

Are food intolerances and allergies increasing in immigrant children coming from developing countries?

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There are not available data concerning the occurrence, the clinical features and the environmental risk factors for food intolerances and allergies in immigrant children. The aim of the study was to evaluate rates, distribution, clinical features and environmental risk factors for food intolerances and allergies in immigrant children. Hospital records of 4130 patients with celiac disease (CD), cow milk protein intolerance (CMPI) and food allergies (FA) diagnosed in 24 Italian Centres from 1999 to 2001 were retrospectively reviewed, comparing immigrant patients with Italian ones. 78/4130 (1.9%) patients were immigrant: 36/1917 (1.9%) had CD, 24/1370 (1.75%) CMPI and 18/843 (2.1%) FA. They were evenly distributed across Italy and their native areas were: East Europe (23/78), Northern Africa (23/78), Southern Asia (14/78), Saharan and Sub-Saharan Africa (9/78), Southern America (4/78), Far East (3/7), Middle East (2/78). Despite differences in their origin, the clinical features of immigrant children were similar to the ones of Italian patients and among each ethnic group. The majority of them were born in Italy (57/78) or have been residing in Italy since several years (19/78). All of them had lost dietary habits of the native countries and had acquired those of the Italian childhood population. Food intolerances and allergies are present also in children coming from developing countries, and paediatricians will need to have a full awareness of them because the number of immigrant children in Italy is quickly increasing. The clinical features of food intolerances and allergies appear the same in each ethnic group, despite differences in races. Sharing of dietary habits with the Italian childhood population seems to be an important environmental risk factor.

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In the last 25 yr the migratory flow from developing countries towards Italy has quickly increased and to day a large part of the immigrant adults living in Italy has a regular residence permit and get married (1). Consequently, the number of infants born in Italy from immigrant parents and of immigrant children coming from their native countries to join their original families have largely increased during these last years [in December 2001 they were 326,101 (1),

amounting to 2% of the entire paediatric population living in Italy]. These children share the same environment of the Italian ones and, whether they have also the same dietary habits as consequence of their integration with the customs of the Italian childhood population, may be at risk for food intolerances and allergies.

During the last decades allergic diseases (asthma, food intolerances and allergies, atopic eczema, etc.) are increasing in developed

countries as an epidemic (2, 3). In this respect in western Europe and in USA, the prevalence of food intolerances and allergies during childhood is well known, involving about 1–6% of the native paediatric population (4–6). Instead, little is known on food intolerances and allergies in developing countries (7–9), and no study addressed epidemiology, clinical features and environmental risk factors for food intolerances and allergies in immigrant children coming from these areas of the world.

The aims of this multicentre and retrospective study were to investigate the prevalence of immigrant children with food intolerances and allergies coming to Italy from developing countries, to inspect their clinical features and to search a possible relation of food intolerances and allergies with dietary habits of the immigrant children.

Materials and methods

This was a retrospective, cross-sectional and multicenter-nationwide study involving 24 Italian Centres of Immigration and Paediatric Gastroenterology. The hospital medical records of 4130 patients (1924 males and 2206 females, aged from 6 months to 15 yr, mean age 9.6 yr, both Italian and immigrant), consecutively diagnosed in these 24 participating centres as having food intolerances and allergies from 1 January 1999 to 31 December 2001, were retrospectively reviewed and summarized, using in each participating centre the same predefined, standardized and structured form. These forms were sent to a coordinator (F.C., Palermo) who collected them in a central register. In northern Italy nine centres with 1004 patients took part in the study, in central Italy there were eight participant centres with 2170 patients, while the remaining seven centres with 956 patients were distributed between southern and insular Italy.

We focused our attention on three different food intolerances and allergies: celiac disease (CD), cow milk protein intolerance (CMPI) and IgE-mediated food allergies (FA) to egg, rice, soy, tomato, peanuts, fish, chicken, fruit and peas. In each centre participating to the study diagnosis of CD was made according to the revised ESPGHAN criteria (10), while CMPI and IgE-mediated food allergies were diagnosed using in each centre the same standardized and certain procedure for diagnostic approach, by means of a double blinded and placebo-controlled food challenge (7, 8). Briefly, patients with history and clinical suspicion of CMPI or of food allergies with high (according to the cut-off of

each participating centre) serum IgE food-specific antibodies (radioallergosorbent test) began an exclusion diet in which suspected food was replaced. After 4 wk of this diet, patients who had shown an improvement in symptoms underwent a double blind placebo-controlled challenge under the supervision of a research. Patients were diagnosed as having CMPI or IgE-mediated food allergies if a relapse of symptoms occurred within 3 days after administration of the suspected food, while the lack of a relapse excluded them.

Seventy-eight immigrant children with food intolerances and allergies were recruited. Children were defined “immigrant” if: (1) they were born in Italy from one or two immigrant parents (respectively, 8 and 49 patients); (2) they were born outside Italy and afterwards joined their parents in Italy (21 patients). A familiar anamnesis was collected from clinical hospital records of immigrant children, paying particular attention to their country of birth and to their parent’s native country. We also investigated the reasons leading immigrant patients in our country (birth in Italy, family rejoining, adoption), their clinical findings at diagnosis, and their dietary habits. Regarding the dietary habits, all the parents of the immigrant children were again called in each Centre participating to the study, in order to request accurate notices on breast or bottle feeding practices, duration of breast-feeding, age and manner of weaning, as well as on dietary habits since second and third years of childhood. This dietary recall was made using in each participating Centre a pre-defined, standardized and structured questionnaire, in order to request and to get the notices in the same manner and using the same criteria. Informed consent was obtained from the families of the 78 immigrant patients.

Clinical features at diagnosis in immigrant patients were compared with the ones in the Italian patients with food intolerances and allergies (control group), diagnosed in the same Centres, in the same period and using the same criteria. In the same way, dietary habits in immigrant patients were compared with the ones in the Italian childhood population (11, 12). The χ^2 test with Yates correction or the Fischer’s exact test were used for statistical analyses. p-values were calculated using the two-tailed test, and the significance was measured at the $p < 0.05$ level.

The study was carried out under the auspices of both the “Gruppo di Lavoro Nazionale per il Bambino Immigrato” (GLNBI), affiliated to the Italian Society of Paediatrics, and of the Italian

Society of Paediatric Gastroenterology Nutrition and Hepatology (SIGENP).

Results

Total 78/4130 (1.9%) of the studied patients were immigrant children. Table 1 shows their prevalence for each food intolerance and allergy, and Table 2 their races and their native Continents in relation to each food intolerance and allergy. Eight immigrant patients had only an immigrant parent.

Table 3 shows the distribution and the prevalence of the immigrant patients through the Italian geographic areas (Northern, Central and Southern-Insular) for each food intolerance and allergy.

Total 57/78 of the immigrant patients were living in Italy since birth, while the majority of the remaining 21 (19) had lived in Italy for several years (3–5 yr), since their second and third years of childhood. Only two immigrant patients were living in Italy since 2 months.

Table 1. Prevalence of the immigrant children for each food intolerance and allergy in the 4130 studied patients

Food intolerances and allergies	Prevalence of immigrant patients/studied patients
CD	36/1917 (1.9%)
CMPI	24/1370 (1.75%)
FA	18/843 (2.1%)
Total	78/4130 (1.9%)

Table 2. Ethnic groups and native continents of the immigrant patients

Ethnic groups	CD (n = 36)	CMPI (n = 24)	FA (n = 18)
Caucasians (n = 25)	East Europe: 15 Middle East: 1	East Europe: 4 Middle East: 1	East Europe: 4
Blacks (n = 32)	North Africa: 12 Saharan and sub-Saharan Africa: 4	North Africa: 7 Saharan and sub-Saharan Africa: 2	North Africa: 4 Saharan and sub-Saharan Africa: 3
Asians (n = 17)	West-south Asia: 4	West-south Asia: 8	West-south Asia: 2
Hispanics (n = 4)		Far East: 2	Far East: 1 South America: 4

Table 3. Distribution and prevalence of the immigrant studied patients through the Italian geographic areas for each food intolerance and allergy

Italian areas	Immigrant CD patients/total CD patients	Immigrant CMPI patients/total CMPI patients	Immigrant FA patients/total FA patients	Overall prevalence
Northern	13/768 (1.7%)	2/148 (1.3%)	2/88 (2.2%)	17/1004 (1.7%)
Center	15/603 (2.5%)	16/879 (1.8%)	14/688 (2%)	45/2170 (2%)
SOUTHERN INSULAR	8/546 (1.5%)	6/343 (1.7%)	2/67 (2.9%)	16/956 (1.7%)

Table 4 shows the origin's continents of the immigrant children living in Italy in the analysed period, the immigrant patients we observed for each origin's area and the rates of immigrant children placed in Italian public hospital during the observed years (1999–2001) in relation to their origin's continents.

The clinical features and the presenting symptoms at diagnosis of food intolerances and allergies were present in the same way in each ethnic group (Table 5). On the other hand, in immigrant children clinical features and presenting symptoms at diagnosis were similar, without significant differences, to the ones in Italian patients. Indeed, in CD immigrant patients and

Table 4. Origin's continents of the immigrant children living in Italy in the studied period

Origin's continents	Immigrant children living in Italy (n = 326,001)	Immigrant cases	Children /case
East Europe	110,196 (33.8%)	23	4791
North Africa	67,476 (20.7%)	23	2939
Far East	41,713 (12.8%)	3	13,904
South Asia	34,542 (10.6%)	14	2467
South America	34,217 (10.5%)	4	8554
Central Africa	13,670 (4.2%)	9	1518
Middle East	10,735 (3.3%)	2	5367
North America	9250 (2.8%)	0	0
Australia-Gipsies	4302 (1.3%)	0	0

The native continents of the immigrant children placed in Italian public hospitals in the studied period were: North Africa 36%, East Europe 25.9%, South Asia 20%, Central Africa 8%, South America 5.8%, Gipsies 4%, Australia, United States and Middle East 0.3% (13).

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Table 5. Clinical features and presenting symptoms at diagnosis compared to ethnic groups of immigrant patients

	CD classical forms (n = 25)	CD atypical forms (n = 9)	CD silent forms (n = 2)	Gastrointes Forms of CMPI (n = 15)	Not Gastrointes Forms of CMPI (n = 9)	Symptoms of FA
Caucasians	14	1	1	3	2	Vomiting and diarrhoea: 1. Atopic dermatitis: 1. Urticaria: 2
Blacks	10	5	1	5	4	Shock: 1. Vomiting and diarrhoea: 2. Urticaria: 2. Asthma: 2
Asians	1	3		7	3	Asthma: 2. Angioedema: 1
Hispanics						Vomiting and diarrhoea: 1. Atopic dermatitis: 1. Urticaria. 2

in CD Italian patients there were, respectively, 25/36 (69.4%) and 1276/1881 (67.8%) classical and at early onset forms ($p = 1$), 9/36 (25%) and 510/1881 (27.1%) atypical and at late onset forms ($p = 0.8522$), as well as 2/36 (5.5%) and 95/1.881 (5.1%) silent forms ($p = 0.7036$). In the same way, gastrointestinal symptoms of CMPI (vomiting, regurgitation, abdominal pains, chronic diarrhoea, blood enterocolitis, failure to thrive, etc.) and not gastrointestinal symptoms of CMPI (wheezing, atopic dermatitis, urticaria, systemic anaphylaxis, shock, apneic disorders, etc.) were present with not significant different rates ($p = 0.1482$ and 0.1492) in immigrant patients (respectively, 15/24, 62.5% and 9/24, 37.5%) and in Italian patients (respectively, 875/1346, 65% and 471/1346, 35%). The onset of CMPI in all the immigrant children, similarly to all the Italian CMPI patients, was during the first year of life. Concerning the FA, 6/18 immigrant patients had urticaria, 4/18 asthma, 4/18 vomiting and diarrhoea, 2/18 atopic dermatitis, 1/18 shock and 1/18 angioedema, without significant different rates in respect to the control group (data not shown).

In the immigrant children dietary habits were similar to the Italian childhood population (10, 11). Indeed, all the 24 immigrant patients with CMPI were born in Italy and had had a practice feeding formula since birth. Concerning gluten intolerance, the 20 CD immigrant patients living in Italy since birth had had a short period of breast-feeding (less than 2 months) or a formula-feeding since birth, with an early weaning and a precocious dietary gluten intake (from the fourth month of life). In the same way, the six immigrant CD patients who came to our country after the birth since their second and third of childhood) began to eat foods gluten containing immediately after their arrival in Italy. They had the onset of celiac disease during the following 6–36 months. The remaining 10 CD immigrant patients who joined their parents (eight since their second and third years of childhood and

two since 2 months), previously in their native country, used to eat great amounts of foods containing wheat flour (especially bread). All of them had a clear CD clinical pattern on their arrival in our country.

Also the 18 immigrant children with FA at diagnosis had dietary habits similar to the Italian children. They were allergic to egg (six cases), fruits (three cases), fish (two cases), peanuts (two cases), tomato (two cases) as well as soy, peas and rice (one case for each of these foods). The onset of FA in these patients was during their second and third years of age in the 13 children born in Italy, and 12–36 months after their arrival in our country in the others five.

Considerations and conclusions

The prevalence of food intolerances and allergies in childhood is well known in the developed countries (2–6), but adequate epidemiological studies during the paediatric age in the developing countries are lacking. Our study, first of all, shows that food intolerances and allergies are present in children coming from those areas of the world, suggesting that great attention to these diseases is needed also among immigrant children native from developing countries.

Our data might represent the national situation because the large number of patients were examined (4130) who were evenly distributed across Italy (Table 3), and because the observed prevalence of immigrant children with food intolerances and allergies among the overall studied patients (78/4130, 1.9%) was similar to that (2%) of the immigrant children among the whole paediatric population residing in Italy (1) during the years studied (1999–2001). Nevertheless, our data hardly can represent the national situation because the study was cross-sectional and retrospective, not longitudinal and prospective, and did not include all the Centres of Immigration and of Paediatric Gastroenterology present in Italy. Moreover, our study could not

have taken in consideration the children of clandestine immigrants, because they usually have not access to the Italian public hospitals (1, 13). Therefore, our study does not refer to all the immigrant children with food intolerances and allergies living in Italy during the observed period, and the true prevalence of these diseases among immigrant children should be higher than we found. In addition, the presence in Italy of immigrant children with permanent setting is quickly increasing (1) and consequently food intolerances and allergies among them in a short time likely will be a new and emerging health problem.

As Table 2 shows, our patients mostly come from Eastern Europe (23/78, 29.5%), North Africa (23/78, 29.5%) and west-southern Asia (14/78, 17.9%). These findings are not surprising because the immigrant children living in Italy and placed in Italian public hospitals in the studied years were mainly native of these continents (Table 4). Therefore, the lower number of immigrant patients coming from other world's areas we observed (Central Africa, South America, etc.) is likely related to their few admittances to the Italian public hospitals.

The majority of the studied immigrant patients were residing in Italy since birth (57/78) or since several years (19/78), according both to the large number of infants who are born during the last years in Italy to immigrant parents, and of immigrant children who came to our nation from native countries to join their families (1). These findings suggest that in the next years food intolerances and allergies among immigrant children will be a new healthy public problem because their presence in Italy is quickly increasing and it will be soon larger in parallel with the growing flow of immigration. Consequently, Italian Paediatricians will need soon to have a full awareness of food intolerances and allergies also among immigrant children coming from developing countries.

In immigrant children with food intolerances and allergies the clinical features and the presenting symptoms at diagnosis were similar to the Italian patients, irrespective of their native country and of their ethnic group. In addition, similarly to the paediatric childhood population of the developed countries, the most common food allergens were cow milk, egg, fruits fish, peanuts and soy (7, 14). These findings show that in childhood the clinical pattern of food intolerances and allergies as well as the foods responsible of the majority of them are the same in each race, irrespective of the world's areas.

The origin's countries of the studied immigrant patients resulted to be distant and their ethnic groups different (Table 2). In our design study we have not looked for the genetic risk factors (5, 15) for food intolerances and allergies in immigrant children. Nevertheless, the reliability of the our diagnoses, based on a double blinded and placebo-controlled food challenge for CMPI as well as for FA, and on ESPGAN criteria for CD, indirectly shows that the observed patients have these predisposing genes. This suggests that distant and apparently different races have the same genetic risk factors for food intolerances and allergies and that, as it has been suggested for asthma and atopic diseases (2, 3, 16–18), the occurrence of food intolerances and allergies in immigrant children from developing countries might be likely related to the impact with some environmental risk factors lacking in their native countries but shared with the childhood population of the industrialized world (i.e. ingested food, intestinal commensal flora, intestinal infectious, etc.). Consequently, the risk of CD as well of other food intolerances and allergies likely seems increases afterwards immigration from developing to developed countries.

In this respect, the majority of our immigrant patients were living in Italy since birth (57/78) or since several years (19/78) and all of them had lost the eating habits of their native countries, whereas had acquired the Italian dietary customs. Indeed, all the 24 immigrant children with CMPI had had a practice-feeding-formula since birth, whereas in developing countries infants' diet is based on an early and prolonged breast-feeding (19) and many evidences suggest a beneficial role of prolonged breast feeding practices in the prevention of food allergies, particularly of CMPI (20, 21). In the same way, the 20 immigrant CD patients living in Italy since birth had had, similarly to a great part of the Italian infants (11, 12), a short period of breast-feeding or a feeding-formula since birth and an early weaning, whereas had neglected their native countries' habits, such as a prolonged breast-feeding and a delayed weaning (19), that play a protective role against the gluten intolerance (22, 23). Likewise, the six asymptomatic CD children who came to Italy since their second and third year of childhood, previously, in their native countries had not ingested gluten but began a gluten containing diet after their arrival in our country, while the 10 immigrant patients who came to Italy with clear clinical signs of CD, previously, in their native countries used to eat foods containing gluten. Also the 18 immigrant patients with FA had dietary habits similar to the

Italian childhood population and were allergic to foods (egg, rice, tomato, peanuts, fish, fruit, peas and soy) usually eaten by Italian children after their second and third years of age (12). Consequently, this sharing of similar dietary customs among immigrant patients and the Italian childhood population might be likely the common environmental risk factor for food intolerances and allergies in studied patients.

In conclusion, children coming to Italy from developing countries can be affected by food intolerances and allergies. This appears as a new and emerging public healthy problem because the number of immigrant children with permanent residence in our country is quickly increasing. Consequently, we should expect that in a short time food intolerances and allergies in immigrant children will be increasing. Immigrant patients with food intolerances and allergies have clinical features similar to the Italian ones, irrespective of their different ethnic group. In immigrant children, the sharing of dietary habits with the Italian childhood population seems to be an important environmental risk factor for food intolerances and allergies.

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