Pregnancy outcome of Moroccan and Turkish women in Belgium

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Summary

Objective: To compare perinatal outcome in women from Turkish and Moroccan descent versus autochthonous women in Belgium. *Methods:* Retrospective cohort study, data from an existing database, coupled with sociodemographic data from birth certificates. *Results:* There were more teenage pregnancies in the Moroccan and Turkish group, Moroccan women delivered more frequently after age 40 but Turkish women less frequently. In Moroccan and Turkish women the level of education was lower, they had less hypertension, fewer pregnancies after artificial reproductive technology and preterm deliveries, more diabetes and more grand multiparity. Moroccan women demonstrated more HIV infection. Planned cesarean section was less frequent in the Moroccan and Turkish group, and there was no difference for secondary cesarean section. Belgian women had more induction of labor, instrumental vaginal delivery and epidural anesthesia. There were more babies with low birth weight in both the Moroccan and Turkish group. Moroccan woman had more babies with a birth weight above 4,500 g. Total perinatal death rate was higher for Moroccan women while there was no difference between Belgian and Turkish babies. *Conclusion:* Moroccan women demonstrated higher rates of HIV infection and perinatal mortality, while in both Turkish and Moroccon women diabetes was higher and hypertension less frequent. Belgian women underwent more interventions during pregnancy.

Key words: Obstetrics; Ethnicity; Cesarean section; Perinatal mortality; Induction of labor.

Introduction

Since the 1990s around 20% of the mothers giving birth in the Flanders region, the northern half of Belgium, are of non-Belgian origin, meaning that at the moment of giving birth the mother does not have the Belgian nationality. A major part of these women are of Moroccan or Turkish descent. Already in the 1970s the outcome of pregnancies in migrant women was studied in Europe [1]. Since the 1980s papers have been published on the perinatal outcome of immigrants, mainly Turkish and Moroccan, in Belgium [2-4]. At that time multiparity, teenage pregnancy and pregnancy at the age of 40 and above were more frequent in Moroccan and Turkish women, whereas induction of labor, epidural anesthesia, multiple pregnancies and cesarean section were more common in women of Belgian origin. Moroccan but not Turkish women also had a significantly lower rate of preterm birth. Diabetes was more frequent in Moroccan, and hypertension more frequent in Belgian women.

The aim of the current study was to assess the differences in perinatal outcome if any, between ethnic groups 20 years later and to examine determinants of differences observed.

Material and Methods

Study population and setting

The Study Centre for Perinatal Epidemiology in Flanders collects data on all deliveries in the region of Flanders, the northern part of Belgium, covering over 99% of all deliveries in the region. Only deliveries after 22 weeks of gestational age are recorded. The district councils collect social data at the time of birth registration. Both anonymized data sets are linked by a common code number. Data were collected for all deliveries in the period between January 1, 2002 and December 31, 2006. For the ethnicity we used the original nationality of the mother as a proxy.

The following data were available in the data base: maternal age, level of education, human immune deficiency virus (HIV) serum status, hypertension, diabetes, parity, singleton or multiple pregnancy, use of artificial reproductive technology, gestational age (as provided by the attending physician or midwife), position of the baby at birth, the use of the vacuum extractor or forceps, primary or secondary cesarean section, previous cesarean section, induction of labor, colonisation with group *B Streptococci* (GBS), the use of epidural analgesia, birth weight, fetal sex, transfer of the neonate to a neonatal intensive care unit, fetal death, early neonatal death, and perinatal death.

The level of education was subdivided as follows:
– no education or lower grade education (primary school)
– lower degree of middle school
– higher degree of middle school
– non university higher grade
– university

Hypertension was defined as systolic blood pressure more than 140 mmHg and/or diastolic more than 90 mmHg. During the study period no sub classification in chronic hypertension, gestational hypertension or preeclampsia was registered. The diagnosis diabetes was accepted as provided by the treating physician on the file; no further subdivision in gestational diabetes, type 1 or type 2 was possible. A primary cesarean section was defined as a planned cesarean section with intact membranes and no labor. Every other cesarean section was considered a secondary cesarean section.

Preterm birth was defined as birth before 37 weeks of com-

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Table 1. — *Sociodemographic factors*.

	Moroccan				Turkish				Belgian	
Deliveries (N)	12,502				9,094				231,289	
Newborns (N)	12,729				9,250				235,561	
	n	%	OR	95% CI	n	%	OR	95% CI	n	%
Maternal education										
None	3039	24.3	13.99	13.53-14.39	1741	19.4	13.36	2.81-13.94	2445	1.1
Primary school	2642	21.1	3.09	2.97- 3.22	1886	20.7	3.10	2.96- 3.26	16812	7.2
Middle school	4120	32.9	0.76	0.73- 0.79	4045	44.4	1.21	1.16- 1.26	91707	39.7
High school	718	5.7	0.11	0.10- 0.12	363	3.9	0.07	0.07- 0.08	87311	37.7
University	221	1.7	0.16	0.14- 0.18	102	1.1	0.10	0.08- 0.12	24754	10.7
Maternal age (years)										
< 20	789	6.3	2.10	1.96- 2.75	991	10.9	3.63	3.40- 3.91	6799	2.9
21-34	9745	77.9	0.64	0.62- 0.67	7518	82.6	0.85	0.81- 0.90	196445	84.9
35-40	1648	13.1	1.19	1.28- 1.25	531	5.8	0.50	0.16- 0.54	26041	11.2
> 40	319	2.5	2.73	2.17- 3.02	54	0.5	0.69	0.53- 0.90	1998	0.8

OR: Odds Ratio; CI: Confidence interval; IVF: in vitro fertilisation.

Table 2. — *Pregnancy-related factors*.

	Moroccan				Turkish				Belgian	
Deliveries (N)	12,502				9,094				231,289	
Newborns (N)	12,729				9,250				235,561	
	n	%	OR	95% CI	n	%	OR	95% CI	n	%
Artificial reproductive technology										
Hormonal stimulation	97	0.8	0.37	0.30-0.45	104	1.1	0.54	0.44-0.65	4969	2.2
IVF	59	0.5	0.28	0.22-0.37	78	0.9	0.51	0.41-0.63	3957	1.7
ICSI	45	0.4	0.10	0.30-0.53	49	0.5	0.58	0.42-0.77	2163	0.94
Twins	421	3.3	0.94	0.86-1.04	306	3.3	0.94	0.84-1.05	8334	3.5
Preterm delivery (weeks)										
< 37	771	6.2	0.83	0.77-0.89	613	6.7	0.91	0.83-0.98	17117	7.4
< 28	50	0.4	0.59	0.45-0.78	25	0.3	1.06	0.72-1.57	659	0.3
28-34	280	2.2	0.81	0.70-0.94	188	2.1	0.97	0.82-1.14	5381	2.3
35-36	441	3.5	0.74	0.64-0.85	400	4.4	1.02	0.87-1.21	11077	4.8
Birth weight (grams)										
< 1500	167	1.3	1.26	1.09-1.46	89	1.0	0.94	0.77-1.16	2413	1.0
1500-2499	559	4.4	0.07	0.06-0.07	529	5.7	0.08	0.07-0.08	14112	6.0
2500-4500	11805	92.7	1.08	1.02-1.16	8557	92.5	1.05	0.97-1.13	217061	92.2
> 4500	198	1.6	1.79	1.57-2.05	75	0.8	0.97	0.78-1.21	1974	0.8
Mortality										
Perinatal	129	1.0	1.88	1.59-2.22	44	0.5	0.93	0.69-1.24	1215	0.52
Antenatal	77	0.6	1.18	0.84-1.64	26	0.3	1.16	0.64-2.10	672	0.3
Intrapartum	6	0.05	0.61	0.28-1.36	2	0.02	0.58	0.14-2.37	93	0.04
Unknown	2	0.02	0.90	0.24-3.44	0	0	–	–	21	0.01
Early neonatal	44	0.35	0.95	0.67-1.35	16	0.17	1.05	0.57-1.91	429	0.18

OR: Odds Ratio; CI: Confidence interval; IVF: in vitro fertilisation; ICSI: intracytoplasmic sperm injection; Horm: pregnancy after hormonal stimulation.

pleted gestational age, and extremely preterm birth was birth before 28 completed weeks. Low birth weight was defined as birth weight less than 2,500 g, and extremely low birth weight as less than 1,500 g.

Fetal death was defined as every fetus born dead with a birth weight of at least 500 g. Neonatal death was defined according to WHO criteria as death during the first 28 completed days of life per 1,000 live births and was subdivided into early neonatal death, occurring during the first seven days of life and late neonatal death after the seventh day but before the 28th completed day of life.

Data analysis

The three groups were compared using chi-squared testing comparing the Moroccan and Turkish group with the Belgian group as a reference. Odd ratios (OR) and 95% confidence interval (CI) were calculated. For the chi-squared test significance was accepted at $p < 0.05$. Relevant differences found at univariate analysis were analyzed in a stepwise logistic regression including relevant items available in the data base. The statistical package used was SPSS 16.0.

Results

Tables 1 and 2 present the most relevant maternal and neonatal outcomes. There were more than twice as many teenage pregnancies in the Moroccan and Turkish group as compared with the Belgian group. Pregnancy after age 40 years was more frequent only in the Moroccan women, while Turkish women demonstrated significantly fewer deliveries in this age group. There were significant-

ly more mothers in the Moroccan and Turkish group who had no education or only primary school. In the Moroccan group nine women (0.07%) screened positive for human immune deficiency virus versus 80 (0.03%) in the Belgian group (p = 0.03, OR 1.97; 95% CI 1.06-3.67). There was no difference between the Belgian and the Turkish groups (n = 5, 0.05%, p = 0.31, OR 1.55; 95% CI 0.66-3.64). Both the Turkish (n = 277, 3.1%, $p < 0.01$, OR 0.61; 95% CI 0.54-0.69) and the Moroccan (n = 311, 2.5%; $p < 0.001$, OR 0.50; 95% CI 0.44-0.56) group had significantly less hypertensive disease in pregnancy versus Belgian women (n = 11,520, 4.9%). The prevalence of diabetes was higher in Moroccan (n = 378, 3.0%, $p < 0.01$, OR 2.37; 95% CI 2.16-2.61) and Turkish (n = 153,1.7%, $p < 0.01$; OR 1.38; 95% CI 1.19-1.62) as compared to Belgian women (n = 2779, 1.2%). The number of grand multiparous women, defined as having had four or more deliveries, was higher in both the Moroccan and Turkish group; in the Belgian reference population it was 998 (4.8%) versus 2,646 (21.2%, $p < 0.001$, OR 4.53; 95% CI 4.35-4.71) and in the Turkish group 1,019 (11.2%; $p < 0.001$, OR 2.40; 95% CI 2.25-2.55).

In the period studied there was no difference in incidence of twins between the three groups but there were more high multiples (≥ 3) in the Moroccan group, 24 (0.19% $p < 0.001$; OR 2.25; 95% CI 1.73-3.66) versus six (0.06% $p = 0.88$; OR 0.9495% CI, 0.43-2.07) in the Turkish and 162 (0.07%) in the Belgian group.

The breech position was significantly less frequent in Turkish (n = 406, 4.4%, $p < 0.01$, OR 0.79; 95% CI 0.71-0.87) and Moroccan (n = 516, 4.1%, $p < 0.001$, OR 0.71; 95% CI 0.67-0.79) women, while in Belgian women this occurred in 13,018 (5.5%) pregnancies. Instrumental vaginal delivery using a vacuum extractor or forceps was performed significantly more in Belgian women; 25,612 (10.9%), underwent vaginal instrumental delivery versus 1,197 (9.4%, $p < 0.001$, OR 0.98; 95% CI 0.97-0.99) in Moroccan and 813 (8.8%, $p < 0.001$, OR 0.97; 95% CI 0.96-0.98) in Turkish women. The differences were even more outspoken for cesarean section. For elective cesarean section there were 26,954 (11.4%) in the Belgian group versus 881 (9.5%, $p < 0.001$, OR 0.98; 95% CI 0.97-0.99) in Turkish and 1,107 (8.7%, $p < 0.001$, OR 0.96; 95% CI 0.95-0.97) in Moroccan women. There was no difference regarding emergency cesarean section; 17,751 (7.5%) in the Belgian group versus 950 (7.4%, p = 0.11, OR = 0.99; 95% CI 0.99-1.01) and 659 (7.1%, p = 0.01, OR 0.99; 95% CI 0.98-0.99) in the Turkish group. In the Belgian group 8,542 (19.1% of all cesarean sections) had undergone a previous cesarean section, while this was significantly more (n = 338; 21.9%, $p = 0.005$; OR 1.18; 95% CI 1.05-1.33) for the Turkish group and there was no significant difference between the Belgian and Moroccan women (n = 408; 19.8%; p = 0.41; OR = 0.96; 95% CI 0.88-1.05).

Labor was more frequently induced in Belgian (n = 67,450; 29.2%) versus 2,992 (23.9%; $p < 0.001$, OR 0.77; 95% CI 0.74-0.81) for Moroccan and 1,946 (21.4%, $p < 0.001$, OR 0.67; 95% CI 0.64-0.71) for Turkish women.

Carriership for GBS was reported more frequently in Moroccan (n = 2,199, 17.6%, $p < 0.001$, OR 1.31; 95% CI 1.26-1.38) women as compared to Belgian women (n = 31,826, 13.8%). GBS were less frequent in the Turkish group (n = 1,027, 11.3%, $p < 0.001$, OR 0.80; 95% CI 0.75-0.86). During delivery epidural analgesia was more frequently applied in Belgian women (n = 153,030, 66.2%) versus 6,309 (50.5%, $p < 0.001$, OR 0.54; 95% CI 0.52-0.56) in the Moroccan women and 4,925 (54.2%, $p < 0.001$, OR 0.62; 95% CI 0.59-0.64) in Turkish women.

There were relatively more babies in the Moroccan group (n = 645, 5.1%, $p < 0.001$, OR 1.25; 95% CI 1.16-1.35) who had to be transferred to a neonatal intensive care unit, whereas in the Belgian group there were 9,629 (4.1%), and in the Turkish group these were comparable (n = 375, 4.1%; p = 0.873; OR 0.99; 95% CI 0.89-1.09).

For further analysis we performed multiple logistic regression analysis including ethnic groups (Belgian, Turkish and Moroccan). In the model for hypertension we entered the ethnic group, maternal age (for logistic regression maternal age was subdivided in to 3 categories: younger than 20 years, between 20 and 34.9 years, and 35 or more years), diabetes, hypertension, gestational age (for logistic regression gestational age was subdivided in less than 34 weeks and 35 or more weeks), parity, multiple pregnancy, diabetes and level of education. After forward stepwise regression all factors entered remained significant demonstrating that controlling for level of education, diabetes, parity, age and multiple pregnancy still resulted in an increased risk for hypertension in Belgian women. For diabetes we entered the ethnic group, maternal age, parity and the level of education, and here also all factors remained significant confirming that being Turkish or Moroccan increases the risk for diabetes when controlling for age, parity and level of education.

For preterm birth we entered the ethnic group, age, parity, hypertension, diabetes and level of education and here we noted that diabetes was not a significant predictor of preterm delivery ($p = 0.34$), but all other factors remained significant.

For elective cesarean section we entered ethnicity, parity, gestational age, having undergone a previous cesarean section, diabetes and hypertension and all factors remained significant confirming that a Belgian women had a higher risk of undergoing an elective primary cesarean section.

Concerning perinatal death we entered into the model the ethnic group, maternal age, birth weight (for logistic regression birth weight was subdivided in less than 2,500 g, 2500-4,499 g and more than 4,500 g) and level of education. In this logistic regression being a Belgian woman still showed a significantly lower risk for perinatal mortality.

The logistic regression for a birth weight above 4,500 g included the ethnic group, maternal age, parity, hypertension and diabetes, and here also all factors remained significant.

Discussion

Different studies [5-7] have demonstrated more teenage pregnancies, more pregnancies after age 40 and a higher rate of grand multiparity in migrant groups in Europe. Our study confirms that grand multiparity is more frequent in the Turkish and Moroccan group.

The higher frequency of human immune deficiency in Moroccan women is disturbing; it might be due to chance and low number in general. This finding is in conflict with the general belief of most practitioners that the more traditional muslim women have a lower risk of sexually transmitted diseases such as human immune deficiency virus. Women of Moroccan descent also seem to be more frequent carriers of GBS than women from Turkish or Belgian descent. We have no further data to analyze any possible explanation for this.

David *et al*. [5] demonstrated that hypertension was significantly more common in German than in migrant, mainly Turkish, women whereas anemia was significantly more frequent in women of non German ethnicity. We have no data on anemia, but we can confirm that in Turkish women and also in Moroccan women hypertension in pregnancy is less of a problem than in Belgian women.

Worldwide ethnic differences in perinatal morbidity and mortality have been reported [8], the causes of which have not been completely elucidated: inequities in the provision of health care as a cause and the need for specific ethnic approaches as a solution has been suggested [9]. Looking only at the social discrepancies does not take into account eventual genetic (carriers of autosomal recessive disorders can be more prevalent in some ethnic groups resulting in a higher frequency of congenital anomalies), environmental and dietary factors [10-15]. Furthermore 'ethnicity' is dynamic, every ethnic group in our multicultural society is surrounded by other groups influencing each other. Dietary habits will evolve when people move from one country to another, environmental influences such as pollution can be different depending on where people live, accessibility of health services will become better when more graduated health professionals from each ethnic group will become available and genetic constitution shifts when more interethnic couples are formed. No studies are available on these interactions in Flanders and our data cannot provide these. In previous studies it has been demonstrated that perinatal morbidity and mortality was higher in Turkish and Moroccan women (4) both for the 1995 and the 1998 cohort, and that the educational level of the mother is the most important determinant of infantile mortality in Flanders.

Schulpen *et al*. [16] found that for deliveries between 1999 and 1993 in the Netherlands, perinatal death in the Mediterranean group including Turkish and north African, mainly Moroccan women, was significantly higher compared to the Dutch group. In a smaller audit study on 135 perinatal deaths in 1999 in Amsterdam, the Netherlands, both Turkish and Moroccan women had double the risk for perinatal death as compared to Dutch women [12], mainly caused by early preterm birth and substandard care in Moroccan but not in Turkish women. In the present study perinatal mortality is still higher for the Moroccan group, but there is no difference in the Turkish group.

This suggests that the integration of the Turkish population in the Belgian health system is better than for the Moroccan population, but we cannot substantiate this from our data.

A high birth weight into Mediterranean/Turkish women has been reported in the Netherlands [17, 18]. David *et al*. [5] demonstrated in a German cohort significantly more neonates weighing more than 4,000 g than in the Turkish group. Studying the role of constitutional (fetal gender, parity, maternal age and height) and environmental (education, cohabitation state, maternal pre-pregnancy body mass index, smoking, alcohol consumption, depression, and work stress) factors influencing ethnic differences in term birth weights, Goedhart *et al*. [14] demonstrated that constitutional rather than environmental determinants explain the difference in birth weight between Dutch, Turkish and Moroccan newborns, limiting possibilities for prevention. We performed a multiple regression to predict birth weight above 4,500 g including ethnicity, diabetes, gestational age, parity, which demonstrated that even when correcting for diabetes, Moroccan women still have a higher risk of having a baby with a birth weight above 4,500 g.

Preterm delivery before 34 weeks was more frequent in German women as compared to migrant Turkish women, especially in the multiparous lower class group [5]. In Amsterdam, the Netherlands, Goedhart *et al*. [18] found Moroccan women to have a significantly lower risk for spontaneous preterm birth as compared to the Dutch group. There was a lower, but not statistically significant, rate of preterm delivery in the Turkish versus Dutch women. Both Moroccan and Turkish women have a lower risk for preterm birth as compared to Belgian women and the ethnic group remains a significant factor in multivariate analysis including diabetes, level of education, parity, age and hypertension. Similar findings have been reported in Germany and in the Netherlands [5, 19].

We previously demonstrated [4] that artificial reproductive technology is used less frequently in Turkish and Moroccan women in 1995 and in 1999, and this did not change in the period 2002-2006.

A lower rate of epidural anesthesia in ethnic minorities has been reported [4, 5, 19, 20]. This has been explained both by offering epidural anesthesia less frequently to migrants by the labor staff and/or by lower demand by the women, both possibly influenced by communication problems. We confirm that Turkish and Moroccan women used epidural analgesia less, even when correcting for level of education, parity, multiple pregnancy and cesarean section.

Elective cesarean section was more frequent in Belgian women as compared to Turkish and Moroccan women, and there was no difference for emergency section; a similar finding has been reported in Germany [5]. The rates

of cesarean section in different ethnic groups are highly variable, e.g. in an analysis of 553,491 live births in Norway, Vangen *et al*. [21] found an increased cesarean section rate in women from India, Africa and Latin America, but not for Turkish and Pakistan migrants. On the contrary, in Switzerland a significantly higher cesarean rate has been described in both Turkish and Moroccan women, even when adjusting for maternal (education, age, parity) and infant (sex, gestational age) characteristics [22].

One major drawback of our study is that we use nationality at birth of the mother as a proxy for ethnic group. This means that women who were born in Belgium with as primary nationality Belgian, were considered as Belgian, although they may well consider themselves as ethnically Turkish or Moroccan.

Conclusion

In Belgium ethnic inequality in obstetric outcome is a reality. Moroccan women still have a significantly worse pregnancy outcome, including more human immune deficiency virus infection, higher perinatal mortality, and more macrosomia. Both Turkish and Moroccan women carry GBS more frequently, have more diabetes and less hypertension and more babies below 2,500 g. Belgian women more often undergo interventions such as instrumental vaginal delivery, elective cesarean section, induction of labor and epidural anesthesia.

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