining the categories of independent variables in a meaningful way, deleting the category entirely, or treating the variables as continuous when modeling them if the variables are ordinal scale.

In this study, some contingency tables between variables contain zero cell. When applying for logistic regression model, values of odds ratios were too high and almost illogical. SPSS output also yields no value for 95% confidence interval for some odds ratios. This situation shows that numerical problems had occurred. Strategies in combining the categories in a meaningful way were unable to be done since the categories are not suitable. Furthermore, the idea of discarding the categories is also not appropriate since it may cut any critical information from respondents. Thus, multivariable analysis by multiple logistic regression was not done for second objective.