J Immigrant Minority Health (2011) 13:990–995
DOI 10.1007/s10903-011-9476-3

ORIGINAL PAPER

Communicable and Non-Communicable Diseases Among Recent Immigrants with Implications for Primary care; a Comprehensive Immigrant Health Approach

Ramin Asgary · Ramesh Naderi · Kristin A. Swedish · Clyde L. Smith · Blanca Sckell · Sara Doorley

Published online: 15 May 2011

Abstract Data on health status of immigrants and practice recommendations for providers are scarce. We evaluated 99 recent immigrants from developing nations in an immigrant clinic in New York City to assess epidemiology of diseases and to recommend potential screening. Providers received ongoing training. Majority patient was from West Africa and Central America with a mean of 2.1 years in the US. Two thirds were uninsured. Half had positive PPD. Half had prior hepatitis B infection, which was higher in Africans. One quarter had intestinal parasites. Two thirds were overweight; 33% had hypercholesterolemia, 26% were hypertensive, and 25% of women had a Pap smear previously. Eosinophila was higher in African and males ($P < 0.05$) but didn't predict stool O&P. Recent immigrants were at risk for chronic non-communicable diseases, similar to the US population. Providers should balance their focus on communicable and non-communicable diseases. We recommend practice-based training and on-site comprehensive health services.

Keywords Immigrants · Refugees · Screening · Communicable · Non-communicable diseases

R. Asgary (✉)
Departments of Preventive Medicine, Medicine, and Medical Education, Mount Sinai School of Medicine, One Gustave L Levy Place, Box 1255, New York, NY 10029, USA
e-mail: ramin.asgary@mssm.edu

R. Naderi
Department of Medical Education, Mount Sinai School of Medicine, One Gustave L Levy Place, Box 1255, New York, NY 10029, USA

K. A. Swedish
Department of Preventive Medicine, Mount Sinai School of Medicine, One Gustave L Levy Place, Box 1255, New York, NY 10029, USA

C. L. Smith
Department of Medicine, Montefiore Medical Center, Bronx, NY, USA

B. Sckell
Department of Medicine, Mount Sinai School of Medicine, One Gustave L Levy Place, Box 1255, New York, NY 10029, USA

S. Doorley
Valley Homeless Healthcare Program, San Jose, CA, USA

Introduction

Man-made disasters, civil conflicts, economical changes, and natural disasters cause global migration affecting epidemiology of diseases. In 2009, nearly half a million new arrivals became legal permanent residents of the United States and 74,000 refugees and aslyees were admitted. The number for undocumented immigrants were equally high. The majority of them were from developing countries where a variety of infectious diseases are endemic [1].

In 2008, 36.4% of the adult population in New York City was foreign-born [2]. Foreign-born adults in New York City are more likely than American-born adults to report their health status unfavorably, and are also less likely to have a primary care provider [3].

Neither medical associations nor health policy makers have developed or adopted specific guidelines to manage the special health needs of immigrants. While there have been some limited recommendations made to aid providers in the evaluation of immigrants, these are mostly related to infectious diseases [4]. Most primary care providers, who manage the complex clinical problems among new immigrants, lack sufficient training in immigrant health [5]. However, immigrant clinics and individual practitioners

generally develop personal or practice-based styles to evaluate and treat their patients for uncommon diseases that may be endemic in immigrants.

This study was designed to assess the epidemiology and risk of diseases among recent immigrants and to suggest potential screening strategies.

Methods

The Comprehensive Health Care Clinic of Montefiore hospital, a teaching facility, serves a large immigrant community in the South Bronx. Resident-physicians evaluate patients. Skilled preceptors with training in tropical medicine and public health, social work services, women's health, laboratory and radiology are available on-site. We dedicated specific weekly sessions to recent immigrants enrolled via outreach efforts collaborating with community organizations, word of mouth, and community health worker outreach. Didactic curriculum and ongoing case-based and country-based training was provided to providers before clinic session.

From 2007 to 2008 we evaluated 100 consecutive recent immigrants. Inclusion criteria were: (a) being in the U.S. less than 5 years (b) from developing countries by the UN classification, (c) 18 years or older. All patients were offered the standard adult visit and suggested screening by the Center for Diseases Control (CDC) and New York State Department of Health (NYSDOH) for refugees including clinical history, physical exam, blood, radiology and stool tests.

Based on original literature search it was hypothesized that our immigrants have higher risk of both hepatitis B exposure and parasitic diseases comparing to national rate. Primary study outcomes were the rates of hepatitis B exposure and parasitic diseases. Secondary outcomes included rate of positive PPD, hypertension, overweight and obesity, hypercholesterolemia, Pap smear, anemia and other laboratory indicators. Logistic regression analysis assessed the presence and degree of association between independent variables (including region of origin, years in the US, age, gender, insurance status as well as important clinical variables) with the main outcomes of interest, and to control for potential confounders. Variables were included into the models when univariate analysis showed significance and when clinically sensible and plausible. Chi square, t-test, bivariate and multivariable logistic as well as linear regression were used where indicated. SPSS Version 15.0 was used to analyze the data.

The difference in prevalence of hepatitis B exposure (Hep Bc antibody) between our population and the US age-adjusted one was estimated to be at east 7% and that the difference in prevalence of parasitic diseases between our study and the US population was estimated to be at least 7% (the US national rate is less than 1%). We set alpha $= 0.05$, power $= 0.8$ and calculated the sample size of $n = 100$. Due to logistical issues and follow up issues we were unable to obtain the result of all recommended laboratory screenings for all patients. Patients provided written consents for medical evaluation and provision of necessary care and treatment at the time of registration in the clinic. Research team had access to identifiable information on patients' medical records but did not have any contact with participants either at the time or after the medical evaluation. This study was approved by the Montefiore's Institutional Review Board. One reviewer (SD) reviewed all patient information and extracted the data.

Results

Socio-Demographic

Fifty-two were female. The patients had a mean age of 38.7 years old. The majority was from Africa (59.6%), predominantly from West African countries. The most common countries of origin were Dominican Republic, Senegal, Ghana, Ivory Coast, and Mali. The patients had spent a mean of 2.1 (median 1.5) years in the US. Over 40% percent spoke only languages other than English: 22% Spanish, 12% French, and 7% Arabic speakers. Their baseline characteristics are summarized in Table 1.

Table 1 Baseline characteristics

Age (years)—mean (SD)	38.7 (14.5)
Male (%)	47.5
Years in US—mean (SD)	2.1 (1.6)
Region of origin (%)	
Africa	64.6
Central America	23.2
Middle East	5.1
Europe	3.0
Asia	3.0
Languages spoken (%)	
English	58
Spanish	22
French	12
Arabic	7
Uninsured (%)	67.7
BMI—mean (SD)	
Males	27.3 (5.1)
Females	28.4 (5)
Blood pressure (mmHg)—mean (SD)	
Systolic	125 (22.7)
Diastolic	76.7 (13.8)
Lipids mg/dl—mean (SD)	
Total cholesterol	207.9 (39.5)
LDL	133.6 (34.7)
HDL	53.6 (12.5)

Over one quarter had no form of employment since arriving in the US, whether temporary or permanent. Sixty seven percent were uninsured. Univariate and multivariate regression demonstrated that Africans were more likely uninsured, even when adjusting for age and years in the US ($P < 0.05$).

The mean BMI for females and males were 28.4 (±5.1) and 27.3 (±5). Thirty-five patients were overweight (BMI 25–29.9) and 29 were obese (BMI > 30). Higher BMI was predicted by the increasing length of stay in the US in linear regression analysis controlling for high cholesterol, high BP, or age ($P < 0.01$).

Communicable Diseases

Almost 20% of patients tested (15/77) had eosinophilia, with either a high percentage or absolute number of eosinophils. Being male, African, and lower BMI were all associated with higher chance of being eosinophilic defined by a cut off of 5% and or high percentage of eosinophilia ($P < 0.01$). However BMI was not a significant independent risk factor of eosinophilia after controlling for sex and region of origin in the multi-variable regression model. When eosinophilia was defined by a cut off of 10% or above it was only predicted by being an African. Six percent of men and 23% of women were anemic based on World Health Organization (WHO) hemoglobin thresholds (less than 13 g/dl for men and less than 12 g/dl for women and).

Infectious disease findings are summarized in Table 2. Two of patients were positive for Hepatitis B surface antigen (HBs Ag). Fifty-one percent (34/66) were positive for Hepatitis B core antibodies (HBc Ab). Older patients and Africans both independently had higher chance of being positive for either HBs or HBc antibody ($P < 0.001$) and even after adding gender and years in the US in regression model ($P < 0.01$). One patient who acknowledged a history of HIV was the only patient tested positive for HIV.

Table 2 Infectious disease findings

	Number positive	% positive
Ova and Parasites hp/f	15/38	39.5
HBcAb	34/66	51.5
HBsAb	20/70	28.6
HBsAg	2/74	2.7
HAV Ab	24/99	24.2
HIV	1/42	2.4
Tuberculosis		
PPD positive >10 mm	24/43	55.8
CXR positive	4/21	19
Complete blood count—mean (SD)		
Hemoglobin g/dl	13.6 (1.8)	
Hematocrit %	41 (4.8)	
Eosinophils %	3.1 (2.9)	

Forty percent of patients tested (15/38) were positive for ova and parasites (O&P). O&P was not predicted by gender, hepatitis B status, or region of origin using chi-square. The overwhelming majority of patients with positive O&P were from West Africa and Central America (70% and 25 respectively). There was no significant relationship between a positive stool O&P and either eosinophilia, BMI, age, or anemia and additional regression model with clinically relevant indicators did not show any association.

Fifty six percent of patients tested (24/43) had a positive PPD reading (≥ 10 mm). Two patients (10.5%) with negative PPDs had evidence of prior tuberculosis on chest radiograph. There was no statistically significant relationship between positive PPD with radiographic evidence of tuberculosis, region of origin, hepatitis B, positive O&P, gender, and age which was almost likely due to the small number of participants who had a positive PPD or chest radiograph.

Chronic Non-Communicable Diseases

Twenty-six percent fit the criteria for hypertension (either sBP or dBP equal or grater than 140 mmHg or 90 mmHg, respectively). Only one third of these patients had acknowledged hypertension in their past medical history. We found no relationship between hypertension and region of origin, gender, years in the US, or BMI. This might however be due to lack of sufficient power in our study to detect such association. Older age was associated with hypertension ($P < 0.05$) and sBP increased with age ($P < 0.01$).

Thirty three percent of patients tested (16/49) fit the criteria for elevated cholesterol. All four diabetic patients had LDL greater than 100 mg/dl. Six of 18 hypertensive patients (33%) who provided samples for lipid levels had hypercholesterolemia (LDL > 130 mg/dl). All diabetics were also hypertensive. Ten patients without diabetes or hypertension had either LDL greater than 160 mg/dl or total cholesterol greater than 240 mg/dl. Four patients (4%) had HDL levels below 40 mg/dl. Chi-square, *t*-test, and logistic regression revealed no association between high total cholesterol and region of origin, hypertension, gender, weight, BMI, or years in the US. This may, however, have been due to the low number of lipid tests done. Only one patient acknowledged a history of hypercholesterolemia.

Other

Only 25% of females had acknowledged having had a Pap smear in the past year. Chi square and t-test analysis showed no significant relationship between having Pap

smear with either insurance, years in the US, age, or region of origin.

Four patients (4%) were diagnosed with depression only one of whom had a known history of depression. Chi-square and *t*-test did not show a relationship between depression and either gender, insurance, region of origin, or years in the US. Depression was higher among younger patients but not statistically significant. Five reported history of asthma, 4 diabetes, 3 malaria, 2 hypothyroid, and 2 typhoid.

Discussion

Recent adult immigrants, predominantly from West Africa, were seen and evaluated in the Montefiore's Refugee and Immigrant Clinic. Forty percent of patients tested demonstrated some form of O&P in stool, indicating a potential significant exposure to intestinal parasites in their country of origin. Despite the fact that not all of our subjects provided stool samples, this rate was significantly higher than previously reported in refugees (12–14%) [6, 7], asylum seekers (14%) [8], and immigrants to other countries (11–23%) [9, 10]. The high exposure to hepatitis A (20% prevalence of positive hepatitis A antibody) also demonstrates an increased risk for diseases transmitting via fecal-oral pathway- likely due to improper sanitation and limited access to clean water in home countries. Although being an African was associated with higher level of eosinophilia, consistent with other researchers, we did not find a strong correlation between eosinophilia and stool O&P [11–13]. However, the possibility of infection with non-intestinal parasites or low gastrointestinal burden can't be overlooked [14]. Additionally we were unable to collect three stool samples for O&P, which limits our data. However, it is unclear what is the best overall strategy to address the potential parasitic diseases among immigrants and whether is better to test or empirically treat due to better cost-effectiveness [15].

A large percentage of this cohort had been infected with Hepatitis B (51.5%). Although it is possible that some of our subjects had a false positive HBc-Ab in the absence of other Hepatitis B antibodies or antigens or had low level of chronic infection, but it is more likely that most patients had a resolved prior infections. Many of these patients immigrated from countries where the prevalence of Hepatitis B is high (>8%). The WHO estimates that between 70 and 90% of the population in high endemic areas become infected with Hepatitis B before the age of 40 [16]. The prevalence of previous Hepatitis B infection is similar to that found among immigrants in Spain (46.5%) [10], though higher than Somalian (27.5%) [17] and former Yugoslavian immigrants (11.8%) [18] in the United Kingdom. In the US, the age-adjusted prevalence of HBc-Ab has been reported to be 4.7%. Prevalence increases with age above 50 (7.2%), in non-Hispanic blacks (12.2%), and foreign-born (12.2%) compared to US-born persons (3.5%) [19]. In our study, older age and being an African were associated with higher risk of prior Hepatitis B infection. Our prevalence of Hepatitis B carriers (2.7% positive HBs-Ag) is 10 times higher than the US rate of 0.27% [19], and higher than that of foreign-born (0.89%) and US-born Americans (0.16%) [19], but lower than the prevalence among refugees in Canada (5.4%) and U.K. (5.7%) [7, 17]. We urge practitioners to vigorously reinforce and stress the general safety precautions and healthy behaviors, including using condom, avoiding unprotected sex, and getting vaccinated against hepatitis B in absence of hepatitis surface antibody to decrease the risk of transmission of hepatitis B as well as the other potential sexually transmitted diseases.

An overwhelming number of our population were positive for PPD (55%), which was consistent among all groups regardless of age, gender, and region of origin. There were no cases of active tuberculosis. A 4.2% prevalence of positive tuberculin skin testing in the US (1.8% in US-born and 18.8% in non-US-born persons) has been reported [20]. In NYC, a 24.4% overall prevalence of PPD positivity has been reported with the prevalence among foreign-born New Yorkers four times higher than that of US-born New Yorkers (39.5% vs. 8.8%) [21]. Two patients in our cohort who had chest radiographic (CXR) evidence consistent with prior tuberculosis were PPD positive, while two patients with PPD negative also had CXR evidence of prior tuberculosis. As part of the mandatory medical exam for all refugees and people overseas applying for US immigration, the CDC requires a CXR to evaluate for tuberculosis, bypassing the PPD altogether for all applicants over 15 years of age [22]. The issue of testing recent immigrants for TB via PPD placement with subsequent treatment of positive cases must create a balance between limiting potential risk for the community and the cost-effectiveness of treating large numbers of immigrants, many of whom may never truly pose a significant public health threat. The role of interferon-gamma release assays to help make a distinction between recent and prior TB infection is promising [23]. Its efficacy for non-US-born population should be further investigated.

The interesting and important observation was that many patients in our study population, despite their recent arrival in the US, have chronic non-communicable diseases such as hypertension, hypercholesterolemia and obesity, some of which were not detected in their home country. In general there are limited data on the prevalence of chronic diseases in developing regions especially from poor nations. Other data suggests that the prevalence increases with longer stay in industrialized regions. Indeed, nearly

two thirds of our fairly recent immigrant patients were overweight or obese, which is close to New York State (NYS) rate for Blacks and Hispanic (62%) [24]. The prevalence of obesity alone in our study population (29%) is comparable to that of the Bronx (25.3%) and NYS (15.4% to 30.1%) [25], but is almost twice as high as that of foreign-born New Yorkers (16%) [3]. This is also similar to the prevalence in the Northeastern US for Blacks (31.7%) and Hispanics (28.7%) [26]. It has been shown that obesity among foreign-born New Yorkers increases with duration of residence in the US [3]. Despite a mean length of stay of 2.1 years, BMI of our participants increased with increasing years of residence in the US and irrespective of age, hypertension or hypercholesterolemia. Obesity puts these patients at an increased risk for cardiovascular disease, some cancers, and diabetes, among other medical conditions [27].

More than one quarter of our population met the criteria for hypertension, which is comparable to the prevalence among foreign-born and US-born New Yorkers (26%) [3]. Forty percent of 45 years of age or older were hypertensive, equal to the US population 45 and older. Less than one quarter of those with hypertension knew they were hypertensive, comparable to the US population [28]. Our participants were in the US for short time and we did not find association with years in the US. We hypothesized that high blood pressure rate might be due to other pre-existing risk factors such as dietary habits, obesity, older age of our participants, and or the stress of immigration or history of conflict.

More than one third of our population met the criteria for elevated LDL or total cholesterol considering their risk profile, equal to the prevalence among foreign-born and US-born New Yorkers (33%) [3]. All patients with known diabetes had uncontrolled cholesterol, none of whom knew they had elevated cholesterol, which poses additional risk to them. We found no association between higher cholesterol and being from Central and South American countries, which might be due to the low power of our study to detect such difference. It is however noteworthy that Africans had high average total cholesterol levels comparing to non-African. Our recent immigrants were at risk for metabolic syndrome.

It is important to note that many of our patients did not know they had hypertension, elevated cholesterol, and other chronic conditions. We hypothesize that this is likely due to many factors including: the lack of access to health care and lack of appropriate health education about their diagnoses both outside and in the US, and poor health literacy about the chronic nature of these diseases.

Women in our cohort had dismal coverage of Pap smear in past year (25%), almost three times less than the foreign-born New York women (73%) [3]. Both the US and NYS coverage for Pap smear among Blacks, Hispanics and Whites women are above 82% [24]. According to the World Health Organization (WHO), cervical cancer was the second most common type of cancer among women in 2005. Eighty percent of the over 250,000 deaths due to cervical cancer were in developing countries [29]. Our immigrant patients from developing countries require heightened surveillance. Their low coverage of Pap smear was independent of their age, region of origin, having insurance or duration of stay in the US. Therefore, targeted heath education, better availability and access to primary care services, and perhaps subsidized care might help to improve the health of female immigrants.

Finally, this population of newcomers demonstrated significant social difficulties and barriers. Only 58% could speak some degree of English. The overwhelming majority were unemployed and uninsured- three times higher than foreign-born New Yorkers under 65 (22%) and 7 times higher than that of US-born New Yorkers [3]. The overall US national rate of uninsured is 15.4% [24]. Our patients' uninsured rate did not decrease with increasing amount of time in the US or increasing age. A disproportionately lower insurance coverage among our African immigrants is likely due to language barriers and less strong community support in addition to other factors such as financial resources and employment status. The prevalence of depression among our population was not higher than that of the surrounding community (one of the poorest district in the nation), but it was under-diagnosed, likely due to poor access to care in both the US and the immigrant's home country.

Conclusion

Primary care providers who treat recent immigrants need to evaluate them for chronic viral and bacterial infections as well as parasitic diseases. Fairly recent immigrants are as likely at risk for chronic non-communicable conditions as the US-born patients requiring rigorous screening, health education, and subsequent treatment. Providers and service organizations should not overlook non-communicable diseases while focusing on infectious pathologies, and should apply a balanced approach. To provide better care for our recent immigrants and over the past few years we have offered ongoing immigrant health didactics and practice-based training to our resident-physician providers to improve their knowledge and skills, expanded the on-site social and counseling services to provide a more centralized approach, and collaborated locally with advocacy and grass-root organizations to identify and bring recent immigrants to our clinic. Additionally we have worked closely with hospital administration to provide and

reinforce existing language and health literacy services. We believe that this comprehensive approach could have helped to improve access to care among this vulnerable population.

Acknowledgments Authors wish to thank Dr. Gerald Paccione, Professor of Medicine and Social Medicine for his invaluable efforts and vision to initiate and support the Montefiore's Immigrant and Refugee Clinic.

Conflict of interest Authors declare no financial and conflict of interest for this study.

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