ORIGINAL ARTICLE

Health and growth status of immigrant and refugee children in Toronto, Ontario: A retrospective chart review

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OBJECTIVE: To describe select anthropometric and health status variables among immigrant and refugee children ≤6 years of age within an inner city clinic in Toronto, Ontario.

METHODS: A retrospective chart review of patients born between January 1, 1998 and December 31, 2008, was conducted at a Toronto community health centre serving a primarily immigrant and refugee population. Outcome measures included calculated age-specific percentiles for height and weight, and the prevalence of anemia, iron deficiency, enteric parasites, elevated lead levels, HIV and hepatitis B. Postal codes were collected and used to determine the patient's neighbourhood income quintile.

RESULTS: A total of 331 patients, born between January 1, 1998 and December 31, 2008, were identified. Of these, a total of 210 charts were manually reviewed. The prevalence of height-for-age and weight-for-age under the third percentile on the Centers for Disease Control and Prevention Growth Charts were 7.2% and 11.6%, respectively, and 8.4% and 5.0%, respectively, on the WHO Growth Standards Chart. Prevalence rates were also calculated for anemia (22.8%), iron deficiency (53.3%), hepatitis B (2.5%), parasitic infections (33.6%), elevated blood lead levels (4.9%) and HIV (0%). Neighbourhood income quintiles revealed that 46.7% of patients were residing in the lowest (ie, poorest) income quintile neighbourhoods.

CONCLUSION: These findings reveal a high burden of illness within the population presenting to an immigrant/refugee health clinic, and illustrate the need for further research in this area, as well as increased efforts to ensure appropriate screening within clinics serving a high volume of newcomer patients.

Key Words: *Canada; Child; Emigrants; Health; Immigrants; Refugees*

The immigrant and refugee population in Canada is growing every year, and currently represents 20.6% of the total Canadian population (1). Toronto, Ontario, is a common port of entry for newly-arrived immigrants and refugees. Recent data reveal that in 2011, immigrants comprised nearly 46% of the population in the Toronto census metropolitan area (2).

Given the large influx of immigrants and refugees, it has become increasingly important to identify and address the specific health issues of this population in general, and the paediatric newcomer population in particular. International studies investigating the health status of immigrant and refugee children have found an epidemiologically distinct disease profile among this population (3-10). Specifically, there is a higher prevalence of nutritional anemia, inadequate immunity to vaccine-preventable diseases, growth abnormalities, malnutrition, dental caries, enteric parasites and psychiatric disorders among the children of recent arrivals. Additionally, lower family socioeconomic status among recent immigrants has a significant impact on their children's health and development (5,11-14).

In response to the increasing number of newcomers to Canada and uncertainty among clinicians regarding best practice primary care for these patients, in 2011, The Canadian Collaboration for Immigrant and Refugee Health released a comprehensive set of evidence-based guidelines on primary and preventive health care for immigrant and refugee populations. These guidelines include recommendations for catch-up immunization and screening for anemia,

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as well as targeted serological testing for hepatitis B and intestinal parasites (specifically *Strongyloides* and *Schistosoma*) among individuals coming from countries with a high prevalence (10). Both the American Academy of Pediatrics and the Canadian Paediatric Society have developed guidelines and tools, which address the unique disease profiles within foreign-born children, and recommend targeted screening for health and developmental issues (15,16,17).

Within Canada, very few studies have examined the prevalence of general health issues and infectious diseases, specifically among school- and preschool-age immigrant and refugee children. Two studies involving immigrant children in Canada revealed a greater risk for vitamin D deficiency (7,18). A mixed-methods qualitative study involving refugee mothers described multiple barriers (including cost) to seeking health care and health services for their children (19). A study involving routine HIV screening for paediatric patients applying for residency in Canada revealed that between January 2002 and February 2005, 36 paediatric HIV cases were reported (14 of 100,000 applicants) (20).

The goal of the present study was to add to the current literature on the immigrant and refugee paediatric populations in Canada, by describing select anthropometric and health status variables among foreign-born children ≤6 years of age, within a clinic serving a high volume of newcomer patients. This age group was chosen for several reasons. First, as discussed previously, few Canadian studies have focused on the health issues of immigrant and refugee children. Second, health and growth in the first few years has a significant impact on cognitive development and health outcomes later in life, and adequate screening and monitoring is, therefore, of utmost importance during this period. Finally, routine health maintenance visits are scheduled most frequently during this age interval, enabling improved identification of health and developmental issues.

METHODS

A retrospective chart review was performed at Access Alliance Multicultural Health and Community Services (AAMHCS; Toronto, Ontario). AAMHCS provides health and social services to newly arrived immigrants and refugees residing in Toronto, Ontario. During the five years preceding the data collection, AAMHCS's patient population shifted to include more government-assisted refugees (GARs), refugee claimants as well as uninsured patients. A series of screening tests were offered to all the clinic's newly-registered paediatric patients. Patients born between January 1, 1998 and December 31, 2008, were identified using the electronic patient database. Charts were manually reviewed for other inclusion criteria: not born in Canada; and ≤6 years of age on arrival to Canada. For patients who were >6 years of age at the time of chart review, data were only collected up to and including six years of age. Manual chart review was performed by one of the primary investigators (LS) and a research assistant using a standard data extraction sheet. All outlier values and positive screening tests were verified by both investigators to ensure validity and reliability of the results.

Demographic characteristics were collected for each chart, specifically, age, sex, date of birth, date of arrival in Canada and country of origin. Data were also collected and recorded on anthropometric measurements, specifically, first recorded height and weight obtained by the clinical staff (nurses, nurse practitioners and physicians) during the child's initial clinic visit. Percentiles for height and weight were determined using the age- and sex-appropriate Centers for Disease Control and Prevention (CDC; Georgia, USA) Clinical Growth Charts. Prevalences were calculated for children who fell below the third percentile threshold for age-specific height and weight. The third percentile mark was selected due to its significance in the clinical setting as a trigger for investigation of potential growth abnormalities. Following completion of the study, subgroup analysis (using the WHO Anthro for PC software [WHO, Switzerland]) was performed to determine the prevalence of age-specific height and weight abnormalities, determined by the WHO Child Growth Standards (using a cut-off z-score of ≤−2, which indicates a percentile measurement of approximately ≤2.3). Data were also collected on the presence of: iron deficiency (defined as ferritin levels below the age-specific laboratory lower reference limits); anemia (defined as hemoglobin levels below the age-specific laboratory lower reference limits); parasitic enteric infections (positive stool culture for ova and parasites); hepatitis B (positive hepatitis B surface antigen levels); HIV (positive ELISA test); and elevated lead levels (lead levels ≥ 0.48 μmol/L).

Postal codes were also collected and used to determine the patient's neighbourhood income quintile. Income quintiles divided the population into five groups based on the calculated average household income within each neighbourhood. Neighbourhoods were categorized from least affluent (Q1) to most affluent (Q5). Using Statistics Canada's Postal Code Conversion File Plus, individual postal codes were converted into neighbourhood income quintiles as a proxy for household income quintile.

Summary statistical analyses were conducted using Excel (Microsoft Corporation, USA).

Ethics approval was obtained from St Michael's Hospital's Research Ethics Board (Toronto, Ontario).

RESULTS

A total of 331 patients, born between January 1, 1998 and December 31, 2008, were identified. Of these, 41 charts were unable to be located. Eighty charts were excluded because the patients were either born in Canada or were >6 years of age on arrival to Canada. A total of 210 charts were manually reviewed.

The study population consisted of 91 (43.3%) females and 119 (56.7%) males. Ages on arrival ranged from two months to six years 10 months. Some countries of origin were over-represented within the clinic sample, specifically Afghanistan (n=30), Myanmar (n=21) and Colombia (n=19). With respect to the distribution of neighbourhood income quintiles among the study population, nearly one-half of the population (46.7%) was residing in the lowest income quintile neighbourhoods. Full demographic data are summarized in Table 1.

Of the 167 subjects with documented height measurements, 7.2% (n=12) fell below the third percentile within the CDC Growth Charts. Of the 180 subjects with documented weight measurements, 11.6% (n=21) fell below the third percentile. Children from Afghanistan and Myanmar were heavily over-represented among those who fell below the third percentile for both height and weight. Using the WHO Growth Standards, the prevalence of height abnormalities was 8.4% (n=14) and prevalence of weight abnormalities was 5.0% (n=9).

Table 2 summarizes the results of the screening tests among the study population. Given the small and variable sample sizes of children from each country, only observations on the regional prevalence of each outcome were made. Among the 49 children testing positive for iron deficiency, 10 were from Myanmar and 11 were from Afghanistan. Of the 122 patients who submitted stool samples for testing of ova and parasites, 41 children provided 53 positive samples (10 subjects had >1 positive stool sample). Of these, 7.5% (n=4) were *Dientamoeba hystolytica*, 37.7% (n=20) *Giardia lamblia*, 28.3% (n=15) *Dientamoeba fragilis*, 15.1% (n=8)

TABLE 1
Baseline characteristics of clinic sample

Characteristic	
Total, n	210
Sex	
Male	119 (56.7)
Female	91 (43.3)
Age at arrival, years	
Median, n	2.67
Mean, n	2.87
N/A*, n	10
Time since arrival, months	
Median, n	1
Mean, n	4.8
Region of origin	
Middle East, Central Asia†	57 (27.1)
Latin America and the Caribbean‡	48 (22.9)
Sub-Saharan Africa	43 (20.5)
South East Asia§	26 (12.4)
Eastern Europe	18 (8.6)
Western Europe	10 (4.8)
Indian sub-Continent	6 (2.9)
United States	2 (1.0)
Income quintile	
1st (lowest)	98 (46.7)
2nd	43 (20.5)
3rd	43 (20.5)
4th	13 (6.2)
5th (highest)	3 (1.4)
Missing data	10 (4.8)
Total, n	210

*Data presented as n (%) unless otherwise indicated. *N/A indicates data not available, ie, this information was not collected or did not appear in the clinic chart; †30 of 57 children in this category were from Afghanistan; ‡19 of 48 children in this category were from Colombia; §21 children within this category were from Myanmar*

Ascaris lumbricoides, 3.8% (n=2) *Enterobius vermicularis*, 4.0% (n=2) *Hymenolepis nana*, 1.9% (n=1) *Cyclospora cayetane* and 1.9% (n=1) *Strongyloides stercoralis*. Positive stool samples were found primarily among children from Afghanistan, Myanmar and Sub-Saharan Africa.

DISCUSSION

Our study revealed a high proportion of height and weight measurements falling under the third percentile within the present clinic population. A study by Geltman et al (4) revealed a similar prevalence of anthropometric abnormalities (using the CDC Growth Chart) in a study involving 1825 refugee children in Massachusetts, USA. However, the prevalence of abnormal weight measurements within our clinic sample became lower, while that of abnormal height measurements became higher when using the WHO Growth Standards. These findings are consistent with previous observations, demonstrating that for the same population, when compared with the CDC Growth Charts, the WHO Growth Standards reveal lower rates of underweight and wasting, and higher rates of stunting (21). While our sample size was too small to allow for conclusive determinations, our results suggest that abnormal or unhealthy growth may be an issue of concern for certain subgroups of newcomer children, although prevalence rates – particularly of underweight or wasting – may be overestimated if using the CDC Growth Charts.

TABLE 2
Results of routine screening tests among clinic sample

Test	
Anemia	
Present*	33 (22.8)
Absent	112 (77.2)
N/A, n	65
Low ferritin	
Present†	49 (53.3)
Absent	43 (46.7)
N/A, n	118
Parasitic infections	
Present‡	41 (33.6)
Absent	81 (66.4)
N/A, n	88
Hepatitis B surface antigen	
Positive	3 (2.5)
Negative	119 (97.5)
N/A, n	88
Lead levels	
Above limits	4 (4.9)
Below limits	77 (95.1)
N/A, n	129
HIV	
Positive	0 (0.0)
Negative	101 (100.0)
N/A, n	109

*Data presented as n (%) unless otherwise indicated. *Value falls below the lower reference limit for hemoglobin concentration; †Value falls below the lower reference limit for ferritin concentration; ‡Intestinal parasite found on stool ova and parasite sample. For optimal sensitivity, three sets of stool samples are recommended. N/A Not available*

We found a high prevalence of iron deficiency and anemia within the clinic sample. The prevalence of anemia within Canada has been estimated to be 4% to 5% among non-Aboriginal children, but present in up to 46% to 66% of children <4 years of age in low- and middle-income countries (22,23). Iron deficiency and anemia in childhood may have significant and long-lasting effects on neurodevelopment and behaviour. Therefore, the Canadian Paediatric Society, the American Academy of Pediatrics and The Canadian Collaboration for Immigration and Refugee Health all recommend screening for anemia in infancy and early childhood, particularly for 'high-risk' children.(10,16,24)

We also found a high prevalence of elevated blood lead levels (BLL) in the clinic population. Studies from the United States (US) involving newly-arrived refugee children, similarly demonstrate higher rates of elevated BLL within this population (9,25). There is no representative nationwide picture of current BLL in Canadian children, although US national screening data reveal a prevalence of elevated BLL (≥10 µg/dL) of 0.8% among children one to five years of age (26). Children <6 years of age are at greater risk for exposure to lead due to crawling and hand-to-mouth behaviour, and more susceptible to the toxic effects of lead due to an incomplete blood-brain barrier and active neurodevelopment in the first years of life. The US CDC has a number of explicit guidelines with respect to lead screening in newly-arrived refugee children (25). Within Canada, although universal BLL screening in children has never been supported, targeted screening of high-risk paediatric populations has been endorsed (27).

A high prevalence of intestinal parasites and hepatitis B was found in the present study population. The higher rate of hepatitis

B is likely due to increased prevalence, and lack of access to childhood immunization and prenatal screening in the childrens' home countries. Intestinal parasites were found particularly in children from Myanmar, Sub-Saharan Africa and Afghanistan. Since 1997, the CDC has released and updated recommendations on overseas presumptive treatment of various intestinal parasites for US-bound refugees from parts of Latin America, the Caribbean Islands, Asia, the Middle East and Africa (28). No such guidelines exist for refugees accepted for migration to Canada.

Several limitations exist in the present study. First are the limitations inherent to chart reviews, including: incomplete charting, failure to locate all charts, and potential human error in measuring and recording clinical data at the time of the clinical assessment, as well as in the data entry process. Second, routine screening tests were not performed for all patients. Although the clinic offers testing to all new patients, the lack of uptake by some has likely introduced a certain degree of bias into our results. Third, we did not have access to reliable data regarding the immigration status (ie, refugee claimant versus GAR versus landed immigrant) of the patients at the time of their initial clinic visit and were, therefore, not able to perform analysis of outcomes as a function of newcomer category. Fourth, we only recorded one measurement for height and weight, as opposed to several measurements over time. Therefore, the growth abnormalities do not fit the definition of 'failure to thrive'. Fifth, several outcomes collected were based on screening tests (as opposed to diagnostic tests). Of note, stool ova and parasite testing has low sensitivity for several enteric parasites, particularly if only one or two samples are submitted, as was the case in our study. Therefore, our outcome measures likely underestimated the true prevalence of enteric parasites within the present clinic sample, particularly among children from countries of origin with a high prevalence. Finally, the present study compromises data from a small convenient sample of children within one clinical setting serving a high volume of newcomer immigrants and refugees and, therefore, may not be representative of the general population of foreign-born children within Toronto or within Canada.

Immigrants and refugees are a very heterogeneous group with different countries of origin, educational levels and socioeconomic status. There is a paucity of systematic data regarding the distinct health issues and risk profiles for various categories of foreign-born children. Economic and family class immigrants differ greatly in terms of various socioeconomic status variables from refugees (2,29). Various authors have identified a 'healthy immigrant' effect – largely among economic and family class immigrants – which is likely a reflection of the health requirements of the immigrant selection program and premigration medical examination. Conversely, refugee-class immigrants have been demonstrated to have a poorer health status (10,29,30).

During the timeline covered by the present study, there was a shift in AAMCHS's patient population to include a far greater number of GARs and refugee claimants, particularly those belonging to waves of refugees coming to Canada from certain countries during that time. Some of the above discussed variability in health status as a function of newcomer category was observed within the study results, in the form of a disproportionately high burden of illness among children from certain countries and regions of origin. Therefore, the findings from the present study cannot be applied to all foreign-born children, because they likely underestimate the burden of disease for some and overestimate for others. Variations in health status within different categories of newcomers and foreign-born children is an area in need of further research.

CONCLUSION

The findings of the present study reveal a high burden of disease and low socioeconomic status among immigrant and refugee children, particularly those from Afghanistan, Sub-Saharan Africa and certain parts of Southeast Asia. These findings highlight the need for more research examining health issues specific to this particularly vulnerable patient population, as well as increased efforts to ensure access to appropriate targeted screening and health care services to foreign-born children, particularly those observed within clinics serving a high volume of immigrant and refugee patients.

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