The second generation and asthma: Prevalence of asthma among Israeli born children of Ethiopian origin

Michal Shani a,b,*, Yael Band c,f, Mona Iancovici Kidon d,f, Michael J. Segel c,e,f, Reena Rosenberg a,b,f, Sasson Nakar a,b,f, Shlomo Vinker a,b,f

a Department of Family Medicine Central District, Clalit Health Service, Israel
b Department of Family Medicine, Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel
c Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel
d The Children’s Health Centre, Paediatric Allergy, Rishon Lezion, Israel
e Institute of Pulmonology, Sheba Medical Center, Tel Hashomer, Ramat Gan, Israel

Received 28 July 2012; accepted 10 December 2012
Available online 18 January 2013

KEYWORDS
Asthma; Ethiopian immigrant; Second generation; Primary care

Summary
Background: Immigrant populations moving from undeveloped countries with low asthma prevalence have shown increased asthma prevalence in their new Westernized environment. We compared the prevalence of asthma among Israeli born children of Ethiopian origin to that in non-Ethiopian children.

Methods: Cross sectional study. Data was retrieved for children aged 6–18 years in four clinics with a large proportion of patients of Ethiopian origin. For each Israeli born child from Ethiopian origin we matched an Israeli born child of any other origin of the same age and gender, receiving primary care from the same physician at the same clinic. Asthma was defined as any visit to a primary care physician, emergency room or hospitalization related to asthma symptoms or subsequent purchasing of any asthma medication during 2008.

Results: 1217 children of Ethiopian origin and 1217 matched controls were studied. More Ethiopian children came from families with a low socioeconomic status (23.9% vs. 17%, \(p < 0.001\)), and with significantly lower parental smoking (5.1% vs. 40.1%, \(p < 0.001\)). The prevalence of asthma was 92/1217 (7.5%) among children of Ethiopian origin, compared to 122/1217 (10.0%) among the control group (OR \(Z 0.74\), 95% CI: 0.56–0.98, \(p = 0.032\)). When adjusted for tobacco exposure, the OR for risk of asthma in the Ethiopian children was 0.80 (95% CI: 0.59–1.09, \(p = 0.16\)).

* Corresponding author. Family Medicine Department Central District, C/O Hadas, 56 Chen St., Rehovot 76469, Israel. Tel.: +972 8 9466394; fax: +972 8 9364007.
E-mail address: michal.shani@gmail.com (M. Shani).

© 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.rmed.2012.12.024
Background

Asthma and allergy are the epidemic of the past century, with increased rates documented worldwide. Immigrant populations traditionally moving from rural undeveloped countries with relatively low disease prevalence have consistently shown an increased prevalence of asthma in their new, usually Westernized, environment.

Ethiopian immigrants arrived in Israel in two main waves, during the 1980s and during the early 1990s. In addition, immigration from Ethiopia to Israel continued in small numbers throughout the years. There are over 100,000 people of Ethiopian origin in Israel today. Asthma prevalence among Ethiopian immigrants upon arrival was 2.5%. The reported prevalence at that time was 3.7% in the general Israeli population.

A study performed in Israel during the 1990s found a threefold higher rate of asthma in adults among Ethiopian immigrants when compared to the general population — 17% vs. 5.8%, and noticed a trend toward increasing frequency of asthma with increased time from immigration. Asthma prevalence was 14.4% in immigrants six years after arrival in Israel vs. 20% in immigrants 13 years after immigration.

Another study from Israel showed that in children of Ethiopian origin, total IgE levels were high upon arrival but gradually decreased over the years after immigration. In healthy Israeli born children of Ethiopian origin, total IgE levels were similar to age matched Israeli born controls; however, Israeli born children of Ethiopian origin with clinical evidence of respiratory atopic disease (asthma and/or allergic rhinitis) had significantly higher levels of total IgE than non-Ethiopian age matched asthmatics. These observations on the whole, may implicate both genetic and environmental causes.

Several other studies worldwide have shown a higher rate of asthma in immigrant populations when compared to the local population. However, as far as we know, no data has been published concerning the prevalence of asthma in the second generation, the children of immigrating parents, in Israel or any other Western immigrant society.

This present study aimed to compare the prevalence of asthma among Israeli born children of Ethiopian origin to the disease prevalence in non-Ethiopian children living in the same neighborhood.

Methods

The study was conducted in the Central District of “Clalit Health Service” (CHS) in Israel, and was approved by the Meir Health Center ethics committee (Approval Number 103/2010).

Conclusion: Asthma prevalence in the second generation of Israeli born children of Ethiopian origin does not seem to differ from other children in their community. This observation supports the theory that environmental exposures, rather than genetic factors, dictated the increase in asthma in this immigrant population.

© 2013 Elsevier Ltd. All rights reserved.

Patients

Data was retrieved in 4 urban clinics with a high percentage of patients of Ethiopian origin, serving a total population of over 25,000 patients of all ages. Each clinic serves its local population.

All Israeli born children of Ethiopian origin (both parents Ethiopian born) age 6–18 years were included in the study. Children <6 years old were not included in order to exclude non-asthmatic phenotypes of early childhood wheezing. For each Israeli born child of Ethiopian origin we matched an Israeli born child of any other origin (neither parent of Ethiopian origin) that was, of the same age and gender, receiving primary care from the same physician at the same local clinic. (Controls were chosen randomly if there was more than one match). We retrieved information about SES, number of siblings, chronic diagnoses, hospitalizations, emergency room visits and parents’ smoking status.

We used a case definition of asthma as any visit to a primary care physician, emergency room (ER) or hospitalization related to asthma symptoms. Specifically, any visit related to asthma symptoms such as dyspnea, chest tightness, cough, nocturnal or exercise induced cough, that was summarized by the primary care physician as asthma/wheezing/bronchitis, or that led to the prescription of any asthma medication, or to the subsequent purchase of asthma medication (bronchodilators: terbutaline or salbutamol, inhaled steroids: budesonide or fluticasone, combined inhalers or montelukast), from January 1st to December 31st 2008, was considered to indicate asthma.

All community pharmacies used by CHS are computerized and report to one central repository. We documented all prescriptions of asthma medications that were filled by the patients during 2008. CHS issues asthma medications and
Asthma prevalence in second generation immigrants

521

Table 1

Basic characteristics of the groups.

<table>
<thead>
<tr>
<th></th>
<th>Ethiopians</th>
<th>Total control group (1217)</th>
<th>p-Value</th>
<th>Both parents born in Israel(^a) (572)</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (male)</td>
<td>601 (49.4%)</td>
<td>601 (49.4%)</td>
<td>1.0</td>
<td>268 (46.8%)</td>
<td>0.318</td>
</tr>
<tr>
<td>Age (years)</td>
<td>11.1 (6–18)</td>
<td>11.1 (6–18)</td>
<td>1.0</td>
<td>10.9 (6–18)</td>
<td>0.022</td>
</tr>
<tr>
<td>Born in the winter</td>
<td>404 (33.2%)</td>
<td>392 (32.2%)</td>
<td>0.604</td>
<td>203 (35.4%)</td>
<td>0.339</td>
</tr>
<tr>
<td>Low socioeconomic status</td>
<td>220 (18.1%)</td>
<td>139 (11.4%)</td>
<td>&lt;0.001</td>
<td>50 (8.7%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>No. of children in the</td>
<td>3.4 (1–10)</td>
<td>2.8 (1–8)</td>
<td>&lt;0.001</td>
<td>3.1 (1–9)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>family (range)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At least one parent smokes</td>
<td>63 (5.1%)</td>
<td>489 (40.1%)</td>
<td>&lt;0.001</td>
<td>269 (47.0%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Average number of chronic</td>
<td>0.37 (0–5)</td>
<td>0.42 (0–5)</td>
<td>0.414</td>
<td>0.37 (0–3)</td>
<td>0.807</td>
</tr>
<tr>
<td>diagnoses (range)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Compare to the study group (Ethiopians).

Results

A total of 2434 children were studied, 1217 children of Ethiopian origin and 1217 matched controls of any other origin. Both parents of 572 (47.0%) children in the control group were born in Israel and both parents of 462 (37.0%) children were born in former USSR.

Basic characteristics of the groups are reported in Table 1. There was a perfect match as related to the primary care physician and the clinic between the groups.

The Ethiopian children differed from their age and sex matched controls, in that more came from families with a low SES (18.1% vs. 11.4%, \(p < 0.001\)), and they had significantly more siblings per family (3.4 vs. 2.8, \(p < 0.001\)) and significantly lower parental reporting of tobacco smoking (5.1% vs. 40.1%, \(p < 0.001\)).

In total 214 (8.8%) of all children fulfilled the case definition for asthma. Households reporting parental smoking had a higher asthma rate compared to smoke free households (10.9% vs. 8.2%, \(p = 0.05\)).

The rate of asthma diagnosis was 92/1217 (7.5%) among children of Ethiopian origin, as compared to 122/1217 (10.0%) among the control group, OR = 0.74 (95% CI: 0.56–0.98, \(p = 0.032\)). However, when adjustments were made for environmental tobacco exposure, the adjusted OR for risk of asthma in the Ethiopian children was only 0.80 (95% CI: 0.59–1.09 \(p = 0.16\)). After further adjusting for low SES, age, and the number of children in the family, the OR was 0.89 (95% CI: 0.65–1.23, \(p = 0.481\)).

Many of the children in our control group are the children of immigrants from the former USSR. In order to confirm the validity of results we compared asthma rates in the 2nd generation Ethiopian children to the subgroup of the control children whose parents were both born in Israel \((n = 572)\). The asthma rate in this subgroup was 41/572 (7.2%, OR compared to the Ethiopian children 0.93, 95% CI: 0.64–1.37, \(p = 0.723\)). After adjustment for age, gender, SES, environmental tobacco exposure and number of siblings, the OR was 0.76 (CI: 0.50–1.15, \(p = 0.197\)).

Discussion

Immigrant populations moving from rural undeveloped countries with a relatively low prevalence of asthma have consistently shown an increased prevalence of asthma in their new Westernized environment.2–5 Ethiopian immigrants to Israel are a case in point. Children in Ethiopia have the lowest prevalence of wheezing symptoms compared to various other countries,11 and Ethiopian immigrants had a low prevalence of asthma on arrival in Israel,6 but the rates among the immigrants increased with time since immigration.10 As time passed from immigration, asthma rates increased up to 3 fold that of the general native Israeli population.8

Living in a rural area with no urbanization, few immunizations, significant rates of severe childhood infections and chronic parasitic infestation12–14 and low rates of smoking might explain the low documented level of asthma in Ethiopia.

Significant factors in the observed increase in the rates of asthma after immigration might be the rapid urbanization in Israel, and the subsequent lifestyle and dietary changes, along with instant deparastization, similar to other immigrant populations worldwide.

The role of genetic predisposition to asthma and atopy in asthma epidemiology in Ethiopian is difficult to ascertain from these studies.

In this study, we have shown that the rate of asthma in children of Ethiopian descent born in Israel (second generation immigrants) is similar to the rate in their Israeli peers of other ethnic origins. The asthma prevalence among children of Ethiopian descent (7.6%) and children of parents born in Israel (7.2%) is comparable to the asthma prevalence in 8th grade (13–14 years old) Jewish children who...
in Israel (7.2%) as reported by the Ministry of Health.\textsuperscript{15} Moreover, the disease severity as reflected in records of medication and health resource usage, such as hospitalizations or ER visits, does not seem to significantly differ between the groups we studied.

Our present study has a few significant limitations. It relies on clinical diagnosis and medication use, and not on an objective measure such as lung function. Clinical diagnosis and prescribing patterns might differ among physicians. To avoid this problem we matched the children by their primary care physician. It is reasonable to assume that the diagnostic and prescribing patterns for each physician remain relatively constant during the study period, thus largely offsetting this potential confounding bias.

Excluding children less than 6 years of age from our study screened out many non-asthmatic phenotypes of early childhood wheezing. However including patients according to usage of asthma medication alone during a defined time period may have included some children who do not have asthma. Though this bias might change the actual number of children diagnosed with asthma, it should influence the study group and the controls in a similar manner.

Another limitation might be the difference in parents’ smoking between the groups. We therefore corrected asthma rates for parental smoking status in our analysis. Furthermore, it is important to note in this context that the high asthma prevalence recorded among Ethiopian immigrants\textsuperscript{4} was despite the very low smoking prevalence among this group.

The study’s strengths are, first, in the completeness of the medication data, since purchasing medication is done within CHS pharmacies. Second, using community clinics which serve the local population within the same area means equal exposure to pollutants. Third, matching for the primary care physicians minimizes the variation in diagnosis and prescription writing between groups. Finally, the ability to connect children to their parents’ information enabled us to correct for additional potential biases.

Because Ethiopian immigrants to Israel are of a different genetic background from the non-Ethiopian Israeli population, and also were generally migrating from an underdeveloped rural to a Western, urban environment, their asthma epidemiology is an excellent model for studying the relative contributions of environment and genetics. Taken together, the low prevalence of asthma in Ethiopia, the secular trend of increasing prevalence with time from immigration in Ethiopian immigrants to Israel, and our current finding that second generation immigrants from Ethiopia have an incidence similar to that in second generation native Israelis, support the conclusion that the environmental influence is dominant over the genetic effect in these dynamics in asthma epidemiology.

Funding

The study had no funding.

Conflict of interests

None.

References


<table>
<thead>
<tr>
<th>Table 2</th>
<th>Medication use in 2008 among the asthmatic children (number of children who purchase the medication at least once in 2008).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All the asthmatic children (214)</td>
</tr>
<tr>
<td>Bronchodilators</td>
<td>165 (77%)</td>
</tr>
<tr>
<td>Inhaled steroids</td>
<td>32 (15%)</td>
</tr>
<tr>
<td>Combined inhalers</td>
<td>20 (9%)</td>
</tr>
<tr>
<td>Montelukast</td>
<td>22 (10%)</td>
</tr>
<tr>
<td>Any controller</td>
<td>72 (34%)</td>
</tr>
</tbody>
</table>


