

An Expert System to Detect Pediatric Skin Allergies

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Abstract: Allergy is one of the many types of diseases found in children. Allergic disease can occur and can attack in all parts of the body, but it also depends on the place where the allergic reaction may occur. Allergy is the manifestation of hyper-responsive of the organs which affected by allergies, such as in the area of the skin. Skin allergies in children can have an impact on children's health such as fever, itching, and rashes. During this time a lay community always uses the services of a doctor to perform a skin allergy disease diagnosis in children. To help communities lay in diagnosing and finding solutions for skin allergy disease in children, therefore, this research will create a model based on knowledge representation, and expert mobile application expert system which detects allergies the skin on the child while looking for a solution is healing based on information and data provided by the user.

1 INTRODUCTION

The child is the most precious treasure for parents. Children's health became the top priority for married couples that have children. Allergy is one of the many types of diseases found in children. Allergic disease can occur and can attack in all parts of the body, but it depends in the place where the allergic reaction may occur. Allergy is the manifestation of hyper-responsive of the organs affected by allergies, such as in the area of the skin, nose, ears, lungs, or the gastrointestinal tract. Allergies arising in the nose can be caused by cold; Allergies arising in the lungs can be in the form of asthma; Allergies arising in the skin can be in the form of eczema, as well as atopic dermatitis; While Allergies arising in the eyes that is conjunctivitis. Allergy is the sensitivity of the body against foreign matter that appears in the body. But the reaction of every individual against allergies is different; some individuals are more sensitive than other individuals. Efforts to prevent allergy that is exposed utilizing avoiding contact with the allergen. (Pogacar, 2017).

Allergic diseases can arise at different ages, such as children, often appears allergic eczema or allergic to food. The other type of allergy is quite popular attacking an individual, i.e., asthma and

frequently contracted this allergy is a child and adult. This allergy disease that occurs in individuals who have a tendency based on genetic factors, which are inherited from the parent. When a parent suffers from allergies, then it will likely decline to about 50%, but if it was just one of those suffering from allergies, it will most likely only 25% (Tüzün, 2015).

Allergy, especially in children, is a severe problem that is experienced by the elderly. Older people tend to panic and do not know what to do when children are cranky, crying because of the case of allergies. Allergy is a type of allergic reaction on the skin most often experienced by small children. There are several types of skin allergies are often experienced as children from Atopic dermatitis, Urticaria, Allergic contact dermatitis, Seborrheic dermatitis, Diaper rash, etc. Lack of informed parents about this type of allergy-causing incorrect handling so that skin damage in children who are getting worse, if not promptly sent to the doctor as soon as possible. Therefore, in this study, the author will create a knowledge representation model and applications that can help parents to diagnose and detect early skin allergies in children.

2 METHOD

- a. Expert system and Knowledge Base System
Expert System, i.e., information systems that deal with problems real and complex which is an interpretation of an expert. An expert system is used to answer the question/suggestion, a member's views and conclusions as an expert. So the expert system is a computer program that contains knowledge from one person more expert about a specific field.

One of the important components in the expert system is a Knowledge Base System (Naser, 2016). Knowledge Base System (KBS) is software that follows the way experts in taking a decision. KBS aims to solve complicated (complicated problems) and follow the IF-THEN. (Expert System Design Shells) (Durkin, 1990) (Ignizio, 1991)

KBS is composed of the user interface, knowledge base and inference engine, (Expert System Design Shells) (Dutta, 1997) (Giarranto, 2004) as shown in Figure 1.

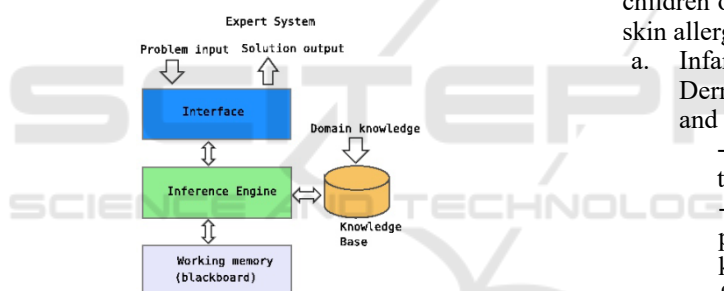


Figure 1: The main component of the Knowledge Base System (Naser, 2016)

- b. Pediatric Skin Allergies
Allergies occur when the body's immune system reacts against the foreign object, which is probably not harmful to others.

When the incoming foreign bodies, the body produce antibodies so that foreign matter does not cause disease. In people with allergies, the antibodies produced despite the foreign object was not dangerous. In the event of contact with the allergen (allergy-causing materials), the body will react by making the skin in flamed; sinus disorders also cause respiratory, or digestive.

Skin allergies can be caused by several types of allergens, with different types of symptoms. For example, atopic eczema, food

allergies, drug allergies, contact dermatitis and allergy, cold allergic.

- c. Decision Table
Decision tree classification method and prediction are very powerful and famous. The decision tree changes the fact becomes the rules. The rules can be easily understood with the natural language. And they can also be expressed in the form of database languages such as Structured Query language to find the record at a specific category.

A decision tree is also useful for exploring the data, find hidden relationships among some candidate input variable with a variable target. Process on the decision tree is changing the shape of the data (table) to be a model tree, change the model tree became the rule, and to simplify the rule.

3 RESULT AND DISCUSSION

In this study, after some survey of skin diseases in children obtained the classification of some diseases skin allergies in children are as follows:

- a. Infantile Atopic Dermatitis (0-1)-atopy
Dermatitis often appears in the first year of life and begins around the age of 2 months.
- This type is also called milk scale because the lesion resembles the former milk.
 - Lesions in the form of eritematosa plaque, papulo-vesicles are delicate and became the krusta due to scratching on the cheeks and forehead.
 - itching arising causes child becomes restless, sleeplessness, and often cry.
 - eksudatif, erosion Lesions, and secondary infections can cause krusta and extend generalisata and become chronic lesions and residif.

- b. Diaper Dermatitis
- Most common in babies, symptoms usually begin at the age of 3 weeks early to 12 weeks. The highest frequency at the age of 9-12 months and 12-24 of the month
 - Degeneration eritematosa, unbounded firmly (following the form of the diapers out of contact, mons pubis, scrotum, and lower abdomen) accompanied papule, vesicle, pustule, erosion, maceration, and eksoriasi.
 - in the further stage (chronic), more severe clinical picture (Jacquet's dermatitis) can be erosion, nodules, infiltrates and ulceration.

- When infected with Candida (usually to be considered if more than three days), it appears the plaque eritematosa (bright red), more wet lesions accompanied by maceration, unbounded firmly, at the edge of the lesion their papule, pustule, sometimes there are satellite lesions.
- c. Allergic Contact Dermatitis
 - Rare in children under the age of 2 years because their immune systems are not yet mature and rare at the age of puberty. May develop due to several applications such as Parabens, lanolin, neomycin, and an elastic bandage around the diaper, or due to contact with nickel and other metals in jewelry.
 - The lesions are preceded by a form of vesicles, which can then be ruptured and became an eczematous feels itchy lesions. The involvement of the regional flexural is very important in diagnosis.
 - A history of exposure to an allergen exposure of location and the area is crucial.
- d. Irritant Contact Dermatitis
 - Usually caused by contact with materials such as detergents, bleach, powder, SOAP or baby products.
 - Irritant reactions frequently occur and are reported on the soles of the feet due to the use of footwear occlusive accompanied or without a moist atmosphere.
 - Lesions in the form of a glossy, fissure hyperkeratosis on the plantar foot, nor could be eczema vesicles that feel itching.
- e. Seborrhoeic Dermatitis
 - Seborrhoeic Dermatitis in infants often occurs at the age 3-4 Sunday's early life or the first three months. Often called cradle cap.
 - In children, who normally complain about are the redness and yellowish scales on the scalp, eyebrows, nasolabial folds, postauricular, forehead, Chin, and chest axial. Lesions rarely found areas of the umbilicus, perineum, and anogenital distance.
 - Lesions in the form of plaque eritematosaskuama with yellow or white greasy and not itchy. Squama lesions in children can be subtle, diffuse or thicken and stick. It can also show lesions petaloid or pitiriasiformis.
 - In infants are generally temporary.

- f. Urticaria
 - a rash or skin lesions in the form of reddish skin with Buran, i.e., a bony elevation or unbounded firmly with a border of pale accompanied with itching (pruritus) moderate to heavy, poignant, and or the sensation of hot like fire.
 - Lesion of urticaria can appear on any part of the body, including the face, lips, tongue, throat, and ears.
 - The diameter of the lesion can vary
 - When the process is oedematous extending into the dermis and/or subcutaneous and the submucosa layer, then it is called angioedema.
 - Urticaria and angioedema can occur at any location simultaneously or independently.
 - Generally about Angioedema of the face or part of a limb, may be accompanied by pain but rarely pruritus, and can last up to several days.

In data studies about the disease, prevention, and therapy to be carried out are arranged in a decision table. The decision table can be seen in table 1, namely the classification of skin diseases in children. In this example, data is used for children who are one year old using some questions and the results of a Yes or no answer.

Table 1: Decision Table of Pediatric Common Skin

Age	Itchy	Looks like	Question		Result
			Question I	Question II	
1	Y	1	Y		Atopi Infantil Dermatitis
			N		Atopi Infantil Dermatitis (uncommon lesion location)
		2	Y		Irritant Contact Dermatitis
			N	Y	Allergies Contact Dermatitis
	3	Y		Urticaria	
		N		Urticaria (uncommon lesion location)	
	N	1	Y		Diaper Dermatitis
			N		Diaper Dermatitis (uncommon lesion location)
		2	Y		Seborrheic dermatitis
			N		Seborrheic dermatitis (uncommon lesion location)
3					

Based on decision tables above then created software with the display as follows in figure 2:

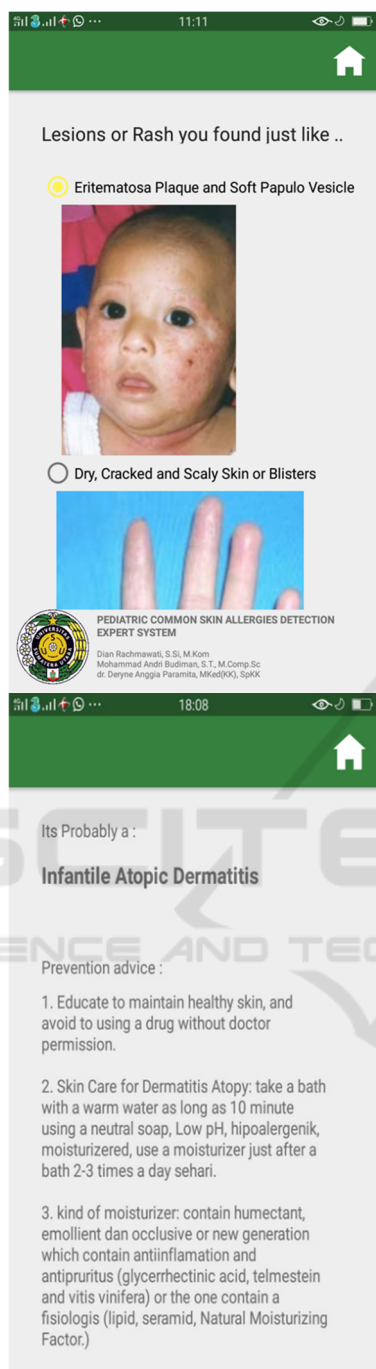


Figure 2: Expert System of Pediatric Common Skin Allergies

Of the 20 respondents who use the application, 80% were either helped by the existence of these applications because they can detect allergic diseases in children with early and obtain the solutions for prevention and treatment. While 20% felt the difficulty of using this application due to the constrained language and many of the medical term.

4 CONCLUSIONS

The conclusions of this research are skin allergies in childhood diseases can be classified into sections, i.e., Infantile Atopic Dermatitis, Diaper Dermatitis, Allergic Contact Dermatitis, Irritant Contact Dermatitis, Seborrhoeic Dermatitis, and Urticaria. Symptoms – symptoms of skin allergies in children it can be modeled in a decision table contains questions Yes and no. Using the answers from the user and inference techniques. The system gives the output form of the name of the disease and its prevention and cure ways. 80% of respondents helped by this application.

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