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PREVALENCE AND ASSOCIATED FACTORS OF ALLERGIC DISEASE AMONG CHILDREN ATTENDING PAEDIATRIC CLINIC AT HOSPITAL SERDANG IN 2013

BY
MAHMUD BIN KHAIRUDIN
CHUA HUI PENG

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MAHMUD KHAIRUDIN[1], CHUA H.P.[1], INTAN HAKIMAH ISMAIL[2], EUSNI RAHAYU MOHD TOHIT[3]

[1]Second year medical student

[2]Department of Paediatrics, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia

[3]Department of Pathology, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia

ABSTRACT

Background: The prevalence of allergic diseases is increasing in developing countries. However, the risk and protective factors for these conditions remains poorly understood.

Objective: To determine the prevalence and the associated factors of allergic diseases among children.

Methods: We conducted a cross-sectional study at Paediatric Clinic, Hospital Serdang. Four hundred and fifteen parents were interviewed using the International Study of Asthma and Allergies in childhood (ISAAC) written questionnaire which comprises of socio-demographic data, medication and vaccination intake, family history of allergic disease, feeding habit and environmental exposure of their children.

Results: Forty per cent of the children had doctor-diagnosed allergic diseases and 92% of them were Malays. Asthma was the commonest allergic disease seen in the clinic. Children with allergic diseases were found to have positive associations with paracetamol ($p<0.001$) or

antibiotic ($p<0.001$) intake during their first year of life, higher number of siblings with allergic disease ($p<0.001$), allergic mothers ($p<0.001$), and indoor cigarette smoke exposure during child's first year of live ($p=0.034$) or at present ($p=0.022$). Conversely, exclusive breastfeeding ($p=0.02$) and early introduction to complementary food ($p<0.001$) were found to be inversely associated with allergic disease.

Conclusion: We found that early intake of antibiotic orparacetamol, family history of having siblings or mother with allergic diseases and exposure to cigarette smokewere risk factors for the development of allergic diseases among children, whereas, exclusive breastfeeding and early introduction to complementary food wereprotective against allergic diseases.

KEY WORDS: *Prevalence, allergic diseases, associated factors, children*

PREVALENS DAN FAKTOR-FAKTOR BERKAITAN PENYAKIT ALERGI DALAM KALANGAN KANAK-KANAK DI KLINIK PEDIATRIK DI HOSPITAL SERDANG PADA TAHUN 2013

MAHMUD KHAIRUDIN[1], CHUA H.P.[1], INTAN HAKIMAH ISMAIL[2], EUSNI RAHAYU MOHD TOHIT[3]

[1]Pelajar perubatan tahun dua, Universiti Putra Malaysia

[2]Jabatan Pediatrik, Fakulti Perubatan dan Sains Kesihatan, Universiti Putra Malaysia

[3]Jabatan Patologi, Fakulti Perubatan dan Sains Kesihatan, Universiti Putra Malaysia

ABSTRAK

Latar belakang: Prevalens penyakit alergi semakin meningkat di negara-negara yang membangun. Walau bagaimanapun, faktor risikonya adalah masih kurang difahami.

Objektif: Untuk menentukan prevalens dan faktor-faktor yang berkaitan penyakit-penyakit alergi di kalangan kanak-kanak.

Kaedah: Kami telah menjalankan kajian silang rentas di Klinik Pediatrik, Hospital Serdang. Seramai 415 ibu bapa telah ditemuramah dengan menggunakan kertas soal selidik *International Study of Asthma and Allergies in childhood*(ISSAC) yang merangkumidata sosiodemografi, pengambilan ubatan dan vaksinasi, sejarah keluarga penyakit alergi, tabiat pemakanan dan pendedahan persekitran terhadap anak-anak mereka.

Keputusan: Seramai 40% daripada kanak-kanak telah didiagnos oleh doktor menghidapi penyakit alergi dan 92% daripada mereka adalah orang Melayu. Asma adalah penyakit alergi yang paling kerap dilihat di klinik. Kanak-kanak yang menghidap penyakit alergi didapati mempunyai asosiasi positif dengan pengambilan paracetamol ($p<0.001$) atau antibiotik ($p<0.001$) ketika mereka berusia setahun, jumlah adik-beradik yang mempunyai penyakit

alergi yang lebih ramai ($p<0.001$), ibu-ibu yang juga menghidap penyakit alergi ($p<0.001$),dan pendedahan kepada asap rokok di dalam rumah ketika mereka berusia setahun ($p=0.034$) atau pada masa sekarang ($p=0.022$). Sebaliknya, penyusuan badan sepenuhnya ($p=0.02$) dan pengambilan awal makanan tambahan ($p<0.001$) didapati mempunyai asosiasi songsang dengan penyakit alergi.

Kesimpulan: Kami mendapati bahawa pengambilan awal antibiotik atau paracetamol, sejarah keluarga adik-beradik atau ibu menghidap penyakit alergi, dan pendedahan kepada asap rokok merupakan faktor risiko untuk penyakit alergi. Manakala, penyusuan badan sepenuhnya dan pengambilan awal makanan tambahan merupakan faktor perlindungan terhadap penyakit alergi.

Kata Kunci: *Prevalens, penyakit alergi, faktor berkaitan, kanak-kanak.*

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CHAPTER 1

INTRODUCTION

1.1 Background

An allergy is a hypersensitivity disorder of the immune system (Dorland's Med Dic, Ed 28). Allergic reactions occur when a person's immune system reacts to normally harmless substances in the environment. A substance that causes a reaction is called an allergen. These reactions are acquired, predictable, and rapid. Atopic sensitization is defined by production of immunoglobulin E (IgE) against environmental antigens such as house dust mites, grass pollen, and animal proteins and can lead to diseases that include asthma, rhinitis, and atopic dermatitis (Robinson et al., 2004). Being atopic is strongly associated with allergic disease such as asthma, allergic rhinitis, food allergy and eczema/atopic dermatitis, but not everyone with atopy develops clinical manifestations of allergy. Triggering an immune response through allergen specific IgE on the surface of mast cells and basophils can lead to immediate symptoms through release of histamine and also other mediators which is known as developing allergic diseases. Such symptoms include rash (eczematous rash or urticaria), periorbital swelling, wheezing, coughing, dyspnoea, difficulty in breathing, sneezing, itching, and redness of the eyes, abdominal pain and bloating, vomiting and diarrhoea, and also severe allergic manifestation that can lead to death, known as anaphylaxis.

The rising rate of allergic disease is accompanied by the healthier benefits of westernized lifestyle, such as low infant mortality rate (Robinson et al., 2004). One of the suggested mechanisms to explain this rise is the hygiene hypothesis. The hygiene hypothesis states that allergic disease is the consequences of reducing infectious stressors during early childhood (Wills-Karp et al., 2001). Over the past 3-4 decades, the morbidity and prevalence

of asthma have increased tremendously in different parts of the world especially in affluent countries, alongside with other allergic diseases, such as food allergy, and atopic dermatitis, which are also common during childhood (Downs et al., 2001). However, this trend seems to have stabilized in recent years (Sánchez-Lerma et al., 2009).Asthma has a worldwide distribution, and its expression varies between countries and even between different areas of the same country (Sánchez-Lerma et al., 2009).In the nineties, the International Study of Asthma and Allergies in Childhood (ISAAC) was designed to compare the prevalence of asthma and allergic diseases in different parts of the world (Sánchez-Lerma et al., 2009). Among children up to 4 years of age, the incidence of asthma has increased 160%, and the incidence of atopic dermatitis has increased twofold to threefold (Eichenfield et al., 2003). The incidence of peanut allergy has also doubled in the past decade (Sicherer et al., 2003).In the United Kingdom, the prevalence of doctor-diagnosed asthma and symptoms strongly suggestive of asthma in children has increased at a rate of about 5% a year (Jarvis et al., 1998). Increasing rate of atopic/allergic diseases is now a problem for clinicians who provide health care to these children.

Apart from genetic factor, the development of allergic disease among children have been shown to be associated by a number of environmental risk factors such as duration of breastfeeding, timing of introduction to solid food, vitamin D status and uptake, pets' exposure, exposure to cigarette smoke, medication and vaccination, and attending day care or kindergarten. Exclusive breastfeeding seems to have a preventive effect on the early development of allergic disease such as atopic dermatitis and asthma. This protective effect is also evidence for other allergic diseases (Greer et al., 2008). Recently, variations in vitamin D status and intake has been implicated in allergy development and considered as one of the suggested explanations for epidemiological and immunological associations (Hollams et al.,

2011). Exposure to cigarette smokes especially maternal smoking during pregnancy has been shown to be associated with increased risk of allergic diseases (Strachan & Cook, 1998). Furthermore, recent studies suggest that a positive association exists between obesity and allergic disease. There is increasing epidemiological evidence that obesity increases the risk of asthma, atopic, and autoimmune diseases (Kusunoki et al., 2008). On the other hand, the association between pet ownership in childhood and subsequent asthma and sensitization is controversial (Litonjua et al., 2002). While early childhood infections are assumed to hold a protective effect on the development of asthma and allergies, the use of antibiotics during the age where immune system is still developing may lead to an increased risk of asthma and allergy (Droste et al., 2000).An unexplained increased in the prevalence of allergic disease has occurred in the developed world in the past few decades. During the same period, there has been an increased in mass immunization, leading to the hypothesis that certain vaccines may increase the risk of allergic disease (McKeever et al., 2004). Daycare attendance in early life may lead to less sensitization later in life. However, whether day-care attendance and subsequent exposure to more frequent early infections is a risk or a protective factor against future allergic disease or asthma is still questionable (Hagerhed-Engman et al., 2006).

1.2 Problem statement

There is a concern that the prevalence allergic diseases especially asthma is increasing in developing countries. Despite a large volume of clinical and epidemiological researches within populations that has been directed at explaining why some individuals and not others developed asthma and other allergic diseases, the risk factors of these conditions remains poorly understood. Therefore, little is known about worldwide variations in the prevalence of allergic diseases.

Quah and colleagues has undertaken a study to investigate the prevalence of asthma, eczema, and allergic rhinitis in Kota Bharu, Kelantan, with a primary focus to determine the differences in symptom prevalence rates of asthma and atopic diseases among school children between 1995 and 2001 (Quah et al., 2005). However, the results revealed that there were no major changes in the prevalence rates of these diseases over a period of 6 years (Quah et al., 2005).

As the prevalence of allergic disease has increased in the developing countries, especially in the South East Asia region, it is important to know if this is also a problem in Malaysia. Therefore, the aim of this study is to investigate the prevalence of allergic diseases, and to establish if this prevalence is influenced by factors associated with these diseases.

1.3 Objectives

General objective:

To determine the prevalence and the associated factors of allergic diseases among children.

Specific objectives:

1. To determine the prevalence of allergic diseases among children.
2. To describe the distribution of the socio-demographic factors (age, gender, ethnicity, and parent's educational level), medication (paracetamol and antibiotic) intake and vaccination, family history (mother and siblings) of allergic disease, feeding habit (breastfeeding, exclusive breastfeeding and age of introduction to complementary food), environmental (pets exposure, daycare attendance, and cigarette smoke exposure) conditions among children attending the Paediatric Clinic at Hospital Serdang.

3. To determine the association between socio-demographic factors and allergic disease among children.
4. To determine the association between medication and vaccination used and allergic disease among children.
5. To determine the association between family history and allergic disease among children.
6. To determine the association between feeding habits and allergic disease among children.
7. To determine the association between environmental conditions and allergic disease among children.

1.4 Research hypotheses

- There is an association between socio-demographic factors and allergic disease among children.
- There is an association between medication and vaccination intake and allergic disease among children.
- There is an association between family history and allergic disease among children.
- There is an association between feeding habits and allergic disease among children.
- There is an association between environmental conditions and allergic disease among children.

1.5 Conceptual Framework

Figure 1.Conceptual framework of factors associated with allergic disease among children.

CHAPTER 2

LITERATURE REVIEW

The incidence of allergy is increasing at an alarming rate throughout the world. With this dramatic increase of allergic cases worldwide, numerous studies have been conducted to determine the risk and protective factor of allergic diseases, thus finding the ways to prevent or delay the onset of the allergic diseases. Associated factors that have been shown to affect the development of allergic diseases among children are socio-demographic factor, family history, breastfeeding, parental smoking, obesity, pets' exposure, medication exposure and attending daycare.

2.1 Socio-demographic

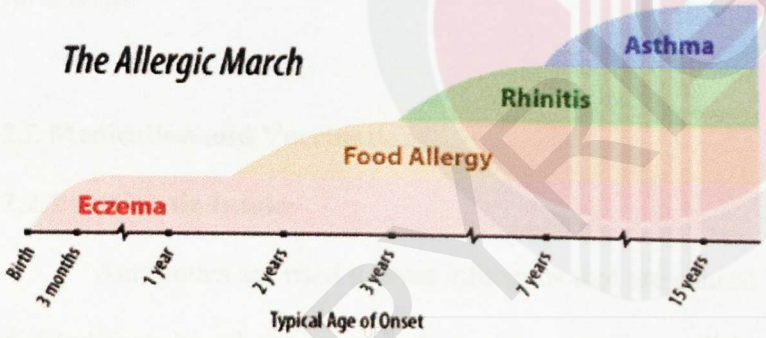

Fig. 2: The allergic march of allergic diseases

Socio-demographic includes age, gender, ethnicity and parents' education level. Different allergic diseases manifest in different age group of children. The term 'allergic march' refers to the natural history of atopic manifestations, which is characterized by a typical sequence of IgE antibody responses and clinical symptoms that appear early in life, persist over years or decades, and often remit spontaneously with age (Wahn et al., 2007). It is showed that the eczema started after birth, preceding other allergic diseases. Food allergy

can be observed from the age of one year old, allergic rhinitis from three years old, whereas asthma can be seen during school going age. It is interesting to note that many children exhibit different allergic symptoms simultaneously.

In regards to gender, males seem to be more often affected by allergic diseases than females, evidence by a study that demonstrated that among children with food allergies, 64.35% were males and 35.65% were females (Kelly & Gangur, 2009). Similarly, asthma is more common and severe in pre-pubertal boys, with boys less than 18 years of age having a higher rate (54%) of asthma than girls of the same age (Kynyk et al., 2011). Malaysia is a multi-cultural country which mainly consists of three ethnicity; Malay, Chinese and Indian. The study done by Norzila et al. (2000) stated that asthma and the related symptoms were common among Malay school children in the inner city of Kuala Lumpur as compared to the rural areas.

2.2 Medication and Vaccination

2.2.1 Antibiotic Intake

Antibiotics are used to treat infections that are caused by microorganism and it can be divided into broad-spectrum and narrow-spectrum antibiotics. In children, the antibiotic prescription has increased to 4.5% between 2007 and 2009, and the most common type of antibiotic prescribed to children in 2009 was Amoxicillin (Kofke-Egger et al., 2011). Many studies had looked at the association between antibiotic usage and development of allergic disease, and several of these studies found an association between early exposure to antibiotic and increased risk of allergies. In contrast, several other studies showed that the use of antibiotic in early childhood had no association with increased risk of developing symptoms of asthma, allergic rhinitis and eczema in children (Karimi et al., 2009; Harris et al., 2007).

Study done in ISAAC phase lll clearly showed that antibiotic use in the first year of life will increase the risk of developing symptoms of asthma, rhinoconjunctivitis, and eczema in children 6 and 7 years old (Foliaki et al., 2009). By age of 7, children that were given at least one antibiotic in the first six months were 1.5 times more likely to develop allergic disease than those who did not receive antibiotics (Henry Ford Health System, 2003). Another study in 2010 had shown that early exposure to paracetamol and/or to antibiotics is associated with an increased prevalence of asthma, eczema and rhinoconjuctivitis (Garcia-Marcos et al., 2010). Moreover, a recent study also showed that early antibiotic use by 6 months had increased the risk of developing asthma and allergy at 6 years of age (Risnes et al., 2011).

Antibiotics impair intestinal bacterial colonization during infancy, altering the normal gut flora and perturbing the developing immune system (Johnson et al., 2005). This possible mechanism may be the reason for the increased risk of allergic diseases in children with early exposure to antibiotic.

2.2.2 Vaccination

Vaccination is an active immunization to a disease by using vaccines. Below is the immunization schedule in Malaysia for infant aged 0 to adolescent aged 15 years old, issued by the Ministry of Health of Malaysia.

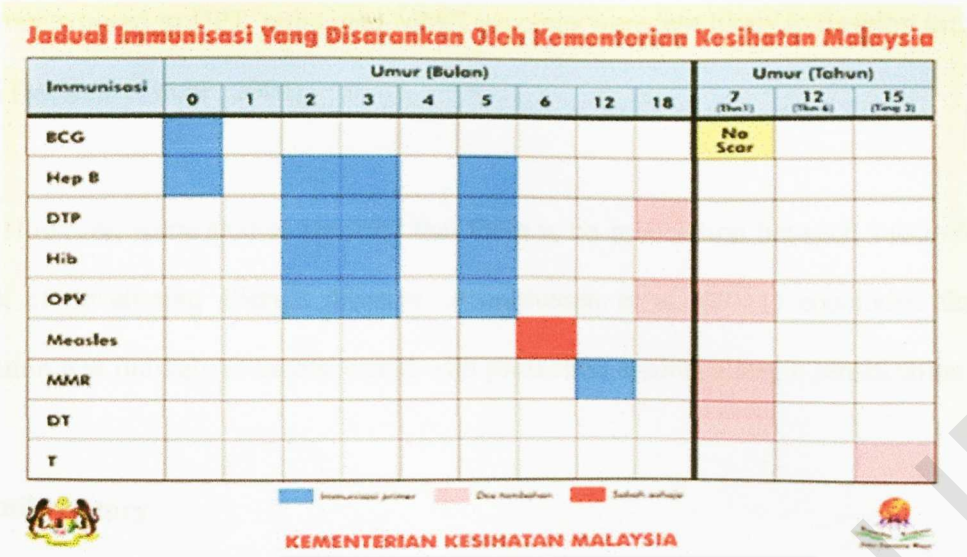

Fig 3. Immunization programme schedule in Malaysia

Linehan et al (2007) found a statistically significant association between neonatal BCG vaccination and prevalence of wheeze in children; with the introduction of neonatal BCG vaccination, there was a possible 27% reduction on the prevalence of asthma but that study had low response rate (47.5%). In Brazil, a study using BCG vaccination scar as evidence of neonatal BCG vaccination showed a significant reduction in the prevalence of exercise-induced wheeze in 12 to 16 years old children (Cunha et al., 2004).

Some studies however, concluded that delayed or refusal of vaccination is associated with a reduce risk of children getting allergic diseases. For example, one study stated that the risk of asthma was reduced by 50% in children whose first dose of DPT vaccine delayed for more than two months and this association was even greater if all first three doses were delayed (60%) (McDonald et al., 2008). A study in 2005 showed that parents who refused vaccination reported less asthma and allergy in the low-risk children but the mechanism for this is not known (Enriquez et al., 2005). In addition, a British birth cohort study found that

children unexposed to DPT, polio, and MMR vaccines were less likely to develop asthma and eczema (McKeever et al., 2004).

However, some studies reported that there is no association between vaccination and the risk of developing allergic diseases. Arnoldussen et al. (2011) concluded that BCG vaccination was unlikely to be associated with protection against allergic sensitization.

2.3 Family history

Family history is an important risk factor for allergic diseases to occur in a family. The genes associated will make the children more susceptible to allergy. The table below shows that the percentage of atopic children increases when the atopic family members' number increases (Shan et al., 2007).

Atopic Family members' number	Percentage of Atopic Children (%)
None	5-10
One sibling	25-35
One parent	20-40
Parent and sibling	40-45
Both parents	40-75

In a Munich Asthma and Allergy Study, it was shown that the risk a child developing atopic dermatitis is higher (OR=3.4) if one or both parents have atopic dermatitis as as compared to one or both parents with asthma (OR=1.5) or allergic rhinitis (OR=1.4). (Gray et al., 2006). Although majority of previous studies found that maternal history of allergic disease have a stronger relationship on the development of allergy among children, one study

found a significant relationship between paternal persistent allergy and atopy in the children (Alford et al., 2004).

Several twins studies on allergic diseases demonstrated a significant relationship between genetic and allergic disease development. In contrast, a recent study in Brazil stated that most asthma cases in childhood were not attributable to atopy with only 24.5% of asthma cases attributable to atopy (Cunha et al., 2010).

The possible mechanism of family history leading to children susceptible to allergic diseases is that the genes associated with atopy will affect the epithelial barrier function, detects the presence of allergens, and mediates Th2 responses, thus the allergic inflammation occurs (March, 2011). Phenotype impact of each gene on allergic diseases is usually mild, whereas larger effect can be observed if multiple genes were synergic together with environment factor (Vercelli,, 2008).

2.4 Feeding habit

2.4.1 Breastfeeding

According to the WHO, exclusive breastfeeding for six months is the best for babies as it shows many advantages for both the mother and baby (Kramer et al., 2009). In Malaysia, the prevalence of ever breastfed among children aged less than 12 months and prevalence of exclusive breastfeeding below 6 months was 94.7% and 14.5% respectively (Fatimah et al., 2010).

Many studies had been conducted to prove that prolonged breastfeeding is able reduce the risk of getting allergy in the children. In year 2010, a birth cohort study of 3825 children

showed that children that were exclusively breastfed for 4 months or more had a reduced risk of asthma during the first 8 years of life (Kull et al., 2010). In the same year, another study concluded that prolonged breastfeeding in high-risk African American subjects during infancy reduced the risk of allergic rhinitis at 3 years old (Codispoti et al., 2010). Exclusive breastfeeding for the first four months of infant life is a protective factor against allergies but breastfeeding less than three months has no significant relationship with allergic disease risk in children (Berner et al., 2004).

There are two main reasons for the protective effect of breastfeeding against allergic disease. First, the colostrum that is filled with antibodies will strengthen the infant's weak immune system and help protect the infant against allergens. The second explanation is that breastfeeding limits the dietary allergens into the infant's gut. In the exclusive breastfeeding period, the infant is only exposed to the allergens that entered the mother's milk.

In contrast, there are also some studies that showed no significant association between breastfeeding and allergic diseases. In 2007, a study in Canada found that there was no significant reduction of allergic risk in breastfed children and there was not enough evidence for exclusive breastfeeding is able to reduce the risk of childhood allergic diseases (Kramer et al., 2007). Early signs of atopic disease may contribute to the prolonged the duration of exclusive breastfeeding, leading to causal effect rather than risk effect Thus it is hard to determine whether breastfeeding is a protective factor or risk factor of allergic diseases in children. Further study need to investigate the relationship between breastfeeding and allergic diseases.

2.5 Environmental condition

2.5.1 Animal Exposure

An estimated 10% of the population may be allergic to animal dander or epithelium, and the most common pets are dogs and cats (www.acaai.org). Most of the studies stated that early exposure to pets during childhood is protective rather than risk against allergic disease factor. However, the effect of pet keeping in childhood is varied according to the type of pet, the allergic sensitization of the individual, and the environmental exposure to allergens (Svanes et al., 2003).

In year 2003, a case-control study done in Kuwait found that the risk of cat sensitization increased significantly among the cat owners and in the children that had contacted with cats when they were one year old. Similarly, for dog ownership, the risk of sensitization was significantly increased. Children who owned both cat and dog were less likely to develop atopic diseases at age 13 years, while living with only one pet was not protected against allergic disease (Mahdi Sayed Hassan Al-Mousawi et al., 2004). There was a synergistic association between both cat and dog exposures and lower risk of developing atopy in childhood (Mandhane et al., 2009). Wegienka et al (2010) showed that lower total IgE levels was measured in those children living with pets in the first year but it was not strongly associated with decreased likelihood of sensitization to common allergens at 18 years old. In the case of rhinitis, a study by Matheson et al. (2011) clearly showed that exposure to both cats and dogs before 5 years and growing up on a farm were associated with lower incidence of rhinitis 10 years later in adolescence. This showed an inverse association between exposure to pets and rhinitis. A large international population-based study conducted in 2003 showed that living with cat during childhood was associated with asthma only among atopic subjects, whereas keeping a dog during childhood was only associated with asthma

among non-atopic subjects. This clearly showed that the effect of pet-keeping in childhood is varied according to the type of pet exposed (Svanes et al., 2003).

In contrast, there are also some studies that concluded exposure to pets increased the risk of allergic diseases. For example, Brunekreef et al. (2012) concluded that early-life exposure to pets is a risk factor for symptoms of asthma, rhinoconjunctivitis, and eczema children especially in less-affluent countries.

The mechanism of the protective factor for early-life exposure to pet may be associated with early pet allergens exposure, and thus induce the tolerance of body to those allergens, resulting in decreased risk in atopic diseases (Matheson et al., 2011). Living with animals also results in endotoxin and bacterial exposures which may serve as an immunomodulatory factor (Campo et al., 2006). Clear mechanism is still unable to be explained as there were limited studies on it.

2.5.2 Day care or Kindergarten

Many children are now attending day care or kindergarten as the parents are busy working. Whether early exposure to daycare decrease or increase the risk of developing allergic diseases is still unknown Based on the studies that had been conducted, the results were conflicting.

Daycare and kindergarten are important sources of exposure to cat and dog, dust mite, cockroach, rodent, and fungal allergens as well as endotoxin (Salo et al., 2009). Daycare exposure is a protective factor against allergies diseases as a study showed strong associations between daycare attendance and reduced risk of current wheezing in 5 years old

children (Nicolaou et al, 2008). A study by Ball et al (2000) showed an inverse association between daycare and recurrent wheeze and asthma in children who entered the daycare before the age of 6 months. Attending day-care in early life was associated with a decreased risk of recurrent wheezing and asthma at the age of 6 years, but only among children without maternal history of asthma (Celedon.et al., 2003). Decreased total IgE levels in the first 3 years of life was demonstrated in children who attended daycare by 3 months and it might reflect a reduced risk of allergic disease in predisposed children (Rothers et al., 2007).

However, daycare attendance is also associated with increased risk of asthma. A study in Swedish demonstrated that day-care attendance was associated with an increased risk for asthma and wheeze in children of 6 years old (Hagerhed-Engman et al., 2006). A study in Norway also found no association between daycare and asthma in children at age 10 years (Nafstad.P et al., 2005).

2.5.3 Cigarette smoke exposure

World Health Organization (WHO, 2011) stated that over 40% of children have at least one smoking parent. Tobacco contains nicotine, tar and carbon monoxide that can cause lung cancer, chronic obstructive pulmonary disease (COPD) and heart disease (www.patient.co.uk).

Cigarette smoking had been proven to increase the risk of allergic diseases. A community-based study in Chicago showed that tobacco smoke exposure was high in the sample of asthmatic children (Kumaret al., 2008). Polosa et al. (2008) showed the importance of cigarette smoking as an additional risk factor for the incidence of asthma (OR 2.67) in adults with allergic rhinitis. The risk for children exposed to environmental tobacco smoke to

develop atopic eczema is higher if they were exposed at a younger age (Suárez-Varela.M et al.,2008).

Maternal smoking during pregnancy and child's early childhood is a significant risk factor as it is associated with consistent increased risk of rhinitis throughout the children's life (Matheson et al., 2011). In a prospective population-based birth cohort study, they showed that maternal smoking during pregnancy was not associated with food sensitization but environmental tobacco smoke exposure in the first 2 months of life had significantly increased the risk on food sensitization at the age of four (Lannero et al.,2008). From the analysis of Phase III ISAAC programme, they concluded that both maternal and paternal smoking was associated with an increased risk of symptoms of asthma, eczema and rhinoconjunctivitis where the maternal had higher OR than paternal smoking. This study has confirmed the primary effect of maternal smoking, and the separate and additional effects of paternal smoking on allergic diseases (Mitchell et al., 2012).

Since it was known that smoking has immunosuppressant effect, these studies suggested that maternal smoking during pregnancy had disrupted the process of the priming of the immune system or epigenetic mechanisms in utero which increasing the tendency of the children to develop allergic disease (Prescott.S.L.2010).

2.6 Definition of allergic diseases

In this study, allergic diseases are defined as having one of the five allergic diseases which are asthma, eczema, allergic rhinitis, food allergy, and allergic conjunctivitis. In Litonjua et al. (1999) study, children with asthma was defined as having doctor's diagnosed asthma. In our study, besides knowing the symptoms of each allergic disease, children with

allergic disease was defined as either having doctor's diagnosed asthma, eczema, allergic rhinitis, food allergy, or allergic conjunctivitis as indicated in the questionnaire. Parents who have children with allergic disease should at least know the symptoms of the allergic diseases as stated in the given questionnaire. The symptoms in the questionnaire are taken from ISAAC phase 1 questionnaire. Asthma is a condition of widespread narrowing of the bronchial airways upon exposure to stimuli which lead to cough, wheezing and dyspnoea. In this study, we defined asthma as the child has **asthma, wheezing or whistling** in the chest and must be **diagnosed** by a doctor. According to Oxford medical dictionary, eczema is a common itchy skin disease characterized by erythema and vesicle formation, which may lead to weeping and crusting. For our study, we defined eczema as the child **having recurrent eczema or itchy rash for at least 6 months** and must be **diagnosed** by a doctor. Allergic rhinitis or hay fever is an inflammation of the nasal passages caused by allergic reaction to airborne substances. In this study, we defined allergic rhinitis cases as the child has problems with **sneezing or runny, or blocked nose when she/he did not have a cold** and must be **diagnosed** by a doctor. Allergic conjunctivitis is the inflammation of the conjunctiva, which becomes red and swollen and produces watery or pus containing discharge. We considered the child to have allergic rhinitis if the child has a problem with **itchy, watery eyes, when she/he did not have a cold** and it has been **diagnosed** by a doctor. Food allergy is an immediate or delayed immune reaction that occurs soon after eating certain foods. In our study, if the child has been **diagnosed** to have food allergy by a doctor, then he is considered as a food allergy case. Maternal allergic disease was defined as ever having doctor-diagnosed asthma, eczema, allergic rhinitis, food allergy, allergic conjunctivitis as indicated the questionnaire.

CHAPTER 3

METHODOLOGY

3.1 Study location

The research was conducted at the Paediatric Clinic in Hospital Serdang.

3.2 Type of study

A cross-sectional study design.

3.3 Study duration

The research was conducted from 26th March till 6th September 2013. The data collection was done from 1st July until 18th July 2013.

3.4 Sampling

3.4.1 Study population

Children attending the Paediatric Clinic at Hospital Serdang.

3.4.2 Inclusion criteria

Children attending the Paediatric Clinic at Hospital Serdang whose ages between one month to 12 years old.

3.4.3 Exclusion criteria

Children attending the Paediatric Clinic at Hospital Serdang who were not accompanied by their own parents.

3.4.4 Sampling method

The sample was chosen from the population using convenience sampling method. The total number of patients entering the Paediatric Clinic was 60 patients on average per day. All of them were having different type of diseases including allergic diseases. Parents of the children were randomly selected to participate in the study by answering the questionnaires. On average, we managed to get 50 patients per day to answer the questionnaires given.

3.4.5 Sampling size

Based on atopic dermatitis prevalence among Chinese and other races (excluding Malay and Indian) in Singapore school children (Tay et al, 2002), the sample size was calculated by:

n = required sample size

P1 = prevalence of Chinese in the project area (22%)

P2 = prevalence of other races in the project area (14%)

$$n = \frac{\left\{Z\left(1-\frac{\alpha}{2}\right)\sqrt{2\overline{P}(1-\overline{P})} + Z(1-\beta)\sqrt{P1(1-P1) + P2(1-P2)}\right\}^2}{(P1-P2)^2}$$

Where,

$$\overline{P} = (P1 + P2)/2$$

$$n = \frac{\left\{1.96\sqrt{2(0.18)(0.82)} + 0.842\sqrt{(0.22)(0.78) + (0.14)(0.86)}\right\}^2}{(0.08)^2}$$

n = 360 respondents

n = 360 respondents + 10% non-response rate

n = 396 respondents ≈ 400 respondents

3.5 Instrument and data collection

3.5.1 Instruments

The questionnaires were divided into three sections which were sections A, B, and C. All questionnaires were printed in dual languages (Malay and English).

Section A: Socio-demographic data which include the children's age, ethnicity, gender, and educational level of their parents.

Section B: Diagnosis of allergic disease. This is to measure whether the children have allergic diseases or not. Children with allergic disease was defined as either having doctor's diagnosed asthma, eczema, allergic rhinitis, food allergy, or allergic conjunctivitis as indicated by the answer to the question besides from knowing the symptoms of each allergic diseases. Parents who have their children with allergic disease should at least know the symptoms of the allergic diseases as mentions in the questionnaire given. The symptoms in the questionnaire are taken from International Study of Asthma and Allergy in Childhood (ISAAC) phase 1 questionnaire.

Section C: Clinical profile which includes the associated factors of the allergic diseases which are medication (paracetamol and antibiotic used) and vaccination, family history (siblings and mother having allergic disease), feeding habit (normal and exclusive breastfeeding, age introduced complementary food) and environment condition (animal

exposure, attending day care, cigarette smoke exposure). These associated factors were also taken from ISAAC questionnaire.

3.5.2 Data collection technique

The data was obtained and collected within the duration of three weeks, from 1st July till 18th July 2013. Data collection took place at the Paediatric Clinic in Hospital Serdang. The questionnaires were given after the parents had understood the research's information. In order for the parents to get a better understanding about the questionnaires, each of them were guided by the researchers in answering the questions, rather than leaving them to answer the questionnaires themselves. The questionnaires were signed and collected back from the respondents by researcher immediately after they had completed the task. Name of the respondents were kept confidential.

3.5.3 Quality control

The questionnaires that were used in the study were adapted from the ISAAC study and had been checked by our supervisor.

3.6 Data analysis.

The data collected was analysed using the Statistical Analysis Package for Social Sciences (SPSS) version 21. Descriptive data statistics was used to determine the prevalence of allergic disease among children and the proportions of socio-demographic data and the associated factors. Chi-square Test was used to determine the association between the associated factors and allergic disease among children. P value of <0.05 was considered as statistically significant.

3.7 Study ethics

Ethical approval had been obtained from the Medical Research Ethics of Universiti Putra Malaysia. The approval from the Medical Research Ethics Committee from National Medical Research Registration (NMRR) of Ministry of Health is pending. Permission from Clinical Research Centre of Hospital Serdang had been obtained.

3.8 Variable

3.8.1 Dependent variable

The prevalence of allergic disease among children.

3.8.2 Independent variable

The associated factors of allergic disease among children which include socio-demographic factors (age, gender, ethnicity, and father and mother's educational level) medication (paracetamol and antibiotic) intake and vaccination, family history (number of siblings and mother having allergic disease), feeding habits (normal and exclusive breastfeeding, age introduced complementary food) and environmental conditions (animal exposure, attending day care, cigarette smoke exposure).

3.9 Definition of terms

Allergic disease

In this study, allergic disease is defined if the person has one of the five allergic diseases which are asthma, eczema, allergic rhinitis, food allergy, and allergic conjunctivitis.

Asthma

Asthma is a condition of widespread narrowing of the bronchial airways upon exposure to stimuli which lead to cough, wheezing and dyspnoea. In this study, we defined asthma when a child has **wheezing or whistling** in the chest ever and it was **diagnosed** by a doctor.

Eczema

Eczema is an itchy skin disease characterized by erythema and vesicle formation, which may lead to weeping and crusting. For our study, eczema was defined as when a child has recurrent eczema or **itchy rash for at least 6 months** and it was **diagnosed** by a doctor.

Food allergy

Immediate or delayed type immune reactions that occurs soon after eating certain food is termed food allergy. In our study, if the child was **diagnosed** by a doctor was considered as food allergy cases.

Allergic rhinitis

It is an inflammation of the nasal passages caused by allergic reactions to airborne substances/allergens. In this study, we defined allergic rhinitis cases when the child has a problem with **sneezing or a runny, or a blocked nose when she/he did not have a cold** and it must be **diagnosed** by a doctor.

Allergic conjunctivitis

It is an inflammation of the conjunctiva, which becomes red and swollen and produces watery or pus containing discharge. We considered the child had allergic conjunctivitis if the child has problems with **itchy, watery eyes, when she/he did not have cold/flu** and it has been **diagnosed** by doctor.

CHAPTER 4

RESULTS

4.1 Response rate

We had approached 463 parents and managed to get 415 of them to enrol in our study by answering the questionnaires through guided interviews. Thus, the response rate for our study was 90%.

4.2 Respondent background

The questionnaires were given to the parents who brought their children to the Paediatric Clinic for medical consultation. The respondents were made up of 248 males and 167 females. The racial composition was 366 Malays, 31 Chinese, 14 Indians and 4 other races. The education levels of parents included primary, secondary and tertiary levels.

4.3 Prevalence of allergic disease

Among 415 children participated in this study, 165 (40%) have doctor-diagnosed allergic diseases regardless of asthma, eczema, allergic rhinitis, allergic conjunctivitis or food allergy (Table 1). For the purpose data analysis, we have included allergic diseases 'perceived by parents' into the NO allergic disease category. Thus, there are 250 (no allergic disease, n= 225 plus perceived by parents, n = 25; 60%) children that do not have any allergic diseases.

Table 1: Distribution of allergic diseases among children attending Paediatrics Clinic in Hospital Serdang.

Allergic diseases	**Yes**		**No**	**Total**
	n (%)		**n (%)**	**n (%)**
	Diagnosed by doctor	Perceived by parents	Absolutely No	
Total, n (%)	165 (40)	25 (6)	225 (54)	415 (100)

Table 2 illustrates that asthma is the commonest allergic disease seen at the clinic with 103 out of 415 children (25%) suffered from it followed by eczema (20%), food allergy (12%), allergic rhinitis (6%), and allergic conjunctivitis (4%).

Table 2: Proportion of allergic diseases among children in Hospital Serdang

Allergic diseases	**No**	**Yes**		**Total**
		Perceived by parents	Diagnosed by doctor	
Asthma, n (%)	310 (75)	2 (0)	103 (25)	415
Eczema, n (%)	317 (76)	15 (4)	83 (20)	415
Allergic rhinitis, n (%)	377 (91)	15 (4)	23 (6)	415
Allergic conjunctivitis, n (%)	396 (96)	4 (1.0)	15 (4)	415
Food allergy, n (%)	347 (84)	17 (4)	51 (12)	415

4.4 Socio-demographic characteristics

Distribution of asthma according to the age is shown in Figure 4. We found that asthma is most prevalent in children of three years of age. The rate of asthma dropped at age four years and stayed constant for next two-three years. After age 7 years, the rate reduced further.

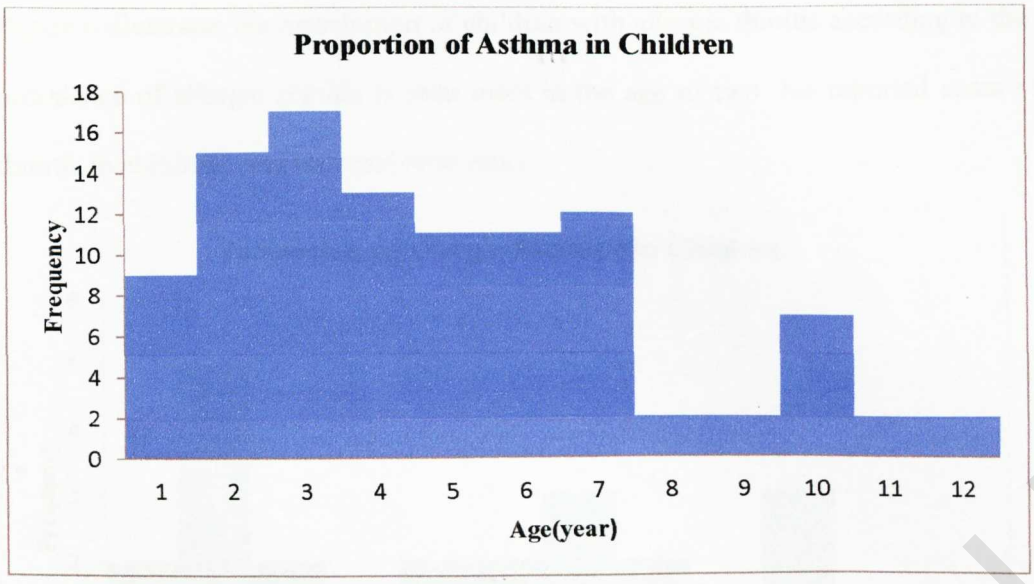

Fig. 4. Distribution of asthma according to the age of children attending the clinic

Figure 5 shows the distribution of eczema according to the age. The presentation of eczema is more common within the first 3 years of life, and the eczema prevalence reduced dramatically at age 4 years and beyond.

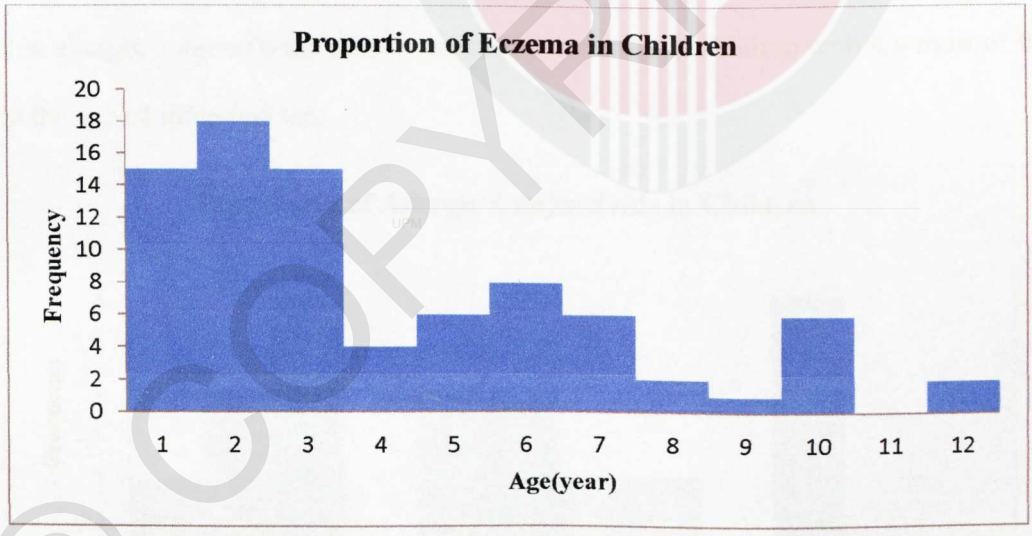

Fig. 5. Distribution of eczema according to the age of children attending the clinic

Figure 6 illustrates the distribution of children with allergic rhinitis according to the age. The prevalence of allergic rhinitis is seen most in the age of two. No reported cases of allergic rhinitis in children aged four and nine years.

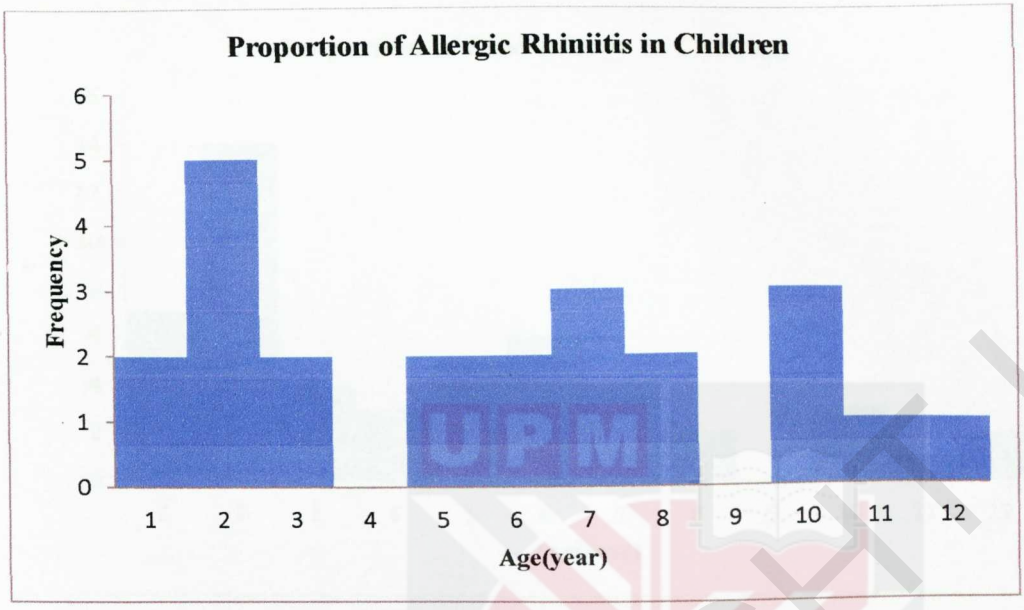

Fig. 6. Distribution of allergic rhinitis according to the age of children attending the clinic

Distribution of allergic conjunctivitis according to the age is shown in Figure 7. We found that allergic conjunctivitis cases were rarely occurred in children with the most of three cases in the age of three and ten.

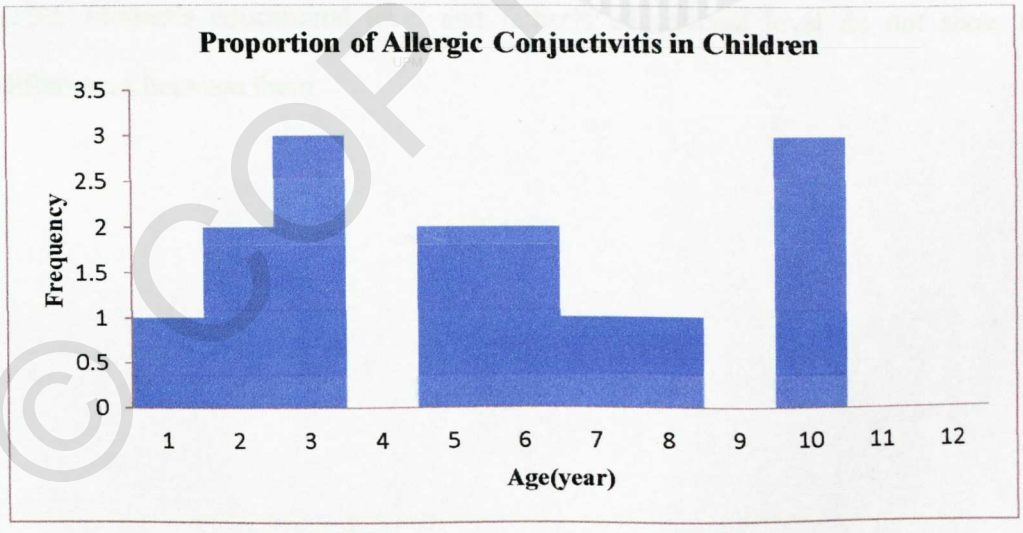

Fig. 7. Distribution of allergic conjunctivitis according to the age of children attending the clinic.

Figure 8 shows the distribution of food allergy according to the age. The presentation of food allergy has already evident in the first year of life with peak cases of 14 noted at the age of two. After age 3 years, there were a reduced number of food allergy cases noted.

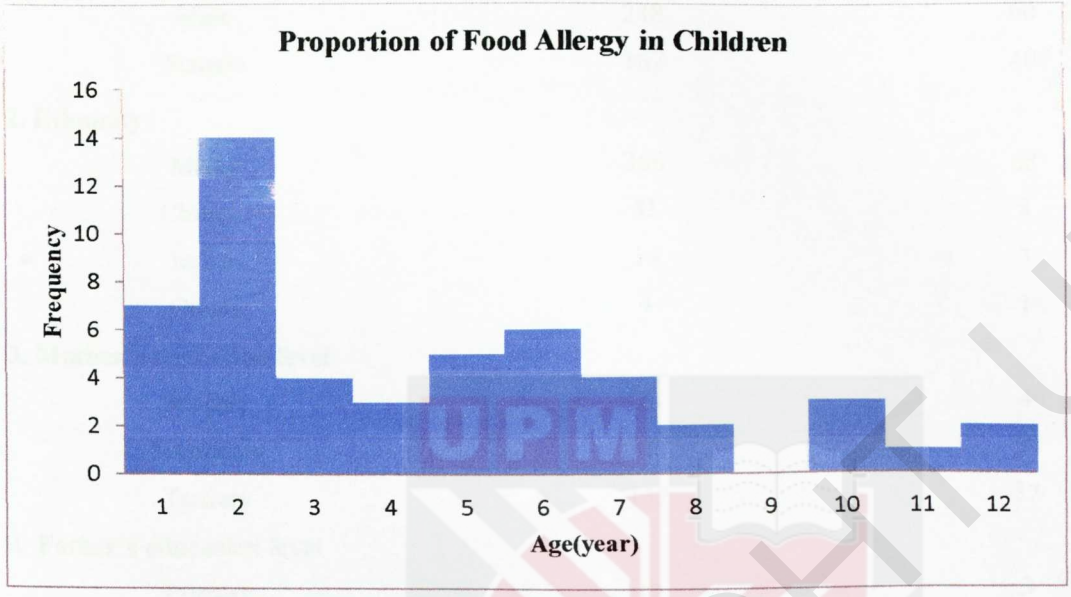

Fig. 8. Distribution of food allergy according to the age of children attending the clinic

Table 3 shows the distribution of children by socio-demographic characteristics. Between gender, male children are the majority (60%). Among ethnicity, Malay has the highest frequency, n=366 (88%) with Chinese only 31 (8%), Indian, 14 (3%) and other ethnic, 4 (1%). Mother's educational level and father's educational level do not show any major differences between them.

Table 3: Distribution of children by socio-demographic characteristics

Variable	Frequency (n)	Percentage (%)
1. Gender		
Male	248	60
Female	167	40
2. Ethnicity		
Malay	366	88
Chinese	31	8
Indian	14	3
Others	4	1
3. Mother's education level		
Primary	16	4
Secondary	247	59
Tertiary	152	37
4. Father's education level		
Primary	12	3
Secondary	234	56
Tertiary	169	41

4.5 Distribution of children according to medication (paracetamol and antibiotic used) and vaccination

The Table 4 is the distribution of medication of the children. It is clearly shown that most children are vaccinated (n=413; 100%) and among vaccinated children only four of them are not following the scheduled whether they delayed or skipped one vaccination.

Table 4: Distribution of children according to medication

Variable	Frequency (n)	Percentage (%)
1. Child has taken paracetamol		
Yes	338	81
No	77	19
2. Frequency paracetamol taken past 12 months		
Never	74	18
At least once a year	263	63
At least once a month	78	19
3. Child has taken antibiotics		
Yes	323	78
No	92	22
4. Child has received vaccination		
Yes	413	100
No	2	0
5. Vaccination following the schedule (n=413)		
Yes	409	99
No	4	1

4.6 Distribution of children according to family history

Table 5 shows children distribution according to family history.

Table 5: Distribution of children according to family history

Variable	Frequency (n)	Percentage (%)
1. Number of siblings with allergic disease		
Less than 2 siblings	295	71
Equal or more than 2 siblings	89	29
2. Child's mother has allergic disease		
Yes	86	21
No	329	79

4.7 Distribution of children according to feeding habits

The distribution of children according to feeding habit can be seen in the Table 6. Ninety three per cent of the children were breastfed. However, 58% were exclusively breastfed. Among 415 respondents, 52 (13%) of them have not yet introduced complementary food to their children.

Table 6: The distribution of children according to feeding habit

Variable	Frequency (n)	Percentage (%)
1. Children were breastfed		
Yes	386	93
No	29	7
2. Breastfeeding duration (for breastfed children, n=386)		
Short duration (1-6 months)	206	53
Long duration (more than 6 months)	180	47
3. Breastfed exclusively		
Yes	240	58
No	175	42
4. Age of introduction to complementary food		
Not yet	52	12
Early age (1-3 months)	8	2
Recommended age (4-6 months)	297	72
Late age (more than 6 months)	58	14

4.8 Distribution of children according to environmental conditions

Table 7 shows the distribution of children according to animal exposure. Majority of them do not have pets such as dog and cat. All of them do not have exposure to the farm animal.

Table7: Distribution of children according to animal exposure

Variable	Frequency (n)	Percentage (%)
1. Cat at home during first year child's life		
Yes	26	6
No	389	94
2. Dog at home during first year child's life		
Yes	9	2
No	406	98
3. Cat at home past 12 months		
Yes	22	6
No	392	94
4. Dog at home past 12 months		
Yes	9	2
No	406	98
5. Child regular contact with farm animal during first year of life (at least once a week)		
Yes	0	0
No	415	100
6. Mother regular contact with farm animal during pregnancy (at least once a week)		
Yes	0	0
No	415	100

Table 8 is the distribution of children according to the first age attending day care. Most of respondents do not send their child/children to the day care (75%).

Table 8: Distribution of children according to the first age attending day care

Variable	Frequency (n)	Percentage (%)
1. Attended day care		
Yes	105	25
No	310	75
2. Age at first day care attendance (for child attended day care, n=105)		
Early age (0-12 months old)	92	88
Late age (more than 12 months old)	13	12

Table 9 shows the distribution of children according to cigarette smoke exposure at home (indoor). Cigarette smoke exposure can be divided into two, that is maternal smoking and anyone smokes in the house. Among our respondents, none of the mothers are smokers.

Table 9: Distribution of children according to cigarette smoke exposure at home

Variables	Frequency (n)	Percentage (%)
1. Maternal smoking during pregnancy		
Yes	0	0
No	415	100
2. Maternal smoking during child's first year of life		
Yes	0	0
No	415	100

3. Maternal smoking during breastfeeding		
Yes	0	0
No	415	100
4. Maternal smoking at present		
Yes	0	0
No	415	100
5. Anyone smoked (indoor) before child's birth		
Yes	179	43
No	236	57
6. Anyone smoked (indoor) during child's first year of life		
Yes	175	42
No	240	58
7. Anyone smoked (indoor) at present		
Yes	168	40
No	247	60

4.9 Association between socio-demographic and allergic disease

In Table 10, age was found to have a significant association with the development of allergic diseases among children.

Table 10: Association between age and allergic disease among children

Age	Confirmed allergic disease		P value (Chi-square Test)
	Yes (n=165)	No (n=250)	
Less than one year	24	84	
1-3 years old	65	112	
4-6 years old	41	26	**0.000***
7-9 years old	20	13	
10-12 years old	15	15	

According to Table 11, Malay is the ethnicity group that has most allergic diseases children which is 152 (92%) out of 165. There was a statistically significant association between ethnicity and allergic diseases among children since $p<0.05$. It also showed that numbers of boys that were having allergic diseases were more than girls but gender has no significant association with the development of allergic diseases among children. Majority of the mothers and fathers were graduated from secondary school and no association was found between parents' education level and allergic diseases among children.

Table 11: Cross-tabulation of socio-demographic factors and allergic diseases among children

Variables	Confirmed allergic diseases		P value (Chi-square Test)
	Yes (n=165)	No (n=250)	
1. Ethnicity			
Malay, n (%)	152 (92.1)	214 (85.6)	**0.034***
Chinese, n (%)	6 (3.6)	25 (10)	
Indian, n (%)	4 (2.4)	10 (4)	
Others, n (%)	3(1.8)	1(0.4)	
2. Gender			
Male, n (%)	104 (63)	144 (57.6)	0.270
Female, n (%)	61 (37)	106 (42.4)	
3. Mother's educational level			
Primary, n (%)	3 (1.8)	13 (5.2)	0.192
Secondary, n (%)	98 (59.4)	149 (59.6)	
Tertiary, n (%)	64 (38.8)	88 (35.2)	
4. Father's educational level			
Primary, n (%)	3 (1.8)	9 (3.6)	0.467
Secondary, n (%)	91 (55.2)	143 (57.2)	
Tertiary, n (%)	71 (43)	98 (39.2)	

4.10 Association between medication (paracetamol and antibiotic used) and vaccination and allergic disease

Medication showed a significant association towards allergic disease. This can be seen in Table 12. Medication included paracetamol and antibiotic used during the child's first year of life and frequency of paracetamol taken for the past 12 months. However, vaccination did not show any association with the occurrence of allergic disease among children.

Table 12: Association between medication and vaccination intake and allergic disease

Variables	Confirmed allergic diseases		P value (Chi-square Test)
	Yes (n=165)	No (n=250)	
1. Child has taken paracetamol			
Yes, n (%)	151 (91.5)	187 (74.8)	**0.000***
No, n (%)	14 (8.5)	63 (25.2)	
2.Frequency of paracetamol taken past 12 months			
Never, n (%)	14 (8.5)	60 (24)	
At least once a year, n (%)	101(61.2)	162(64.8)	**0.000***
At least once a month, n (%)	50 (30.3)	28 (11.2)	
3. Child has taken antibiotics			
Yes, n (%)	147(89)	176(70.4)	**0.000***
No, n (%)	18 (11)	74 (29.6)	
4a. Child has received vaccination			
Yes, n (%)	165(100)	248(99.2)	0.520
No, n (%)	0	2(0.8)	
4b. Vaccination following the schedule			
Yes, n (%)	163(98.8)	246(98.4)	1.000
No, n (%)	2(1.2)	4 (1.6)	

4.11 Association between family history and allergic disease

Table 13 shows the association between family history and allergic disease. Both the number of siblings and child's mother having allergic disease showed significant association with allergic disease.

Table 13: Association between family history and allergic disease

Variables	Confirmed allergic disease		P value (Chi-square Test)
	Yes (n=165)	No (n=250)	
1. Number of siblings with allergic disease			
Less than 2 siblings, n (%)	136 (82.4)	248 (99.2)	**0.000***
Equal or more than 2 siblings, n (%)	29 (17.6)	2 (0.8)	
2. Child's mother has allergic disease			
Yes, n (%)	50 (30.3)	36 (14.4)	**0.000***
No, n (%)	115 (69.7)	214 (85.6)	

4.12 Association between feeding habits and allergic disease

Table 14 shows that children that are breastfed exclusively was significantly associated with allergic disease in children. Similarly, the age of introduction of complementary food was found to have an association with the occurrence of allergic disease. In contrast, children who were breastfed (regardless whether exclusively or not) were not associated with allergic disease development. Breastfeeding duration also showed no significant association with the development of allergic disease.

Table 14: Association between feeding habit and allergic disease

Variables	Confirmed allergic disease		P value (Chi-square Test)
	Yes (n=165)	No (n=250)	
1. Children were breastfed			
Yes, n (%)	152 (92.1)	234 (93.6)	
No, n (%)	13 (7.9)	16 (6.4)	0.563
2. Breastfeeding duration			
Short duration (0-6 months), n (%)	89 (54)	146 (58.4)	0.370
Long duration (more than 6 months), n (%)	76 (46)	104 (41.6)	
3. Breastfed exclusively			
Yes, n (%)	84 (50.9)	156 (62.4)	**0.020***
No, n (%)	81 (49.1)	94 (37.6)	
4. Age of introduction tocomplementary food			
Not yet, n (%)	8 (4.8)	44 (17.6)	
Early age (0-3 months), n (%)	4 (2.4)	4 1 (1.6)	**0.000***
Recommended age (4-6 months), n (%)	125 (75.8)	172 (68.8)	
Late age (more than 6 months), n (%)	28 (17)	30 (12)	

4.13 Association between environmental conditions and allergic disease

Table 15 shows the association between pet's exposure and allergic disease among children. All of them showed no association with the occurrence of allergic disease.

Table 15: Association between pet's exposure and allergic disease

Variables	Confirmed allergic disease		P value (Chi-square Test)	P value (Fisher's exact Test)
	Yes (n=165)	No (n=250)		
1. Cat at home during first year child's life				
Yes, n (%)	10 (6.1)	16 (6.4)	0.889	
No, n (%)	155 (93.9)	234 (93.6)		
2. Dog at home during first year child's life				
Yes, n (%)	3 (1.8)	6 (2.4)	0.690 (cell is 25%)	1.000
No, n (%)	162 (98.2)	244 (97.6)		
4.Cat at home past 12 months				
Yes, n (%)	7 (4.2)	16 (6.4)	0.347	
No, n (%)	158 (95.8)	234 (93.6)		
5. Dog at home past 12 months				
Yes, n (%)	3 (1.8)	6 (2.4)	0.690 (cell is 25%)	1.000
No, n (%)	162 (98.2)	244 (97.6)		

Table 16 is the association between day care and allergic among children. Both attending day care and the child's age sent for the first time did not show any significant association with allergic disease.

Table 16: Association between day care and allergic disease

Variables	Confirmed allergic disease		P value (Chi-square Test)
	Yes (n=165)	No (n=250)	
1. Attended day care			
Yes, n (%)	48 (29.1)	57 (22.8)	0.149
No, n (%)	117 (70.9)	193 (77.2)	
2. Age at first day care attendance			
Early age (0-12 months old), n (%)	41 (85.4)	51 (89.5)	0.288
Late age (more than 12 months old), n (%)	7 (14.6)	6 (10.5)	

There was a significant association between cigarette smoke exposures with the occurrence of allergic disease as shown in Table 17. The number of children who did not expose to cigarette smokes at home (indoor) during child's first year of life and at present is higher than those who were exposed (n=15; p = 0.034 and 160; p = 0.022,respectively).

Table 17: Association between cigarette smoke exposure and allergic disease

Variables	Confirmed allergic disease		P value (Chi-square Test)
	Yes (n=165)	No (n=250)	
1. Anyone smoke at home (indoor) before child's birth			
Yes, n (%)	80 (48.5)	99 (39.6)	0.074
No, n (%)	85 (51.5)	151 (60.4)	
2. Anyone smoke at home (indoor) during child's first year of life			
Yes, n (%)	80 (48.5)	95 (38)	**0.034***
No, n (%)	85 (51.5)	155 (62)	
3. Anyone smoke at home (indoor) at present			
Yes, n (%)	78 (47.3)	90 (36)	**0.022***
No, n (%)	87 (52.7)	160 (64)	

CHAPTER 5

DISCUSSION

5.1 Prevalence of allergic disease among children

The prevalence of allergic diseases in our study is 40% (n=165) out of 415 children regardless of the type of allergic diseases i.e. asthma, eczema, allergic rhinitis, allergic conjunctivitis, and food allergy. This figure is higher compared to the prevalence of allergic disease in other studies. For example, a study conducted in Singapore (Tay. et al, 2002) showed a prevalence of atopic dermatitis of 30.7%. Quah et al. (2005) reported a prevalence of 27% and 12% for allergic rhinitis and eczema symptoms respectively. These differences could be explained by the fact that the study was conducted more than 10 years ago and will not represent the current rate of allergic disease. The other explanation is that children attending Paediatric Clinic Hospital Serdang were mostly followed up in the subspecialty clinics such as Respiratory and Allergy Clinics for their problems of asthma, eczema and food allergy, whereas, allergic rhinitis patients are usually seen at the ear, nose and throat (ENT) specialist clinic.

5.2 Association between socio-demographic and allergic disease

In this research, the socio-demographic studied are age, gender, ethnicity, father's educational level and mother's educational level. The term 'allergic march' refers to the natural history of atopic manifestations, antibody responses and clinical symptoms that appear early in life, persist over years or decades, and often remit spontaneously with age (Wahn.U,2007). It is showed that the eczema started afterbirth, preceding other allergic diseases. Food allergy can be observed from the age of one year old, allergic rhinitis from

three years old, whereas asthma can be seen during the school going age. It is interesting to note that many children exhibit different allergic symptoms simultaneously.

A study has demonstrated that among children with food allergies, 64.35% were males and 35.65% were females (Kelly & Gangur, 2009). In our study, gender showed no association with the occurrence of allergic disease among children.

In contrast, ethnicity showed an association with allergic disease in children. However, this may be a bias finding as most of the respondents interviewed were Malay (88%). This is because majority of the respondents who seek medical care at Hospital Serdang live in Hulu Langat District and some of them are from Seri Kembangan and Puchong area. Based from the Department of Statistics, Malaysia, 2010, in Kajang, there were 411,669 Malays followed by Chinese (228,912) and Indians (84,018). Puchong and Seri Kembangan are categorized as Subang Jaya area. In Subang Jaya, Chinese are the biggest community reside in that area (n=288,752) followed by Malays (n=264,176) and Indians,(n=80,080). However, majority of patients who come to the government hospital are of Malay ethnicity. Chinese on the other hand, would prefer to go to the private hospital or clinic. This is the reason why the respondents interviewed in our study majority were Malays.

For parents' educational level, both maternal and paternal educational levels showed no association with the occurrence of allergic disease among children. In Lannero et al. (2002) study, they showed that the educational level has an influence on the risk factors for development of atopic disease in childhood and indicating a need of deeper understanding of life style in different socioeconomic groups. In addition, a study by Gehring et al. (2006)

showed that low parental education was associated with a decreased risk of inhalant allergy and itchy rash in school children. Furthermore, low parental education was associated with an increased prevalence of wheeze and nocturnal dry cough. However, no clear association was found between parental education and prevalence of doctor-diagnosed asthma and bronchitis. In this study, there was no association between educational level and allergic disease because the primary educational level for both mother and father was 4% and 3% respectively. Majority of the parents living near Hospital Serdang have secondary educational level followed by tertiary educational level.

5.3 Association between medication and vaccination and allergic disease

In this research, there was a significant association between medication and vaccination intake and allergic disease among children. The example of study that showed an association between antibiotic used in early of life and increased risk of allergies is the study done in ISAAC phase lll. They clearly showed that antibiotic used in the first year of life will increase the risk of developing symptoms of asthma, rhinoconjunctivitis, and eczema in children 6 and 7 years old (Foliaki.et al., 2009). Another study in 2010 showed that early exposure to paracetamol and/or to antibiotics was associated with an increased prevalence of asthma, eczema and rhinoconjuctivitis (Garcia-Marcos et al., 2010). In our research, we asked regarding paracetamol intake during child's first year of life and the frequency of paracetamol given. We also asked regarding antibiotic usage during child's first year of life. All the three factors showed significant associations with the occurrence of allergic disease among children.

The vaccination that we asked in our questionnaire was according to the Malaysian vaccination programme provided by the Ministry of Health as shown in Figure 3. Some of our respondents also admitted of having extra vaccinations given to their children at the private clinic or hospital. This information was not included in our study. For vaccination intake, majority of the children were vaccinated (n=413; 100%) and among vaccinated children, only 4 of them did not follow the vaccination schedule according to the provided schedule. This may be the reason of why there was no association between vaccinated children and the occurrence of the allergic disease. There are studies that claimed vaccination is a protective factor against allergic diseases. One example is the study by Linehan et al. (2007). They found a statistically significant association between neonatal BCG vaccination and prevalence of wheeze in children. In Brazil, a study using BCG vaccination scar as evidence of neonatal BCG vaccination showed a significant reduction in the prevalence of wheezing after exercise in 12 to 16 years old children (Cunha.et al., 2004). However, a newer study reported that there was no association between vaccination and the risk of developing allergic diseases. For example, the study on BCG vaccination and allergy concluded that BCG vaccination was unlikely to be associated with protection against allergic sensitization (Arnoldussen et al, 2011). This supports our study finding that vaccination was not associated with the occurrence of allergic disease in the children.

5.4 Association between family history and allergic disease

In a Munich Asthma and Allergy Study (Grayet al., 2006), it was shown that the risk a child developing atopic dermatitis is higher with odd ratio (OR) of 3.4 if one or both parents have atopic dermatitis as compared to 1 or both parents with asthma (OR=1.5) or allergic rhinitis (OR=1.4). In 2004, a birth cohort study was conducted to examine the relationship between parental onset and duration of atopic disease and the risk of children to develop

allergic diseases. They found that mother's history of allergic disease, especially asthma history has a stronger relationship than father's history of allergic disease with allergic diseases development in their children. There was also a significant relationship between persistent allergy in mother and atopy in the children (Alford et al., 2004). In our study, we found similar results. Family history showed a significant association with allergic disease among children. Most of the cases with allergic disease in our study had family history of having allergic disease. The family history includes either siblings or mother or both of them having allergic disease. Among the children who have allergic disease, 30% (n=50) of them have mother with allergic disease and 34% (n=56) of them have at least one sibling who has allergic disease. This is because genetic plays an important role in the development of allergic disease among the children. A study by Arshad et al. (1993) showed that those who have positive family history are more susceptible to suffer from allergic disease. In a recent study by Miranshi et al. (2007), a cohort of children with a family history of asthma in Sydney, Australia, was followed from birth to age 5 years showed that a longer duration of breastfeeding and later introduction of solid foods did not prevent the onset of asthma, eczema or atopy by age 5 years. This suggests that family history does play a crucial role in the occurrence of allergic disease.

5.5 Association between feeding habits and allergic disease

In year 2010, a birth cohort study was carried out to investigate the relationship between breastfeeding and asthma during the first 8 years of life. The results showed that children who were exclusively breastfed for 4 months or more had a reduced risk of asthma during the first 8 years of life and also showed a significant better lung function (Kull. et al., 2010). In our research, we asked the respondents whether they have breastfed their children or not. We then further enquired regarding the duration of breastfeeding. We categorized the

duration of breastfeeding into two, short duration (1-6 months) and long duration (more than 6 months) of breastfeeding based on the study by Tanaka. et al (2010) who showed that the duration of breastfeeding, regardless of exclusivity, for more than 6 months is associated with a lower prevalence of asthma. There was no significant association between breastfeeding and wheeze or eczema. In our study, breastfeeding had no association with the occurrence of allergic disease among children.

For exclusive breastfeeding, there was a significant association with the occurrence of allergic disease. However, the duration of exclusive breastfeeding was not further explored. This could be the caveat of our study as some mothers may breastfed exclusively their children for just one or less than 6 months, while others for more than six months. Nonetheless, both categories of mothers mentioned that they breastfed exclusively regardless of the duration. Thus, we found that the question regarding exclusive breastfeeding could be mis-interpretated by different parents we interviewed. In order to get a clearer view, the duration of exclusive breastfeeding should be asked to the parents.

We also asked regarding the age of introduction to complementary food to the children. Our study showed that there was an association between the age of complementary food introduced and the occurrence of allergic disease among the children. We had categorized the age of food introduction into two, at recommended age (4-6 months) and at late age (more than 6 months). Current recommendation is that the best time to introduce complementary or solid food is between 4 to 6 months as outlined by the European Society of

Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHN) and Malaysian Society of Allergy and Immunology (MSAI).

5.6 Association between environmental conditions and allergic disease.

5.6.1 Association between animal exposure and allergic disease

A study found out that owning a pet in the first year of life may increase the risk of atopic dermatitis among children of non-smokers (Davis et al., 2004). In the case of food allergy, there was no association between early exposure to pets and food allergy (Ezendam et al., 2010). From our study, we found that owning pets were not associated with allergic disease among children. This may due to the small number of children that have pets in the house among our respondents. Those who have cats and dogs were 26 (6%) and 9 (2%) respondents respectively. In our study, we asked the parents whether they have pets in the house (indoor) or not. Having pets in the house will have direct exposure to the children.

For the exposure to farm animals, none of the children or their mothers has been exposed to farm animals such as cows, buffalos, goats and pigs.

5.6.2 Association between day care and allergic disease

A study that showed day care exposure is a protective factor against allergic diseases is the population-based birth cohort study by Nicolaou et al (2008). A study conducted by Ball et al (2000) showed an inverse association between day-care and recurrent wheeze and asthma in children who entered the day-care before the age of 6 months. Our research showed that there was no association between day care attendance and allergic disease among the children. We further asked the respondents for the first age of their children attended daycare.

The ages were categorized into two, early age (1-12 months) and late age (more than 12 months). No significant association had been found.

5.6.3 Association between cigarette smoke exposure and allergic disease

A study of tobacco smoke exposure among inner-city children with asthma carried out in Chicago showed that tobacco smoke exposure was high in the sample of asthmatic children (Kumar et al., 2008). Cigarette smoking has been proven to increase the risk of allergic diseases. An example is the study by Polosa et al. (2008) that evaluated cigarette smoking as an additional risk factor for incidence of asthma cases. Maternal smoking during pregnancy and early childhood is a significant risk factor, and it is consistently associated with increased risk of rhinitis throughout the children's life (Matheson et al., 2011). From our research, it showed that exposure to cigarette smoke was a risk factor for the children to develop allergic diseases; smoking at home (indoor) during child's first year of life and at present were associated with the occurrence of allergic diseases among children. The odds ratio calculated for smoking during child's first year of life is 1.54 whereas for present smoking, the odds ratio was 1.59. These suggest that smoking is a risk factor for the children to develop allergic disease. For exposure to smoke before child's birth, the P value has nearly reached 0.05 indicating that indoor smoking before child's birth may or may be not associated with the occurrence of allergic diseases. Smoking before child's birth may indicates that someone smoked when the mother was pregnant or even prior to the pregnancy itself. For maternal smoking, we could not analyse the data because all mothers did not smoke cigarette at all.

5.7 Conclusion

In conclusion, medication exposure such as early intake of antibiotic and paracetamol, family history of having siblings or mother with allergic diseases and exposure to cigarette smoking

have significant association and are risk factors for the development of allergic diseases among children. On the other hand, exclusive breastfeeding and early introduction to complimentary food are protective factors towards the occurrence of allergic diseases that are able to reduce the risk of having allergic diseases among children.

5.8 Limitations

This study may not represent the distribution of populations in Malaysia as the distribution of ethnicity of patients attending Hospital Serdang showed that majority of them are Malays. Almost all people living in Selangor area do not have contact with farm animals, thus the association between contact with farm animals and the development of allergic diseases among children is difficult to assess. Furthermore, since our study used the convenient sampling method, the results must be carefully evaluated and interpreted. For the family history section, we did not ask about the presence of allergic diseases in the father. Due to that, we could not study the association between the father's allergic diseases and the development of allergic diseases among children. In the feeding habit section, further information on the duration of exclusive breastfeeding was not obtained, and therefore we could not analyse further the association between duration of exclusive breastfeeding and development of allergic disease in children.

5.9 Strengths

Our study is the most recent study on the prevalence of allergic diseases among children in Malaysia as the previous local study on the same topic was conducted more than ten years ago. Our study provides a preliminary picture on the burden of allergic disease in Malaysia. We also showed how many Malaysian children are affected by allergic diseases as well as the risk and protective factors that contribute to the development of allergic diseases, thus

enabling the government to take appropriate action on how to lower or prevent the incidence of allergic diseases among children.

5.10 Recommendation

We recommend for future study on this topic to use probability sampling method to obtain more substantial results. In addition, we also recommend asking the parents on the duration of exclusive breastfeeding and the father's allergic diseases to study the associations between these two factors and the development of allergic diseases among children.

Since usage of antibiotic and paracetamol is a risk factor for the development of allergic diseases, thus parents should limit the use of antibiotic and paracetamol for their children to reduce the risk of developing the allergic diseases. Nevertheless, parents especially the fathers should avoid or stop smoking in front of their children as the chance for the allergic diseases to occur would increase.

To reduce the risk of allergic diseases to occur in the children, mothers should practice exclusive breastfeeding for their children. In addition, early introduction of complimentary food (four to six months) to the children also is also highly recommended to decrease the occurrence of allergic diseases in children.

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BORANG PERSETUJUAN PENYERTAAN (IBUBAPA/ PENJAGA)

TAJUK PENYELIDIKAN : KAJIAN FAKTOR-FAKTOR PENYAKIT ALERGI DALAM KALANGAN KANAK-KANAK DI HOSPITAL SERDANG PADA TAHUN 2013

PENYELIDIK : **MAHMUD BIN KHAIRUDIN**
CHUA HUI PENG

PENYELIA : **DR INTAN HAKIMAH BINTI ISMAIL**

PENYELIA BERSAMA: **DR EUSNI RAHAYU BINTI MOHD TOHIT**

Saya..... No Kad Pengenalan. .....
beralamat.....
.....dengan ini secara sukarela bersetuju membenarkan *anak / jagaan saya ..... menyertai penyelidikan klinikal *(pengajian klinikal/ pengajian soal selidik/ percubaan ubat-ubatan) seperti yang disebut di atas.

Saya telah diberi penjelasan secara menyeluruh mengenai dasar penyelidikan klinikal dari segi metodologi, risiko dan komplikasi (seperti tertulis pada Helaian Penerangan Responden). Saya memahami bahawa *anak / jagaan saya berhak menarik diri dari penyelidikan ini pada bila-bila masa tanpa memberi sebarang alasan.Saya juga memahami bahawa sebarang maklumat yang berkaitan identity *anak / jagaan saya akan dirahsiakan.

Saya* berminat / tidak berminat untuk mengetahui keputusan kajian yang dijalankan ke atas sampel yang diambil *anak / jagaan saya.

*potong yang tidakberkenaan

Tandatangan .....
(*Ibubapa/ Penjaga*)

Tandatangan .....
(*Saksi*)

Tarikh :.....

Nama :.....

No. K/P: .....

Saya mengesahkan bahawa saya telah menerangkan kepada ibubapa/penjaga responden mengenai sifat dan tujuan penyelidikan klinikal tersebut di atas.

Tarikh .....

Tandatangan .....
(*Penyelidik*)

CONSENT FORM (PARENTS/GUARDIAN)

STUDY TITLE :STUDIES OF ASSOCIATION FACTORS OF ALLERGIC DISEASES AMONG CHILDREN IN HOSPITAL SERDANG IN 2013

RESEARCHER : MAHMUD BIN KHAIRUDIN
CHUA HUI PENG

SUPERVISOR : DR INTAN HAKIMAH BINTI ISMAIL

C0-SUPERVISOR : DR EUSNI RAHAYU BINTI MOHD TOHIT

I ..... Identity Card No. ..... address.....
.....hereby voluntarily agree to allow my *son / daughter / ward..... to take part in the clinical research *(clinical study, questionnaire study/ drug trial) specified above.

I have been informed about the nature of the clinical research in terms of methodology, possible adverse effects and complications (as written in the Respondent Information Sheet). I understand that my *son / daughter / ward has the right to withdraw from this clinical research at any time without assigning any reason whatsoever. I also understand that this study is confidential and all information provided with regards to the identity of my* son / daughter / ward will remain private and confidential.

I* wish / do not wish to know the result of the tests performed on any samples taken from my *son / daughter / ward.

* delete where necessary

Signature .....
(*Parent/Guardian*)

Date :.....

Signature .....
(*Witness*)

Name :.....

I/C No. :.....

I confirm that I have explained to the respondent's parent/guardian the nature and purpose of the above –mentioned clinical research.

Date .....

Signature .....
(*Researcher*)

RESPONDENT'S INFORMATION SHEET

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

STUDY TITLE
Studies of association factors of allergic diseases among children in Hospital Serdang in 2013.

INTRODUCTION
Allergic reactions occur when a person's immune system reacts to normally harmless substances in the environment. A substance that causes a reaction is called an allergen. Atopic sensitization is defined by production of immunoglobulin E (IgE) against environmental antigens such as house dust mites, grass pollen, and animal proteins and can lead to diseases that include asthma, rhinitis, atopic dermatitis, and other allergic diseases. The development of allergic disease among children can be associated by a number of risk factors such as breastfeeding, pets' exposure, parental smoking, obesity, antibiotic treatment, vaccination, attending day care or kindergarten and genetic.

WHAT WILL YOU HAVE TO DO?
Please read this respondent's information sheet for further information on the study. If you agree to let your child to participate in this study, you will need to sign the informed consent as evidence of approval. The researcher will then give you a written questionnaire for you to answer.

WHO SHOULD NOT ENTER THE STUDY?
Children attending the paediatric clinic that is more than 12 years old.

WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

You will know the burden and prevalence of allergic diseases among children in the population. Besides that, you will also be able to identify the association factors of allergic diseases among children. In fututre, health authority will train doctors to manage the diseases as well as prevent it.

b)TO THE INVESTIGATOR?

We will be able to determine the prevalence of allergic diseases among children in a population with its association factors. Together, we can suggest the preventive strategies in order to overcome the diseases.

WHAT ARE THE POSSIBLE RISKS?
There are no possible risks as the research only involve in answering questionnaire.

WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?

The participation in this study is voluntary. If you prefer not to participate, you do not need to give reasons. You may also withdraw from the study at any point in time during the study without giving any reasons. Your treatment will not be affected if you wish not to participate or withdraw from this study. You will not need to pay nor is payment given to you for participating in this study.

WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH?

You may contact us at:

Dr Intan Hakimah binti Ismail
Paediatric Department
Faculty of Medicine and Health Sciences
University Putra Malaysia
Tel: 03-89472610

HELAIAN PENERANGAN RESPONDEN

Sila baca maklumat berikut dengan teliti. Sekiranya anda mempunyai sebarang pertanyaan, sila kemukakan kepada penyelidik.

TAJUK KAJIAN
Kajian faktor-faktor penyakit alergi di kalangan kanak-kanak di Hospital Serdang pada tahun 2013.

PENGENALAN
Reaksi alahan berlaku apabila sistem imun seseorang bertindak balas kepada bahan-bahan yang biasanya tidak berbahaya di alam sekitar. Satu bahan yang menyebabkan tindak balas yang dipanggil alergen. Pemekaan atopik ditakrifkan oleh pengeluaran imunoglobulin E (IgE) terhadap antigen yang terdapt di alam sekitar seperti hama, rumah debu, debunga rumput, dan protein haiwan dan boleh membawa kepada penyakit-penyakit yang termasuk asma, rinitis, dermatitis atopik, dan penyakit alahan lain. Perkembangan penyakit alahan di kalangan kanak-kanak boleh dikaitkan dengan beberapa faktor risiko seperti susu ibu, pendedahan haiwan, ibu bapa yang merokok, obesiti, rawatan antibiotik, vaksin, menghadiri jagaan harian atau tadika, dan genetik.

APAKAH YANG PERLU ANDA LAKUKAN?
Sila baca lembaran maklumat responden ini untuk mendapatkan maklumat lanjut mengenai kajian ini. Jika anda bersetuju untuk membenarkan anak anda untuk mengambil bahagian dalam kajian ini, anda akan perlu menandatangani persetujuan berpengetahuan sebagai bukti kelulusan. Penyelidik akan memberikan anda soal selidik bertulis untuk anda untuk menjawab.

SIAPA YANG TIDAK BOLEH MENYERTAI KAJIAN INI?

Kanak-kanak yang menghadiri klinik kanak-kanak yang berusia lebih daripada 12 tahun

APAKAH FAEDAH MENYERTAI KAJIAN INI?

a) KEPADA ANDA SEBAGAI PENYERTA?
Anda akan tahu beban dan kelaziman penyakit alahan dalam kalangan kanak-kanak dalam kalangan penduduk. Selain itu, anda juga akan dapat mengenal pasti faktor-faktor persatuan penyakit alahan dalam kalangan kanak-kanak. Dipercayai pada masa hadapan, doktor-doktor di Malaysia akan dilatih oleh pihak berkuasa untuk menguruskan penyakit alahan ini dengal lebih efektif.

b) KEPADA PENYELIDIK?
Kita akan dapat menentukan prevalens penyakit alahan di kalangan kanak-kanak di penduduk dengan faktor-faktor persatuannya. Bersama-sama, kita boleh mencadangkan strategi pencegahan untuk mengatasi penyakit-penyakit alahan daripada terus dijangkiti kanak-kanak.

ADAKAH IA BERISIKO?

Tiada risiko kerana kajian hanya melibatkan dalam menjawab soal selidik.

ADAKAH MAKLUMAT DAN IDENTITI SAYA KEKAL RAHSIA?

Penyertaan dalam kajian ini adalah secara sukarela. Jika anda memilih untuk tidak menyertai, anda tidak perlu memberi sebab. Anda juga boleh menarik diri daripada kajian ini pada bila-bila masa semasa kajian tanpa memberi sebarang sebab. Rawatan anda tidak akan terjejas jika anda ingin untuk tidak menyertai atau menarik diri daripada kajian ini. Anda tidak perlu membayar, atau adalah bayaran yang diberikan kepada anda untuk mengambil bahagian dalam kajian ini.

SIAPA YANG SAYA PERLU HUBUNGI SEKIRANYA SAYA MEMPUNYAI SOALAN TAMBAHAN SEMASA MENGIKUTI PENYELIDIKAN INI?

Anda boleh menghubungi kami di :
Dr. Intan Hakimah binti Ismail
Jabatan Pediatrik
Fakulti Perubatan dan Sains Kesihatan
Universiti Putra Malaysia
Tel: 03-89472610

TITLE: PREVALENCE AND ASSOCIATED FACTORS OF ALLERGIC DISEASES AMONG CHILDREN ATTENDING PAEDIATRICS CLINIC AT HOSPITAL SERDANG IN 2013

Section A: Socio-demographic

Please answer all the questions and tick ( ) in the box. Please note that the questions are about your son/daughter that is admitted to this hospital.

1. Age of your children : _____ years old
2. Ethnicity: ( )Malay ( )Chinese ( ) Indian ( )Others
3. Gender: ( )Male ( )Female
4. Mother's level of education
( ) primary
( ) secondary
( ) tertiary-diploma, degree, etc
7. Father's level of education
( ) primary
( ) secondary
( ) tertiary-diploma, degree, etc

Section B: Allergic disease

1. Has the child been found to have allergic diseases problem and by whom?
( ) yes ( ) no
whose diagnosis
( ) family
( ) doctor

2.	No	Perceived by parents	Diagnosed by doctor
Has your child has asthma, wheezing or whistling in the chest?	( )	( )	( )
Has your child had recurrent eczema or itchy rash for at least 6 months?	( )	( )	( )
Has your child had a problem with sneezing or a runny, or a blocked nose when she/he did not have a cold?	( )	( )	( )
Has your child had a problem with itchy, water eyes, when she/he did not have a cold?	( )	( )	( )
Has your child had food allergy?	( )	( )	( )

Section C : Clinical profile

Please answer all the questions and tick only one ( ) in the box for one question.

1. In the first 12 months of your child's life, did you usually give paracetamol (example: panadol) for fever?
( ) yes ( ) no
2. In the past 12 months, how often, on average, have you given your child paracetamol?
( ) never
( ) at least once a year
( ) at least once per month
3. In the first 12 months of life, did your child have any antibiotics?
( ) yes ( ) no
4. Was the child has taken any vaccination before this?
( ) yes ( ) no
a. If yes, does the child take the vaccination by following the vaccination schedule?
( ) yes ( ) no
5. How many brothers and sisters does your child have?
_____brothers and sisters
6. How many of them have allergic diseases(eczema, rhinitis, asthma, etc) that are diagnosed by the doctors?
_____ brothers and sisters

7. Has the child's biological mother has been diagnosed with the following

	No	Perceived by parents	Diagnosed by doctor
Asthma	( )	( )	( )
Allergic rhinitis	( )	( )	( )
Eczema	( )	( )	( )
Food allergy	( )	( )	( )

8. Was your child breastfed?
( ) yes ( ) no
9. Did you have a cat in your home during the first year of your child's life?
( ) yes ( ) no
10. In the past 12 months, have you had a cat in your home?
( ) yes ( ) no
11. Did you have a dog in your home during the first year of your child's life?
( ) yes ( ) no
12. In the past 12 months, have you had a dog in your home?
( ) yes ( ) no
13. In your child first year of life, did he/she have regular contact (at least once a week) with farm animals (example: cattle, pig, goat)?
( ) yes ( ) no
14. Has the child's mother had regular contact with farm animals while being pregnant with this child?
( ) yes ( ) no
15. Has the child ever been in day care home?
( ) yes ( ) no
a. If yes, at what age was the child sent for the first time?
_____ month old/ years old

16. Has the child's mother ever smoked?

	Never	Yes (occasionally)	Yes(regular/daily)
During pregnancy		( )	( ) ( )
During breastfeeding	( )	( )	( )
During the child's first year		( )	( ) ( )
At present		( )	( ) ( )

17. Has anyone ever smoked at home (indoors)?

	No	Yes
Before child's birth	( )	( )
During child's first year	( )	( )
At present	( )	( )

TAJUK: PREVALENS DAN FAKTOR-FAKTOR PENYAKIT-PENYAKIT ALERGI DALAM KALANGAN KANAK-KANAK YANG HADIR KE KLINIK PEDIATRIK DI HOSPITAL SERDANG PADA TAHUN 2013

Seksyen A: Sosio-demografi

Sila jawab semua soalan yang disediakan dengan menandakan ( ) pada kotak yang disediakan. Soalan yang dikemukan adalah mengenai anak cik/tuan/puan yang dimasukkan ke dalam Hospital Serdang.

1. Umur anak:_____tahun
2. Kaum ( ) Melayu ( ) Cina ( ) India ( ) Lain-lain
3. Jantina ( ) lelaki ( ) perempuan
4. Peringkat pelajaran emak
( ) sekolah rendah
( ) sekolah menengah
( ) universiti
7. Peringkat pelajaran ayah
( ) sekolah rendah
( ) sekolah menengah
( ) universiti

Seksyen B: Diagnosis penyakit alergi

1. Adakah anak anda didapati mempunyai masalah penyakit alergi dan didiagnos oleh siapa?
( ) Ya ( ) Tidak
Diagnos
( ) Keluarga sendiri
( ) Doktor

2.	Tidak	Pandangan famili	Diagnosis doktor
Adakah anak anda mempunyai asma?	( )	( )	( )
Adakah anak anda mempunyai ekzema berulang atau ruam gatal sekurang-kurangnya selama 6 bulan?	( )	( )	( )
Adakah anak anda mempunyai masalah dengan bersin atau hidung berair apabila anak anda tidak menghidap selsema?	( )	( )	( )

Adakah anak anda mempunyai masalah dengan mata berair yang gatal apabila dia tidak menghidap selsema?	( )	( )	( )
Adakah anak anda mempunyai alahan kepada makanan?	( )	( )	( )

Seksyen C: Profil Klinikal

Sila jawab semua soalan dengan menandakan satu ( ) pada setiap satu soalan.

1.Dalam tempoh 12 bulan pertama anak anda membesar, adakah anda biasanya memberikan paracetamol (contoh: panadol) untuk demam kepada anak anda?
( ) ya ( ) tidak

2.Dalam tempoh 12 bulan yang lalu, berapa kerap, secara purata, anda telah memberikan parasetamol kepada anak anda?
( ) tidak pernah
( ) sekurang-kurangnya sekali setahun
( ) sekurang-kurangnya sekali sebulan

3.Dalam tempoh 12 bulan pertama pembesaran, adakah anak anda telah mengambil antibiotik?
( ) ya ( ) tidak

4.Adakah anak anda telah mengambil sebarang suntikan vaksin sebelum ini?
( ) ya ( ) tidak

a. Jika ya, adakah anak anda mengambil vaksin ini dengan mengikuti jadual suntikan?
( ) ya ( ) tidak

5.Berapakah bilangan adik-beradik anak anda?
_____ adik beradik

6. Berapa ramaikah daripada mereka mempunyai penyakit alahan (ekzema, rinitis, asma, dan lain-lain) yang telah disahkan oleh doktor?
_____ adik beradik

7. Adakah ibu kandung anak itu telah didiagnosis dengan yang berikut

	Tidak	Pandangan famili	Diagnosis doktor
Asma	( )	( )	( )
Alergi rinitis	( )	( )	( )
Ekzema	( )	( )	( )
Alergi makanan	( )	( )	( )

8. Adakah anak anda diberikan susuan ibu?
( ) ya ( ) tidak

9. Adakah anda mempunyai kucing di rumah pada tahun pertama anak anda membesar?
( ) ya ( ) tidak

10. Dalam tempoh 12 bulan yang lalu, adakah anda mempunyai kucing di rumah anda?
( ) ya ( ) tidak

11. Adakah anda mempunyai anjing di rumah pada tahun pertama anak anda membesar?
( ) ya ( ) tidak

12. Dalam tempoh 12 bulan yang lalu, adakah anda mempunyai anjing di rumah anda?
( ) ya ( ) tidak

13. Pada tahun pertama anak anda membesar, adakah dia mempunyai hubungan yang tetap (sekurang-kurangnya sekali seminggu) dengan haiwan ternakan (seperti lembu, babi, kambing)?
( ) ya ( ) tidak

14. Adakah ibu anak itu mempunyai hubungan dengan haiwan ladang ketika sedang mengandung anak ini?
( ) ya ( ) tidak

15.Adakah anak anda pernah dihantar di rumah penjagaan kanak-kanak?
( ) ya ( ) tidak

a. Jika ya, pada usia berapakah anak anda dihantar untuk kali pertama?
_____ bulan/ tahun

16.Adakah ibu anak itu pernah merokok?

	Tidak pernah	Ya (jarang)	Ya (kerap)
Ketika mengandung	( )	( )	( )
Ketika memberi susuan ibu	( )	( )	( )
Ketika tahun pertama anak membesar	( )	( )	( )
Sekarang	( )	( )	( )

17. Adakah sesiapa yang pernah merokok di rumah?

	Tidak	Ya
Sebelum anak itulahir	( )	( )
Ketika tahun pertama anak membesar	( )	( )
Sekarang	( )	( )