Gender and age related differences in the use of medicines for chronic diseases among undocumented migrants

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Abstract

Purpose – *The purpose of this paper is to evaluate gender-related differences in the use of drugs for chronic diseases in undocumented migrants.*

Design/methodology/approach – *The authors analyzed the databases of two charitable organizations providing medical help and medicines to undocumented migrants. Data were available for 9,822 patients in the period 2014–2016. The authors grouped medicines according to the Anatomical Therapeutic Chemical (ATC) classification. We considered the ATC group as an indicator of a group of diseases.*

Findings – *Both males and females needed medicines for chronic diseases in a comparable manner. When we analyzed the age distribution, The authors noticed that males showed a tendency to begin to be affected at an earlier age; however, this cumulative difference was not statistically significant. But when we looked at six groups of drugs separately (cardiovascular, respiratory, anti-thrombotic, neurologic, psychiatric, anti-diabetic), the authors found that females always needed drugs for chronic diseases at a later age, always with a significant difference ($p < 0.0001$ for cardiovascular, antithrombotic, antidiabetic and psychoactive drugs; $p < 0.002$ for neurologic products; $p < 0.04$ for drugs used in chronic respiratory conditions).*

Research limitations/implications – *This is a retrospective study based on the analysis of existing databases, but the peculiar features of this population (undocumented migrants) do not allow at the moment controlled studies.*

Practical implications – *Our observations could be important when planning public health strategies, especially in the field of prevention.*

Originality/value – *This is the first report of gender differences in the use of medicines for chronic diseases within a large sample of undocumented migrants.*

Keywords *Gender, Chronic non-communicable diseases, Pharmacoepidemiology, Undocumenred migrants*

Paper type *Research paper*

Introduction

A "healthy migrant effect", defined as a possible advantage of migrant populations over the hosting population, regarding major health endpoints (Razum *et al.*, 1998), has been early questioned on the basis of possible epidemiological biases (Ringbäck Weitoft *et al.*, 1999) and has recently been thoroughly debated (Vang *et al.*, 2015). Data available for documented migrants are somehow conflicting: though some researchers have found that migrants have a better health status than the resident population (Diaz *et al.*, 2015), others have described a health status comparable to that of the population in the destination country (Volodina *et al.*, 2011) or converging to that of the national population over the years (Jatrana *et al.*, 2014). Moreover, this possible healthy immigrant effect could be restricted to certain groups of migrants: for example, it cannot be found in recent refugees and in migrants with no previous education (Okrainec *et al.*, 2015). This type of observations highlight the need to consider temporal and environmental factors; these seem to have an extremely important role when mental health is considered; in this case, both pre-migration and

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post-migration factors may influence the health conditions of migrants (Arévalo *et al.*, 2015). Moreover, mental health problems in migrants seem to have significant gender related differences, with men less affected than women and showing lower depressive symptomatology in high vs low ethnic density neighborhood (Aervalo *et al.*, 2015). Women, on the other hand, have a greater risk for panic, generalized anxiety disorder and suicidal ideation (Beutel *et al.*, 2016). Gender differences have been reported also for predisposing conditions such as perceived stress (Muller and Koch, 2017). In addition to mental health, other health problems and diseases have a different gender prevalence in migrants, as for example obesity (Agyemang *et al.*, 2016) and diabetes (Montesi *et al.*, 2016). In general it can be said that, as in the national population, gender-related differences in health conditions are increasingly being observed in documented migrants settling in western countries though occasionally observations are somehow conflicting. This seems to be largely a consequence of the many confounding factors that have to be dealt with, when studying this type of populations. In addition, the situation is sharply different when one comes to undocumented migrants, for whom very few data are available in literature. Our knowledge of their possible gender-related differences in health conditions is virtually inexistent. On the basis of these considerations and of our earlier observation that chronic non-communicable diseases are an important health problem in undocumented migrants (Fiorini *et al.*, 2016), we tried to evaluate age and gender-related differences in the health status of this particular population which escapes the usual methods of investigations in order to have preliminary epidemiologic data potentially useful to plan better prevention and treatment strategies. This type of information could be valuable both for charities caring for undocumented migrants and for administrators designing public health policies.

Methods

Population

We contacted the two bigger Charitable Organizations providing medical assistance to undocumented migrants in Milan, Italy. These persons have no documents because they have entered the country illegally either as refugees (the minority) or as economic migrants (the majority). Only exceptionally are they undocumented because their temporary visa has expired. Documented migrants can use the National Health Service facilities and therefore they do not seek this type of medical assistance. These Organizations made their databases available for the present study. The databases contain for every patient the records of all the consultations in the out-patient clinic, together with the specification of the medicines prescribed and dispensed for free and basic demographic data (age, gender and country of birth). Since doctors give their time on a voluntary basis, they usually have no more than three shifts every month; therefore, prescriptions to out-patients repeatedly seen are made by different physicians and so prescription bias is avoided.

The population extracted from the databases was composed of 10,265 subjects (4,044 males and 6,221 females) who were divided on the basis of their ethnicity and age. We thus obtained six ethnic groups, five of migrants from various geographic macroareas (Asia, Eastern Europe, Northern Africa, Subsaharan Africa and Latin America) and one made of subjects belonging to the national population in conditions of severe poverty. The latter group (443 patients) was not considered in the analysis of gender differences in migrants, who were in total 9,822. Females were more represented in three and males in two out of the ethnic groups. Age groups were made by decades.

The characteristics of the population, with the number of subjects in each ethnic and age group are shown in Table I.

Drug dispensation data

In accordance with World Health Organisation indications, we identified all the medicines on the basis of the ATC classification, as previously described (Fiorini *et al.*, 2016). From the 14 ATC classes, we chose those containing drugs considered to be typically employed to treat chronic diseases; within each main class the groups of drugs relevant for chronic conditions were selected using the second level of classification. We considered the

Table I Age, sex and ethnic characteristics of the entire population

Demographic data of the population	*Females*										*Males*										*Total*
	AGE GROUPS (Decades)										*AGE GROUPS (Decades)*										
Geograpic macro-area	*10-20*	*21-30*	*31-40*	*41-50*	*51-60*	*61-70*	*71-80*	*81-90*	*>90*	*Total*	*10-20*	*21-30*	*31-40*	*41-50*	*51-60*	*61-70*	*71-80*	*81-90*	*>90*	*Total*	*Total*
Asia	4	23	47	92	90	61	17	6	7	347	3	154	501	363	196	102	19	5	1	1,344	1,691
East Europe	23	120	256	256	322	330	60	23	13	1,403	37	113	187	192	222	157	32	15	7	962	2,365
Italy	17	10	18	22	20	16	10	5	16	134	24	11	18	40	89	69	28	11	19	309	443
North Africa	21	26	119	89	52	29	7	4	9	356	9	159	491	509	359	116	16	8	3	1,670	2,026
South America	46	163	363	337	326	175	39	31	24	1,504	41	82	181	232	235	114	20	8	11	924	2,428
Sub-Saharan Africa	2	26	99	64	40	29	18	14	8	300	2	131	349	312	147	49	5	4	13	1,012	1,312
Total	113	368	902	860	850	640	151	83	77	4,044	116	650	1,727	1,648	1,248	607	120	51	54	6,221	10,265

following groups, designed with a three digit code: A10 (drugs used in diabetes); B01 (antithrombotic agents); C01 (cardiac therapy), C02 (antihypertensive drugs), C04 (peripheral vasodilators), C07 (beta blocking agents), C08 (calcium channel blockers), C09 (agents acting on the renin-angiotensin system), C10 (lipid modifying agents); G04 (urologicals); H02 (corticosteroids for systemic use), H05 (calcium homeostasis); L01 (antineoplastic agents), L03 (immunostimulants); M04 (antigout preparations), M05 (drugs for treatment of bone diseases); N03 (antiepileptics), N04 (anti-parkinson drugs), N05 (psycholeptics), N06 (psychoanaleptics), N07 (other nervous system drugs); R03 (drugs for obstructive airway diseases). Since the ATC class N includes both drugs for neurological diseases and psychoactive compounds, we arbitrarily split it into subclass $N_{(N)}$ (Neurological drugs: N03, N04 and N07) and subclass $N_{(P)}$ (Psychoactive drugs: N05, N06). We had therefore nine groups of drugs: A, B, C, G, H, L, M, $N_{(N)}$, $N_{(P)}$.

Statistical analysis

Parametric data descriptive statistics were analyzed with ANOVA for differences among ethnic groups and sex. Non parametric and frequency data were analyzed using χ^2 or Kruskall–Wallis test when appropriate. The SPSS statistical package was used for statistical analysis.

Ethics

The design of the study was transmitted to the local Ethics Committee. In accordance with Italian regulations for retrospective studies, no authorization is required but 60 days have to be allowed for the Ethics Committee to make comments or objections. Therefore, having received no communication, we started to collect data after that period. All the records were completely and permanently anonymized.

Results

As can be seen from Table I, the greatest number of patients belonged to age decades 3 to 6 (21 to 60 years old); this was true for the whole population, for both males and females, and in general for all the ethnic groups. Patients belonging to the national population had a different age distribution but their number was small; as already stated they were not considered in the analysis.

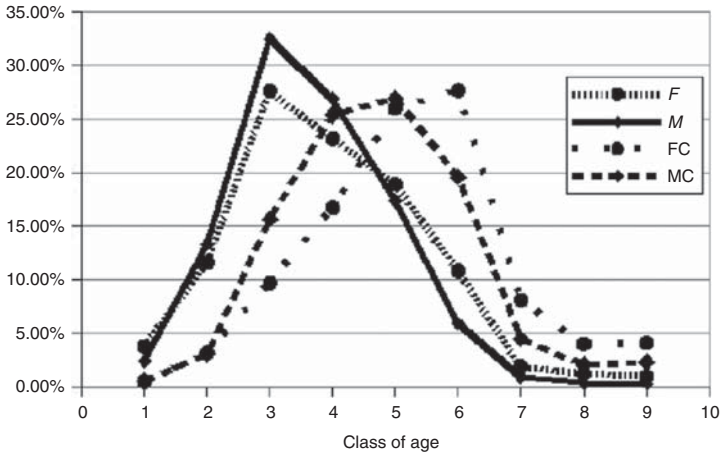
When we evaluated the cumulative use of drugs for chronic diseases as compared to that of drugs for acute diseases, we found that patients to whom the latter were prescribed were 39.4 percent of the entire population. Among the patients on medicines for chronic diseases (60.6 percent) there were more males than females (59.4 vs 40.6 percent).

We then analyzed the age pattern of our patients divided according to gender and the use of drugs for acute vs chronic conditions (Figure 1). Not unexpectedly the use of drugs for acute conditions peaked at an earlier age; moreover, in these patients the peak age was the same for males and females. The peak age for chronic conditions showed a difference between males and females, with the latter showing a delay of more than a decade, though no statistically significant difference was found when the two means were compared.

When we looked at the different therapeutic groups, we found that for four of them (H, G, L and M) the number of patients in many cells was too small for a reliable statistical analysis which therefore was carried out only for groups A, B, C, $N_{(N)}$ and $N_{(P)}$. In all of them the age distribution was significantly different, indicating that for these medicines the use in men peaks earlier than in women (Figure 2). This difference is statistically significant (Table II) and it reflects what we had noticed in the analysis of the cumulative prescription of medicines for chronic conditions (Figure 1), though in that case it did not reach statistical significance.

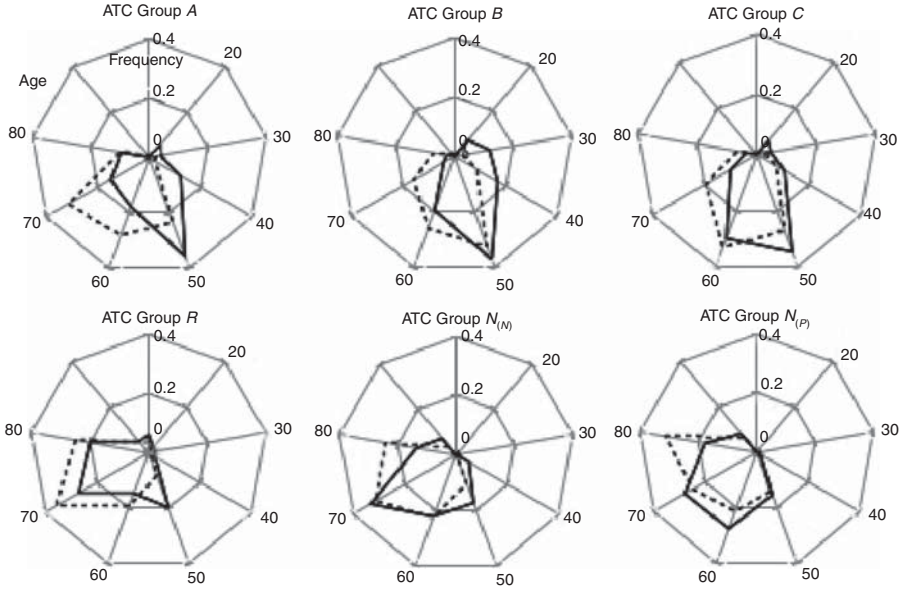
We did not carry out any further analysis to identify possible peculiar patterns in different ethnic groups for two reasons. First the number of patients in some cells was, as outlined above, too small to afford reliable results. Second, the ratio of males to females was largely different among the various groups and this raised a bias that could not be overcome.

Figure 1 Age distribution in the use of drugs for acute and chronic diseases



Notes: *F* = females using drugs for acute conditions; *M* = males using drugs for acute conditions; FC = females using drugs for chronic conditions; MC = males using drugs for chronic conditions

Figure 2 Age distribution in the use of specific groups of drugs for chronic diseases



Notes: Continuous line = males; dotted line = females. *A* = antidiabetics, *B* = anti-thrombotics, *C* = cardiovascular, $N_{(N)}$ = neurologic drugs, $N_{(P)}$ = psychoactive drugs, *R* = drugs for chronic respiratory conditions. $p<0.001$ for groups *A*, *B*, *C* and $N_{(P)}$; $p<0.002$ for group $N_{(N)}$; $p<0.04$ for group *R*

Discussion

In the present study, we describe the age differences between males and females in the use of drugs for some chronic diseases in a large population of undocumented migrants, who for obvious reasons usually escape traditional epidemiologic analyses.

Table II *P* values for age related differences in the use of medicines for chronic diseases between males and females (see Figure 2); the *p*-value was calculated for differences in distribution and not in the mean, median or mode

GROUPS OF DRUGS USED IN CHRONIC DISEASES	*p*
Antidiabetics	0.001
Anti-thrombotics	0.001
Cardiovascular	0.001
Neurologic	0.001
Psychoactive	0.002
Respiratory	0.04

Though the phenomenon of migration has always existed, in recent years massive migrations have steadily increased, fueled by wars, persecutions and poverty in many areas of the world (Tsiodras, 2016) and undocumented migrants are thought to account for 10 to 15 percent of the total migrant population worldwide (Montesi *et al.*, 2016). This migratory flux impacts on countries where the health conditions of the population are increasingly characterized by the expanding prevalence of chronic non-communicable diseases (Nagavi *et al.* and GBD 2013 Collaborators, 2015), which account for a continuous growth of the years lived with disability (Vos T. *et al.* and GBD 2013 Collaborators, 2015). Interestingly, also in developing countries these diseases are reaching epidemic proportions but receive much less funding than infectious diseases such as AIDS (Allen and Feigl, 2017). In this situation, it is mandatory to know which is the impact of migrants on the already burdened National Health Services of western countries. A first impression was optimistic and, at least momentarily, a so-called "healthy immigrant effect" was noticed (Razum *et al.*, 1998), but it has later been recognized that this effect depends on the population groups chosen for confrontation (Hamilton, 2015), it is hampered by negative habits and pollutants encountered by migrants in host countries (Domnich *et al.*, 2015) and tends to decline with age (Vang *et al.*, 2015). Thus, evidence is growing that migrants have a significant prevalence of chronic non-communicable diseases. They are affected by diabetes, possibly more than the national population (Montesi *et al.*, 2016; Wilkinson *et al.* 2016; Raza *et al.*, 2017), though caution should be exerted when interpreting data, since it is known that many factors contribute to ethnic differences in the prevalence of Type 2 diabetes (Piccolo *et al.*, 2016). Arterial hypertension seems also to be frequent in migrants, though differences could exist among different ethnic groups (Okrainec *et al.*, 2015; Sewali *et al.*, 2015). Mental health problems have reported to be more frequent in migrants than in their native-born counterpart (Levecque and Van Rossem, 2015), but observations are sometimes conflicting; this could be due to the strong effect of poverty (Cerri *et al.*, 2017) and other factors (Arevalo, 2015) on the onset of these diseases.

Migrants are also exposed to the same risk factors as the national population and gender differences have been reported for smoking prevalence (Aspinall and Mitton, 2014) and obesity (Agyemang *et al.*, 2016). Gender differences have recently been reported also in the perception of migration related stressor (Muller and Koch, 2017) and this could be at the basis of a different prevalence of psychiatric problems in male and female migrants, as well as gender-related differences in the prevalence of risk-factors could be a partial explanation in the observed different gender prevalence of certain diseases in migrants (Montesi *et al.*, 2016; Arevalo *et al.*, 2015; Agyeman *et al.*, 2016; Beutel *et al.*, 2016). In spite of these observations, however, to our knowledge no systematic studies are available in literature on gender-related differences of disease prevalence in migrants, especially if undocumented. With our study we tried to get some preliminary information on this subject, using a method that we have already employed to measure the burden of chronic diseases in this particular population (Fiorini *et al.*, 2016). We are aware of the limitations of our study: first, we used an indirect method (i.e. drug dispensations), second we used a secondary data source and this can cause statistical problems and, even more important, potential biases: for example, different reasons to migrate can introduce a selection and different types of migratory journey can be associated with different morbidities; our population was made of different types of undocumented migrant, but this gives no absolute guarantee that there are no biases. Though conscious of

these limitations we could draw some conclusions. First, we noticed that males tend to begin to use medicines for chronic diseases earlier than females. Though this tendency did not reach statistical significance as a whole, it did when we split it into different groups of diseases (as inferred from the use of different groups of medicines). Migrant males show a significant earlier beginning in the use of anti-diabetic, anti-hypertensive and anti-thrombotic drugs, as well as medications for chronic respiratory diseases and psychoactive drugs. This does not appear to be due to the larger proportion of males in our population since the proportion of males to females is different across the different ethnic groups, with more females than males in both East Europeans and Latin Americans. Moreover our method though indirect, seems to yield an objective measure, which could be more difficult to obtain with other methods, in consideration of different perceptions of disease of these patients (Alidu and Grunfeld, 2017). Our finding of earlier onset of chronic diseases in migrant males than in females could also be in keeping with the observation that in females the survival is better than in males (Uitenbroek, 2015).

Our observations could be relevant for different aspects. First, gender differences in the health status of migrants could be relevant to design targeted health interventions, especially for specific prevention strategies; second, our data could be useful to predict the impact of certain populations of migrants on the public health of host countries, an issue of paramount importance for the future perspectives of National Health Services in Western countries (Sun *et al.*, 2015), since their involvement in the assistance of this population is likely to be at least in part necessary in the near future.

It appears advisable that further studies are carried out on these aspects of migrants' health conditions.

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