

Increasing prevalence of macrosomia in Flanders, Belgium: an indicator of population health and a burden for the future

W. GYSELAERS^{1,2}, G. MARTENS³

¹Dept. Obstetrics & Gynaecology, Ziekenhuis Oost Limburg, Genk, Belgium.

²Dept. of Physiology, Hasselt University, Diepenbeek, Belgium.

³Study Centre for Perinatal Epidemiology, Brussels, Belgium.

Correspondence at: Wilfried Gyselaers, Department of Obstetrics & Gynecology, Ziekenhuis Oost Limburg, Schiepse Bos 6, B-3600 Genk, Belgium. E-mail: wilfried.gyselaers@zol.be

Abstract

Macrosomia, defined as birth weight > 4 kg, increased in Flanders from 7.3% (4899/67143) in 1991 to 8.63% (6034/69924) in 2010 ($p < 0.0001$) in singleton pregnancies at term.

There are at least 3 important factors contributing to this evolution. (1) Increase of maternal stature and length: during the last century, mean length of Belgian women increased with approximately 10cm to the current value of 1.66 m. (2) Increase of maternal age: the proportion of pregnant women aged 35 years or more increased significantly from 6.1% in 1991 to 14.3% in 2010. (3) Increase of maternal overweight or obesity: between 1994 and 2000, there was an increase of 4% for both overweight and obesity in women and today, 44% of Belgians are overweight (BMI > 25 kg/m²), and 12% are obese (BMI > 30 kg/m²). From these data, rate and increase of macrosomia can be considered indirect indicators of general public health.

Next to the risks for obstetrical complications, neonates > 4 kg are at risk for development of adult obesity and type 2 diabetes with related diseases, such as hypertension and metabolic syndrome. As adults, they also tend to deliver macrosomic baby's themselves. As such, macrosomia at birth is a burden for a community's future health status, health care and related costs.

Prenatal health care workers should be aware of the relevance to prevent macrosomia in the first generation by implementing guidelines on nutrition, physical activity and appropriate weight gain into routine preconceptional and prenatal care, screening for gestational diabetes with strict monitoring of blood sugar levels in affected individuals, and promotion of breastfeeding.

Key words: Macrosomia, maternal weight, maternal length, maternal age, type 2 diabetes, metabolic syndrome.

Macrosomia is defined as birth weight > 90% at each gestational age according to national, regional, local or subpopulation specific charts for birth weight, or as birth weight > 4000 g regardless of gestational age or study group (Kierans et al., 2007; Sacks, 1993). It is considered a relevant issue in perinatal care, as it harbours intrinsic risks for increased morbidity for both mother and neonate. Maternal morbidities associated with macrosomia are prolonged and/or obstructed labour, instrumental or surgical delivery, birthing canal trauma and postpartum hemorrhage. Neonatal morbidities are birth trauma and asphyxia, neonatal metabolic and respiratory dysfunction and admission to neonatal care units (Chauhan and Magann, 2007).

Figure 1 shows the 20-years evolution in Flanders of macrosomia, defined as birth weight > 4 kg in term singleton pregnancies, as registered by Study Centre for Perinatal Epidemiology in Brussels. During these 2 decades, there was an 18% increase of macrosomia from 7.30% (4899/67143) in 1991 to 8.63% (6034/69924) in 2010 ($p < 0.0001$). This rise was associated with an increase of caesarean section rate for the indication of obstructed labour from 4.07% (2587/63599) in 1997 to 4.62% (3231/69924) in 2010 ($p < 0.0001$). Between 1997 and 2010, annual increase of mean birth weight for all term singletons was 2.1 g (0.06%), whereas this was 17.4 g (0.52%) for neonates, delivered by caesarean section for obstructed labour ($p < 0.0001$).

% birth weight > 4 kg

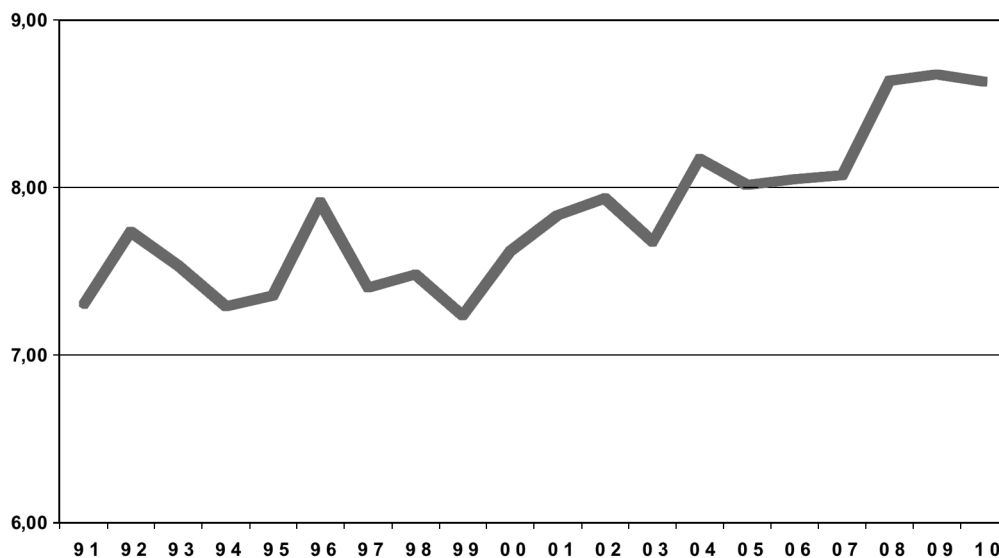


Fig. 1. — Twenty years evolution of macrosomia in Flanders, defined as birth weight > 4 kg in singleton, term pregnancies (Source: Study Centre for Perinatal Epidemiology, Brussels).

During the last decades, an increase of macrosomia and neonates large-for-gestational-age has been reported in many countries across Europe (Albermann, 1991; Bergmann et al., 2003; Power, 1994; Schack-Nielsen et al., 2006; Skjaerven et al., 2000), Asia (Lu et al., 2011), Latin-America (Forsbach et al., 1988; Kierans et al., 2007), Australia (Campbell-Westerway et al., 2003) and in Canada (Rodrigues et al., 2000; Wen et al., 2003). The exception to this rule are the United States, where macrosomia is decreasing since the mid-nineties (Chauhan et al., 2005). Between countries, large differences can exist between both the observed prevalence of macrosomia – varying between 1% (Serirat et al., 1992) and 34% (Rodrigues et al., 2000) – and the evolution pattern, with annual increase rates between 0.3% (Campbell-Westerway et al., 2003) and 0.85% (Rodrigues et al., 2000). These differences can partly be explained by the definitions used and the population characteristics. There is one striking similarity in this evolution for most countries: the increase was more prominent during the last decades than in the years before (Lu et al., 2011).

There has been extensive research to explain the general evolution of birth weight, and many confounding factors have been discussed: genetic and environmental factors, life style and socio-economic status, pregestational maternal weight or body-mass index, net gestational weight gain, high birth weight or previous macrosomia, maternal age and height, race and gender, parity, postdate pregnancy, diabetes and glucose control (Chauhan and Magann, 2007).

For Belgium and Flanders, at least three different factors can contribute to the increase in birth weight, but the actual contribution of each factor cannot be calculated based on the available data : (1) increase of maternal stature and length, (2) increase of maternal age, and (3) increase of maternal overweight or obesity. Epidemiological data indicate that, during the last century, mean length of Belgian women increased with approximately 10 cm to the current value of 1.66 m (Gezondheid.be, 2005). It is expected that this growth will continue for another few decades (Worldorder.nl, 2008). For Flanders during the past 20 years, the proportion of pregnant women aged 35 years or more increased significantly from 6.1% in 1991 to 14.3% in 2010 (Cammu et al., 2011). Maternal age of 40 year or more nearly tripled from 0.8% to 2.3% (Cammu et al., 2011). Next to this, recent demographic data indicate that 44% of Belgians are overweight (BMI > 25 kg/m²), and 12% are obese (BMI > 30 kg/m²) (Obesitas Forum, 2005). Between 1994 and 2000, there was an increase of 4% for both overweight and obesity in women (Obesitas Forum, 2005). Young adults in Belgium, at the start of their reproduction, show overweight in 19% and obesity in 10% (Obesitas Forum, 2005). From these data, rate and increase of macrosomia can be considered indirect indicators of general public health.

Next to the macrosomia-related obstetric risks, as mentioned above, neonates > 4 kg are also at risk for development of adult obesity (Eriksson et al., 2001) and type 2 diabetes with related diseases, such as hypertension and metabolic syndrome (Hermann et

al., 2010; Ong and Dungerl, 2004). In many populations, there is a U-shaped association between birth weight and adult development of type 2 diabetes (Eriksson et al., 2003). Also coronary heart disease is increased in offspring of mothers with high BMI, when there is an association with inadequate food intake (Forsén et al., 1997). An increasing trend for macrosomia at birth thus is a burden for a community's future health status, health care and related costs. Next to this, women who were born macrosomic tend to deliver macrosomic baby's themselves (Chauhan and Magann, 2007). This means that macrosomia positively influences a further increase of macrosomia in the next generations, with progressively stronger implications for population health.

Prenatal health care workers should be aware of the relevance to prevent macrosomia in the first generation. It is rational to implement guidelines on nutrition, physical activity and appropriate weight gain into routine preconceptional and prenatal care (Henriksen, 2008). Screening for gestational diabetes with strict monitoring of blood sugar levels in affected individuals is mandatory (Chauhan and Magann, 2007). Promotion of breastfeeding during the first six months postpartum has been shown to be effective in reducing the prevalence of obesity (Binns et al., 2003). As clinical or ultrasound prediction of macrosomia remains elusive, an abnormal partogram with slow descend of the fetal head warrants suspicion for a big baby with the possibility of a complicated delivery, for which availability of an experienced obstetrician is needed (Henriksen, 2008).

References

- Alberman E. Are our babies becoming bigger? *J R Soc Med.* 1991;84:257-60.
- Bergmann RL, Richter R, Bergmann KE et al. Secular trends in neonatal macrosomia in Berlin: influences of potential determinants. *Paediatr Perinat Epidemiol.* 2003;17:244-9.
- Binns C, Lee MK, Oddy W. Breastfeeding and the prevention of obesity. *Asia Pac J Public Health.* 2003;15:S22-6.
- Cammu H, Martens G, Martens C et al. Perinatale activiteiten in Vlaanderen 2010. SPE, Brussel, 2011.
- Campbell Westerway S, Keogh J, Heard R et al. Incidence of fetal macrosomia and birth complications in Chinese immigrant women. *Austr NZ J Obstet Gynecol.* 2003;43:46-9.
- Chauhan SP, Grobman WA, Gherman RA et al. Suspicion and treatment of the macrosomic fetus: a review. *Am J Obstet Gynecol.* 2005;193:332-46.
- Chauhan SP, Magann EF. Fetal macrosomia. In: Berghella V (ed) *Maternal-Fetal evidence based guidelines.* Infoma Healthcare, London, UK 2007; 294-6.
- Eriksson J, Forsén T, Osmond C et al. Pathways of infant and childhood growth that lead to type 2 diabetes. *Diabetes Care.* 2003;26:3006-10.
- Eriksson J, Forsén T, Tuomilehto J et al. Size at birth, childhood growth and obesity in adult life. *Int J Obesity.* 2001;25:735-40.
- Forsbach G, Contreras-Soto J, Fong G et al. Prevalence of gestational diabetes and macrosomic newborns in a Mexican population. *Diabetes Care.* 1988;11:235-8.
- Forsén T, Eriksson J, Tuomilehto J et al. Mother's weight in pregnancy and coronary heart disease in a cohort of Finnish men: follow up study. *BMJ.* 1997;315:837-40.
- Gezondheid.be. De Belg wordt alsmäär langer. http://www.gezondheid.be/index.cfm?fuseaction=art&art_id=2819, 2005 (1/5/2012).
- Henriksen T. The macrosomic fetus: a challenge in current obstetrics. *Acta Obstet Gynecol Scand.* 2008;87:134-45.
- Hermann GM, Dallas LM, Haskell SE et al. Neonatal macrosomia is an independent risk factor for adult metabolic syndrome. *Neonatology.* 2010;98:238-44.
- Kierans W, Luo Z, Wilkins R et al. Infant Macrosomia Among First Nations in British Columbia- Prevalence, Trends and Characteristics. http://www.vs.gov.bc.ca/stats/indian/REPORT_Macrosomia.pdf, 2007 (1/5/2012).
- Lu Y, Zhang J, Lu X et al. Secular trends of macrosomia in southeast China, 1994-2005. *BMC Public Health.* 2011; 11:818-26.
- Obesitas Forum. Preventie en aanpak van overgewicht en obesitas in België. http://www.gezondheid.be/index.cfm?fuseaction=art&art_id=2938, 2005 (1/5/2012).
- Ong KK, Dunger DB. Birth weight, infant growth and insulin resistance. *Eur J Endocrinol.* 2004;151:U131-9.
- Power C. National trends in birth weight: implications for future adult disease. *BMJ.* 1994;308:1270-1.
- Rodrigues S, Robinson E, Kramer M et al. High rates of infant macrosomia: a comparison of a Canadian native and a non-native population. *J Nutr.* 2000;130:806-12.
- Sacks DA. Fetal macrosomia and gestational diabetes: What's the problem? *Obstet Gynecol.* 1993;81:775-83.
- Schack-Nielsen L, Molgaard C, Sorensen TI et al. Secular change in size at birth from 1973 to 2003: national data from Denmark. *Obesity.* 2006;14:1257-63.
- Serirat S, Deerochanawong C, Sunthornthepvarakul T et al. Gestational diabetes mellitus. *J Med Assoc Thai.* 1992;75: 315-9.
- Skjaerven R, Gjessing HK, Bakketeig LS. Birthweight by gestational age in Norway. *Acta Obstet Gynecol Scand.* 2000;79:440-9.
- Wen SW, Kramer MS, Platt R et al. Secular trends of fetal growth in Canada, 198 1 to 1997. *Paediatr Perinat Epidemiol.* 2003;17:347-54.
- Worldorder.nl. De maximale gemiddelde lichaamslengte. <http://www.worldorder.nl/Demaximalegemiddeldelichaams-lengte.htm>, 2008 (1/5/2012).