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Original research

Migrant adults with diabetes in France: Influence of family migration

C. Chambre [a], C. Gbedo [a], N. Kouacou [b], M. Fysekidis [a], G. Reach [a], H. Le Clesiau [b], H. Bihan [a,c,*]

[a] Department of Endocrinology, Diabetology, Metabolic Disease, AP-HP, Avicenne Hospital, 127 route de Stalingrad, Paris 13 University, Sorbonne Paris Cité, CRNH-IdF, Bobigny, France
[b] Centre d'Examens de Santé de la Caisse Primaire d'Assurance Maladie de Seine-Saint-Denis, 2 avenue de la Convention, 93009 Bobigny, France
[c] Sorbonne Paris Cité, Epidemiology and Biostatistics Research Center, Nutritional Epidemiology Research Team (EREN), Inserm U1153, INRA U1125, CNAM, Paris 13, 7 and 5 University, 74 rue Marcel Cachin, 93009 Bobigny cedex, France

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ABSTRACT

Aim: To explore the influence of migration and this parameters on the control of diabetes.
Methods: A cohort of migrant patients with type 2 diabetes was recruited in a center affiliated to the French national insurance system situated in a department with important migratory phenomenon. Patients fulfilled a questionnaire about diabetes, their migration history, and the EPICES score (deprivation score). We have explored by univariate and multivariate analysis if any of the characteristics of migration could be related to the control of diabetes. This cohort was compared to a non-migrant control group of age and sex-matched patients.
Results: We included 72 patients, 36 women and 36 men from 20 different countries. The mean age was 57.7 ± 9.6 years. A migration for family reunification was associated with better diabetes equilibrium (Risk of having an HbA1c ⩾8% (63.9 mmol/mol): OR 0.07 (95% IC [0.005–0.86], p = 0.04). The migrant patients who wished to share their time between France and country of origin during their retirement had a better glycaemic control than the migrant patients who would like to go alone into their country (OR 0.08 [0.01–0.78], p = 0.03). Compared to the non migrant group, the EPICES score was higher in the migrant group (52.8 vs. 28.3, p < 0.05), HbA1c was also higher in the migrant group (8.4 vs. 6.7% (68 vs. 50 mmol/mol)).
Conclusions: We may fear that migrants share an increased risk of uncontrolled diabetes. Individual migration could be a risk factor of uncontrolled diabetes. Knowing the migration history of migrant patients is fundamental to understand some barriers of care.

Introduction

In Seine-Saint-Denis department, the rate of immigration is the highest in metropolitan France, and around 19% of persons are immigrants. Most migrants came from Maghreb, where the prevalence of diabetes (6.63% in Algeria [1,2], 15.1% in Tunisia [3]) is much higher than France (4.6% in France [4]). Indeed, the Entred study had reported that 19% of patients with diabetes were born abroad [5]. More recently, the composition of immigration changes, France hosts people from central Africa (13.3% of immigrants were born in Sub-Saharan Africa) [6] and Asia (14.4% of immigrants), countries that have high prevalence of diabetes.

Although many studies had shown that diabetes has a higher prevalence in the immigrant population in developed countries compared to the host population [7,8], few studies have compared diabetes control and the outcomes between those two populations [9,10]. In Netherlands, the comparison of patients of Turkish descend to the local population with diabetes revealed similar levels of mean fasting and post-prandial glycaemia, but a difference in health care utilization with more consultations requested by the Turkish population [9]. In France, patients from Africa had a poorer diabetic control [10], these results have been confirmed recently [11]. Moreover, for some patients, an increased prevalence of complication has been reported among immigrant patients even with a similar glycaemic control [12] .

Barriers to attain glycaemic control could have been partly explained by a common lower socioeconomic level, difficulties in health access [13], cultural specificities [14] and linguistic barrier. Thus, as education is a major part in the treatment of diabetes, many authors claimed for a culturally adapted education towards migrant patients [15,16]. Therefore, a better knowledge of their history of migration should be useful to implement those educative programs. Surprisingly, no study has so far raised the sociological question of the migration process and its impact in coping with

* Corresponding author at: Department of Endocrinology, Diabetology, Metabolic Disease, AP-HP, Avicenne Hospital, 127 route de Stalingrad, 93009 Bobigny, France.
E-mail address: claire.chambre@avc.aphp.fr (H. Bihan).

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disease in the new country. We hypothesized that a low level of French proficiency and a high rate of multiple journeys between France and the native country could interfere with the treatment of the chronic disease.

The aim of our study was to focus on a group of immigrants with diabetes and to explore the impact of their history of migration on their diabetes' control. Our secondary objective was to compare our cohort to a control group of non-migrant patients.

Methods

Patients

We recruited patients with type 2 diabetes in a center affiliated to the French national insurance system, in a deprived suburb of Paris. Inclusion criteria were 1) diabetes duration diagnosed of at least 6 months with an exclusive follow-up by general practitioner 2) being immigrant 3) being 15 years old or older at the time of migration. French citizens who were born in the French overseas departments and territories and moved in metropolis were also considered as migrants. Exclusion criteria were a level of French proficiency not allowing to answer the questionnaire.

We collected the following data with self reported questionnaires: sociodemographic data, the French deprivation score EPICES [17], parameters of diabetes (duration, treatment, complications, HbA1c). A nurse collected anthropometric measures. A questionnaire on the migration history included 17 items (Supplementary Data). This questionnaire has been created for this study, mainly inspired by previous work by Mejean et al. [18]. The study was accepted by Comité d'Evaluation de l'Ethique des projets de Recherche Biomédicale (CEERB) du Groupement Hospitalier Universitaire (GHU) Nord (N° IRB: IRB00006477) (Supplementary Table).

A control group has been selected in a center located in another department where the percentage of immigrants was lower (Center affiliated with the French national insurance system, Tours). Patients were matched for age and gender. For this control group, we had access to the following variables: age, gender, EPICES score and mean HbA1c at the time of the visit.

Statistical analysis

Data analysis was performed using SAS software. Cross tabulations were used to compare history of diabetes and history of migration among men and women. Differences in proportions were analyzed with Pearson's chi-square tests; continuous variables were analyzed with a Mann-Whitney test. Uncontrolled diabetes was defined by an HbA1c $\geqslant$8% (64 mmol/mol) (arbitrary threshold) and was previously used [5]. The relationships between control of diabetes and sociodemographic variables (gender, duration of diabetes, smoking status, deprivation status, fruit and vegetable consumption) were examined by logistic regression in univariate analysis. These sociodemographic variables have been described in the published literature as related to control of diabetes (gender, duration of diabetes, smoking status) or could be involved as surrogate marker of poor socioeconomic level. The relationship between the control of diabetes and variables describing migration were assessed in different models by multivariate logistic regression analyses adjusted for all sociodemographic variables. Accuracy of our models was assessed by Hosmer Lemeshow's test.

Comparison of the migrant group and control group was performed using the Wilcoxon Mann-Whitney test after propensity score matching for age and gender.

Results

Among 90 patients screened, 18 were excluded (12 non migrants, 3 immigrated before 15 years, and 3 did not fill the questionnaires). The 72 patients included were from 20 different countries, the 3 first ones were Algeria, Morocco and Haiti. They were born in North Africa (54%, n = 39), Asia (17%, n = 12), Sub-Saharan Africa (12%, n = 9), West Indies (11%, n = 8), or Europe (6%, n = 4). There were 36 men and 36 women, with a mean age of 57.7 years, and most of them were deprived (Table 1). They were mostly young adults at the time of migration, but there is a wide range of age at migration (Table 2). Men immigrated alone, for work with a poor level of French language proficiency whereas women reported more often a family reunification they had no job but a better level of French. Duration of diabetes was nearly 10 years, and the mean HbA1c was 8.4 ± 1.5% (68 ± 7 mmol/mol) (Table 1). Diabetes has been diagnosed after their migration except for two. The mean BMI and prevalence of nephropathy were higher among women and the prevalence of smoking was higher in men (data not shown).

Determinant factors of diabetes control

There was no link between a poorer control of diabetes (HbA1c 8%, 64 mmol/mol) and gender, duration of diabetes $\geqslant$5 years, smoking status, deprivation or daily consumption of fruits and vegetables $\geqslant$2. Association has not been demonstrated neither between having poorly controlled diabetes and duration of living in France, the level of French language proficiency or journey in the country of origin.

In the multivariate analysis, patients who migrated for a familial reason or who plan to live in both countries (France and their country of origin) during their retirement were more likely to have a lower HbA1c (Table 3).

Comparison with a control group

Compared to a non migrant diabetic population with the same age and anthropometric profiles, our immigrant patients experienced higher level of fasting glycaemia and higher prevalence of poorly controlled diabetes (HbA1c 8.4% vs. 6.7%; 68 vs. 50 mmol/mol, $p < 0.05$). They were also more likely smokers and socially deprived (Table 1).

Table 1
Characteristics of the study population and comparison with the control group.

	Migrant population (n = 72)	Control population (n = 72)	p
Age (y)	57.7 ± 9.6 (30–84)	59.7 ± 9.5 (34–79)	0.22
Weight (kg)	80.5 ± 16 (50–148)		
BMI (kg/m^2)	30.5 ± 5.3 (19–47.8)	29.7 ± 6 (19–50)	0.27
Smokers (%)	36.11	11.43	<0.05
EPICES score	52.8 ± 20.8 (7.1–100)	28.3 ± 20.7 (0–91)	<0.05
Deprived persons (%)	83.33	38.57	0.000
Creatinine (µmol/l)	84.8 ± 20.1 (0–136.1)	91.3 ± 16.8 (65–145)	0.05
Triglycerides (g/l)	1.7 ± 1.3 (0.4–9.5)	1.2 ± 0.5 (0.3–3.2)	0.05
Cholesterol (g/l)	1.9 ± 0.4 (1.1–3.1)	1.9 ± 0.4 (1–3.1)	0.51
Fasting glycaemia (g/l)	1.8 ± 0.6 (0.9–3.6)	1.4 ± 0.5 (0.4–4)	<0.05
HbA1c (%)	8.4 ± 1.5 (6.8–13.5)	6.7 ± 1.3 (4.9–10.5)	<0.05
(mmol/l)	68 ± 7 (51–124)	49 ± 9 (30–91)	
HbA1c $\geqslant$8% (%)	50	21.43	<0.05
Diabetes duration	9.4 ± 6.9 (0–25)		

Table 2
Description of migration history.

History of migration	Men	Women	Total	
Residence abroad (years)	27.4 ± 9.7 (19–67)	28.1 ± 11 (17–61)	27.8 ± 10.3 (17–67)	0.85
Length of residency in France	33.2 ± 10.6 (14–51)	26.5 ± 11.8 (0–46)	29.7 ± 11.7 (0–51)	**0.04**
French level				
Low	57%	25%	41%	
Intermediate	34%	39%	37%	
Good	9%	36%	23%	**<0.001**
Individual migration	74%	33%	54%	**<0.001**
Workers before migration	69%	36%	52%	**<0.001**
Annual Journey(s) in the country of origin	71%	72%	72%	1.00
Reason of migration				
Work searching	66%	11%	38%	
Family gathering	11%	75%	44%	
Other reason	20%	14%	17%	**<0.001**
Future project				
Return in native country	15%	22%	19%	
Stay in France	56%	47%	51%	
Both	21%	17%	19%	
Do not know	9%	14%	11%	0.76

The bold values are significant results.

Table 3
Migration history and diabetes control. Odds ratios (95% confidence interval) of having poorly controlled diabetes multivariate analysis (adjusted on age, sex, BMI, smoking status, EPICES Score, duration of diabetes and consumption of fruits and vegetables).

Characteristics of migration	Multivariate	p
Model 1: Duration of life in the country of birth		
Less than 21 y	1	
21–25 y	0.53 (0.10, 2.66)	0.44
26–30 y	0.84 (0.14, 4.93)	0.84
>30 y	0.79 (0.12, 5.30)	0.81
Model 2: Financial difficulties		
Yes	1	
Not really	0.96 (0.31, 3.00)	0.95
Wealthy	1.83 (0.13, 26.59)	0.66
Model 3: Ownership in the country of birth		
Yes	1	
No	0.79 (0.25, 2.53)	0.79
Model 4: Reason of migration		
Looking for work	1	
Family reunification	0.07 (0.005, 0.86)	**0.04**
Other reason	0.04 (0.003, 0.62)	**0.02**
Model 5: Type of migration		
Individual	1	
Familial	0.20 (0.044, 0.95)	**0.04**
Model 6: Length of residency in France		
<23y	1	
23–29	0.37 (0.07, 1.88)	0.23
30–36	0.53 (0.08, 3.56)	0.92
>36	1.08 (0.21, 5.56)	0.51
Model 7: Level of French literacy		
Low	1	
Intermediate	0.90 (0.21, 3.87)	0.88
Good	0.68 (0.16, 2.86)	0.60
Model 8: Project for retirement		
Return in the country of birth	1	
Stay in France	0.23 (0.04, 1.33)	0.10
Life between France and country of birth	0.08 (0.01, 0.78)	**0.03**
Don't know	2.20 (0.12, 12.89)	0.57

The bold values are significant results.

Discussion

We found that our migrant population has a lower glycaemic control, poorer socioeconomic conditions and higher rate of smoker that a non-migrant diabetic population. Among this cohort of 72 migrant adults with diabetes, there was no link between a poorly controlled diabetes and duration of migration or language proficiency. However, familial migration and the project of living in both countries after retirement were associated with a better control of diabetes.

The comparison with a control group underlined the poorer results of diabetic and risk factors control in the migrant group. The mean Hba1c in the control group is slightly lower than in France, where the mean HbA1c was 7.1% in the ENTRED cohort [19]. Other European studies described similar differences in Africans in France (Hba1c at 8.6% vs. 8.1% in the host population (71 vs. 65 mmol/mol) $p < 0.001$ [11], 10.5% vs. 9.3% (91 vs. 78 mmol/mol) $p < 0.01$ in 1986 [10]), or Turks in Holland [9]. Although no significant difference was seen in terms of HbA1c between Italian and Belgium patients with diabetes in Belgium, the migrant patients had a diagnosis of diabetes at younger age and required higher doses of insulin [20]. In a larger cohort (ENTRED, n = 3894), patients with diabetes who were born in north Africa had a poorer diabetes control (Hba1c >8% or 64 mmol/mol in 30% vs. 15% for patients born in France) and performed less frequently a test for HbA1c (tested 3 times/year in 39% vs. 44%, $p < 0{,}05$) [5].

Lower socioeconomic conditions of migrants compared to those of host population have been well studied and were present in our cohort and could be an obvious mediating factor of health disparities [21]. In literature, the migrant population has a different consultation frequency in general practice than non migrant patients with diabetes: more frequent in Netherlands [9], less frequent in France [5], but a bias of more hospitalizations should be recognized [22].

We have described an association between psychosocial factors related to the migration history and control of diabetes. Familial support is an important factor for one's implication in chronic care [23]. We suggest the educational sessions should focus on this aspect, suggesting discussion groups on where are the family members, how often these relatives could be seen or contacted. Persons that reported a future project to live between two countries, which usually means spending 6 months by year in each country, were more likely to have a better control. This could be explained by the sociological concept: the best of the two worlds (being aware of a better health care system in France compared to the one in their birth country). As well demonstrated, diabetes is sometimes a barrier for finding a job [24], to make life plans

and can cause a reduction in the self-respect, causing psychological distress [25,26]. Migrant's situation is also bound to psychological distress, like finding a work, obtaining identity papers. This supplemental psychological distress can explain a bad control of diabetes for the migrants. We suggest that familial gathering could be helpful to reduce diabetes and psychosocial distress. This proposition is not so simple given the political implications it would generate. Nevertheless the public authorities are in position to request a socioeconomic evaluation of this aspect.

There was no association between language proficiency and HbA1c. However, we were interested in this aspect of education. Indeed some authors suggested that health care for migrants could be improved by cultural awareness of staff [27] and culturally adapted education, such as health care and patients share a common language [14,28]. Zheng et al. showed that Tamil-speaking Indians had significantly higher prevalence of diabetes (46.2 vs. 34.7%, $p < 0.001$) and, among those with diabetes, higher prevalence of diabetic retinopathy (36.0 vs. 30.6%, $p < 0.001$) than English-speaking Indians [29]. The language barriers can be seen as a double barrier. There is incomprehension of the words between the migrants and the health care providers. The intervention of an interpreter allows the migrant to understand the words but not necessarily to understand the message [30]. Seventy five percents of healthcare professionals express their difficulties adapting itself to the cultural practices of their patients [31]. Here, we did not study the approach of the healthcare professionals of the migrants but it is probably important in the care of their diabetes.

Our study has some limitations. First, the number of migrants is low, recruited in limited geographical area and compared to a not migrant group living in another region. Moreover, in the control population, the smoking status is more favorable and we do not have access to diabetes duration, which may reduce generalization of some of the conclusions. To validate our conclusions it would be necessary to enlarge our population of immigrants and find a control group in the same area. Second, the immigrants should to have a good level of French proficiency to answer the questionnaire, which is a bias for the interpretation of the language barrier on the glycemic balance. Third, we are not able to differentiate the impact of deprivation and the one of immigration. For example, as those who were planning on living in both countries could have a different socioeconomic status vs. those that could not afford to be traveling back and forth, this factor could be a confounding variable that explain our findings.

In conclusion, we have confirmed the risk of poorer diabetic control among patients who were not born in the country of residence. Our results can suggest that poorly explored psychosocial factors could be related to the control of diabetes. Data about the ties that people can maintain with their country of birth and relatives over there should be included in other prospective studies.

Authors' contribution

CC wrote the manuscript. CG researched the data and wrote the first draft. NK performed the statistical analyses. MF, RG, HLC reviewed/edited the manuscript. HB directed the research and reviewed/edited the manuscript. All authors contributed to the interpretation of the results and the revision of the manuscript for intellectual content and approved the final version of the manuscript.

Declaration of interest

The authors declare that there are no conflicts of interest.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.jcte.2016.12.003.

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