Maternal Obesity: An Important Contributor to Congenital Anomalies, Infant and Child Mortality with Negative Economic Impact

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Abstract

Obesity is a leading risk factor for global death and its incidence and prevalence, including maternal obesity is increasing globally. Obesity is linked to certain congenital anomalies viz. neural tube defects (NTD), congenital heart disease (CHD) and orofacial anomalies. Congenital anomalies in general are a leading cause of infant and child mortality but they are on decline in many countries. However maternal obesity on the other hand is on the rise. As a result, the share of maternal obesity contributing to congenital anomalies is likely to increase. Maternal obesity can therefore significantly contribute to infant/child mortality and can have seriously negative economic, social and psychological impact.

Keywords: Obesity; Congenital anomalies; Infant mortality; Economic implications

Introduction

Obesity is a major worldwide health burden and is considered the fifth leading risk factor for global death [1]. Pregnant women are significantly and increasingly affected by obesity. In the U.K. and U.S. about 33–40% of all pregnant women are overweight or obese [2-4] whereas in rapidly developing nations like India and China the burden is anywhere from 8–26% [5,6]. The standard World Health Organization (WHO) classification of BMI is widely followed to define overweight and obesity, where BMI ≥ 25 and ≥ 30 are defined as overweight and obese, respectively. Besides the overall long-term risk for diabetes, cardiovascular disease, and cancer, overweight and obesity are also associated with many pregnancy and birth complications including certain types of congenital anomalies.

Some Facts about Congenital Anomalies

Congenital anomalies affect approximately 1 in 33 births, corresponding to about 3.2 million birth defect–related disabilities every year [7]. The prevalence of major congenital anomalies in Europe was from 20.9 to 23.9 per 1,000 births during 2003-2007 and 2007-2011 respectively. The most common anomaly had been non-chromosomal CHD (congenital heart disease) with prevalence from 5.8 to 6.5/1,000 for 2003–2007 and 2007–2011 respectively. NTD (neural tube defects) stood at about 0.77/1,000 for 2007–2011 [8,9]. In the U.K. the major CHD rate was from 35-53 per 10,000 births, and the open NTD rate (spina bifida) from 6–11.5 per 10,000 births [10-12].

Several important studies have shown a distinct link between maternal obesity and congenital anomalies specially NTDs, CHDs and orofacial anomalies. The odds ratio (OR) for NTDs ranged from a lowest of 1.7 (95% CI 1.34–2.15) for all NTDs to a highest of 3.5 (95% CI 1.2–10.3) for spina bifida, for CHDs from a lowest of 1.15 (95% CI 1.07–1.23) to a highest of 2.0 (95% CI 1.2–3.4) and for orofacial clefts from a lowest of 1.2 (95% CI 1.09–1.31) for septal defects to a highest of 3.71 (95% CI 1.05–13.10) for cleft lip.

It is also observed that obesity, when compounded by maternal diabetes, is associated with an increased risk of congenital anomalies [13].

Effects on Infant Mortality

From 2009 to 2010, congenital malformations including chromosomal abnormalities, contributed to 21% of a total of 24,586 infant deaths in the US [14]. Congenital anomalies are the second most common cause of infant deaths overall with a rate of 1.39/1,000 live births in 2007 and the leading cause of post-neonatal death at 0.52/1,000 live births [15]. Approximately 3% of pregnancies and infants are diagnosed with congenital anomalies, of which 7% result in stillbirth or infant death [16].

Since contribution of obesity on congenital anomalies varies from 3% (for CHD) to 10% (for NTD), the effect of obesity on infant death and still- birth could be anywhere between 6 per 100,000 (for CHD) to 20 per 100,000 (for NTDs).

Economic Implications

Although the absolute number of congenital anomalies is not very large, economic and healthcare impact may be substantial due to the specialized care needs of many children and adults living with these anomalies [17]. The estimated medical cost for an infant with any CHD was about 100,000 USD in 2005 (for the privately insured) and higher for a major cardiac anomaly. Total hospitalization cost for all individuals with CHD was 1.4 billion USD in 2004 [18]. Economic implications of other congenital anomalies are not well documented. Social and psychological effects on the individual and parents and discrimination due to congenital anomalies are perhaps incalculable.
Future Trends

The birth defect prevalence in Europe has decreased from 23.9/10,000 to 20.9/10,000 between 2003–2007 and 2007–2011 [8,9]. Birth defect mortality has also declined, at least in the developed world. It has declined from 255.4/100,000 live births in 1979 to 134.0/100,000 in 2007 in the U.S [19]. On the contrary, obesity in women of childbearing age has been increasing steadily. Health Survey for England (HSE) shows that the prevalence of obesity among women aged 16–44 has increased from about 12% in 1993 to about 20% in 2010 [20]. Similar trends are also seen in the U.S., where the estimated age-adjusted prevalence of obesity in women ≥ 20 years has increased from 25% during 1988–1994 to about 36% in 2007–2008 [21]. This means that the congenital anomalies as a result of maternal obesity are likely to increase in the future, which can be a significant factor of infant and child mortality along with serious economic, social and psychological implications.

Conclusion

- Obesity, including maternal obesity is increasing globally.
- Obesity is linked to certain congenital anomalies viz. NTD, CHD and orofacial anomalies.
- Since congenital anomalies in general are on decline and maternal obesity is on the rise, share of maternal obesity contributing to congenital anomalies is likely to increase.
- Infant mortality due to congenital anomalies as a result of maternal obesity is thus likely to see a corresponding rise.
- Maternal obesity can therefore significantly contribute to infant/child mortality and can have seriously negative economic, social and psychological impact.

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