

## Skin Test Reactivity to Fungal Aeroallergens in Asthmatic Children in Southern Iran

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The development of asthma appears to involve interplay between host factors and environmental exposures. The most important environmental factors are viral respiratory infections and airborne allergens in consist of sensitization to fungal aeroallergens<sup>[1]</sup>. Exposure to fungal aeroallergens was reported to be a cause of asthma in many parts of the world.

There are few data on the prevalence of allergy to molds in Iran. This study was performed to determine the positive skin prick test to molds and their related risk factors in asthmatic children in Shiraz, southern Iran (Table 1).

Skin prick test was done in two hundred and thirty asthmatic children with five types of common fungal aeroallergens (*Aspergillus fumigatus*, *Cladosporium herbarum*, *Penicillium*, *Alternaria* and *Rhizopus*).

Out of 230 asthmatic children (175 boys, 55 girls) with mean age  $6.34 \pm 3$  years, 25 (10.9%) had positive skin test to molds. In other studies this rate was reported to be different between 2% to 80%<sup>[2]</sup>.

Of 25 children with positive skin test to molds, the common fungal aeroallergen was *Aspergillus* followed by *Cladosporium*, *Alternaria*, *Penicillium* and *Rhizopus*. Amin R et al studied airborne fungal spores in Shiraz. The most

important fungi, in order of numbers, had been *Alternaria*, *Aspergillus*, *Rhizopus* and *Penicillium*<sup>[3]</sup>. With regard to results of skin prick test in our study, it seems that *Alternaria* is the most common outdoor fungus, but *Aspergillus* could be the most important indoor fungus.

Another study showed in asthmatic patients that main skin test reactivity to fungi was for *Aspergillus* but most frequent cultured fungus was *Cladosporium*<sup>[4]</sup>.

Of 25 subjects with positive skin test to molds, 5 (20%) were females, 20 (80%) were residents of urban areas and 4 (56%) lived in homes older than ten years. There was no significant correlation between the prevalence of mold skin test positivity in males and females, rural and urban habitats and age of homes.

**Table 1:** Risk factors of 25 patients with positive skin test to fungal aeroallergens

Variables	Patients Number (%)	P value
<b>Age</b>		
≤ 2 y/o	8 (32)	NS
> 2 y/o	17 (68)	
<b>Gender</b>		
Boy	20 (80)	NS
Girl	5 (20)	
<b>Site</b>		
Urban	20 (80)	NS
Rural	5 (20)	
<b>Type of home</b>		
Apartment	1 (4)	0.04
House	24 (96)	
<b>Age of homes</b>		
≤ 10 y/o	11 (44)	NS
> 10 y/o	14 (56)	
<b>Father's education</b>		
Primary school	8 (32)	NS
High school	12 (48)	
College degrees	5 (20)	
<b>Mother's education</b>		
Primary school	10 (40)	NS
High school	12 (48)	
College degrees	3 (12)	
<b>Damp homes</b>	7 (28)	NS

NS: Not significant

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There was no difference in the frequency of positive skin test response to fungi in infants ( $\leq 2$  years of age) and older children in our study. This finding demonstrates that fungi allergy can start very early in life.

Fifty-nine (25.7%) fathers had college degrees of whom five (8.5%) children had positive skin test to molds. Thirty-nine (17%) mothers had college degrees and three (7.7%) of their children had positive skin test to molds. We found no significant relationship between parents' education level and results of the mold skin prick test. In other study, authors analyzed 57,000 children aged 6-12 yrs from 13 diverse countries. Multiple logistic regressions showed that low parental educational level was associated with an increased prevalence of wheeze and nocturnal dry cough<sup>[5]</sup>. There was no reason for our finding; only small sizes of parents with college degree were available.

One child lived in apartment and 24 (96%) in houses. There was significant differences in the frequency of positive skin test response to mold and living in apartment or house. Ginger et al examined home characteristics and level of indoor allergens in 499 homes of asthmatic children. Increased temperature in apartment could be related to warming of surface and resultant decreased micro environmental relative humidity<sup>[6]</sup>. We think that decreased entrance of fungal aeroallergens and low humidity in apartments are causes of these differences.

The site's weather of our study is hot and dry; there were no significant differences between positive skin test to mold with dampness of home in this study. Other studies have shown that home dampness increases indoor mold burden and is associated with increased allergic symptoms among young children<sup>[7]</sup>.

The results of this study showed that sensitivity to fungal aeroallergens may occur in asthmatic children. A positive reaction may even be observed during infancy. It seems that type of home is a significant factor to increase the presence of molds in residential areas. It is reasonable to consider fungal aeroallergens in the routine battery of inhalant skin tests in this geographic location.

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**Key words:** Asthma; Fungi; Skin prick test; Children; Iran

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## Frequency of Hypoxic-Ischemic Encephalopathy among Hospitalized Neonates in West Iran

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Hypoxic-ischemic encephalopathy (HIE) is brain damage from a shortage of oxygen or blood flow to the tissues<sup>[1,2]</sup> and is characterized by clinical and laboratory evidence of acute or subacute brain injury due to asphyxia<sup>[1-6]</sup>. It is a major contributor to neonatal death and morbidity<sup>[4-6]</sup>. 15%-20% of HIE cases die during the neonatal period and 30% of those who survive suffer from neurodevelopmental disorders<sup>[1,3,6]</sup>.

An estimated 23% of the 4 million neonatal deaths and 8% of all deaths at <5 years of age throughout the world each year are associated with signs of asphyxia at birth<sup>[1,4]</sup>. Even at referral centers in developed countries, death or moderate to severe disability occurs for 53% to 61% of infants diagnosed as having moderate to severe HIE<sup>[1,4,6]</sup>. Children with moderate/severe neonatal encephalopathy are at risk for reduced school performance, whereas those with mild encephalopathy have school performance scores similar to those of their peers<sup>[1,6]</sup>. HIE is one of the most common causes of cerebral palsy and other severe neurologic deficits in children occurring in two to nine of every 1000 live births<sup>[1-6]</sup>. The incidence of HIE reported in different studies varies widely<sup>[2-6]</sup>, which may be explained by the selection criteria for studies of HIE during the neonatal period<sup>[3,4]</sup>.

The aim of the present study was to evaluate the frequency of hypoxic-ischemic encephalopathy in hospitalized neonates with seizure in Hamedan (west Iran) in a two year period. This is a retrospective cross sectional study on 34 neonates from 2004 to 2006.

Inclusion criteria were: all neonates with seizures due to HIE asphyxia having pH below 7, 5<sup>th</sup> minute Apgar score between 0 and 3,

decreased muscle tone and consciousness, cortical atrophy in brain CT scan and multiple organ involvement (eg, kidney, lungs, liver, heart, intestines). Neonates with jitteriness were excluded from the study.

The study was based on the recorded files of the patients. CT scan findings, blood gas findings, Apgar score of 5<sup>th</sup> minute, decreased muscle tone and consciousness, seizure, age, sex and birth weight were recorded and analyzed using SPSS 13. Management plan for evaluation of hypoxic-ischemic encephalopathy included: Profound metabolic or mixed acidemia (pH<7), persistence of Apgar score of 0-3 for longer than 5 minutes, neonatal neurologic sequelae (eg, seizures, coma, hypotonia), multiple organ involvement (eg, kidney, lungs, liver, heart, intestines) and cortical atrophy in brain CT scan.

From 34 neonates with seizure, 11 (32.4%) had HIE. The infants who developed HIE had significantly 5<sup>th</sup> minute Apgar score between 0 and 3, decreased muscle tone and consciousness, pH below 7 in blood gas, cortical atrophy in brain CT scan and multiple organ involvement. The mean age of the neonates was 14.03±10.05 days (range 1 to 29 days). 25 (73.5%) neonates were boys and 9 (26.5%) girls. 23 (67.6%) neonates had normal weight (2500 to 4000 gr), 6 (17.6%) low birth weight (1500 to 2500 gr) and 5 (14.7%) very low birth weight (less than 1500 gr).

In 1980, the term hypoxic ischemic encephalopathy (HIE) came into use for all phases of ischemic changes<sup>[1]</sup>. HIE is a potential cause of brain injury that can produce some alterations of the neurologic development of the newborn<sup>[4-6]</sup>. The incidence of HIE reported in different studies varies widely. The variability in the reported incidence of HIE may be explained by the selection criteria for studies of HIE during the neonatal period<sup>[2-6]</sup>. In our study the incidence rate of Hypoxic-ischemic encephalopathy was 32.4%, which is higher than rates reported from other countries<sup>[1,2,4,5]</sup>. This difference may be due to evaluation of the incidence of HIE in newborns *with* seizure in our study. HIE occurs in two to nine per 1000 live births in developing countries<sup>[1-6]</sup>. Thomberg et al from Sweden reported an incidence rate of five and seven per 1000 live births<sup>[4]</sup>. The

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incidence of birth asphyxia in Palsdottir study in Iceland was 9.4/1000 live term births<sup>[2]</sup>. In the other study of Palsdottir et al the incidence of HIE after birth asphyxia was 1.4/1000. In Gonzales study in Spain the incidence of HIE was 4.66 cases per 100 full-term newborns, this is higher than the rate reported in the present study<sup>[5]</sup>.

In our study 67.6% of neonates had normal birth weight, 17.6% low birth weight and 14.7% very low birth weight. Neonates with normal birth weight were more than those with other birth weights. This finding is different from the results of other studies<sup>[1-6]</sup>.

The incidence of cortical atrophy in brain CT scan in our study was 32.4%. This is consistent with incidence rates reported in the literature<sup>[1,3,6]</sup>.

Neuroimaging appearances and EEG results help to prognosticate outcomes for preterm and term infants; the overall prognosis is poor<sup>[1,6]</sup>. Eghbalian and Monsef reported that brain CT scan appearance helps to prognosticate the outcome<sup>[3]</sup>. Supportive care includes maintenance of adequate ventilation, avoidance of hypotension, maintenance of normal metabolic status including blood glucose, fluids, nutritional status, control of seizures, and control of brain edema. Selective brain hypothermia may improve outcome in HIE infants<sup>[1]</sup>.

This was a retrospective study with its limitations. We recommend similar prospective

research documenting that improvement in antenatal care and intra-partum monitoring can decrease the incidence of HIE.

**Key words:** Hypoxic-ischemic Encephalopathy; Neonate; Brain damage

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