Moderate and Extreme Maternal Obesity

Abstract:

The aim of this study was to investigate the prevalence of moderate and extreme obesity among an Irish obstetric population over a 10-year period, and to evaluate the obstetric features of such pregnancies. Of 31,869 women delivered during the years 2000-2009, there were 306 women in the study group, including 173 in the moderate or Class 2 obese category (BMI 35-39.9) and 133 in the extreme or Class 3 obese category (BMI e 40). The prevalence of obese women with BMI e 35 was 9.6 per 1000 (0.96%), with an upward trend observed from 2.1 per 1000 in the year 2000, to 11.8 per 1000 in the year 2009 (P<0.001). There was an increase in emergency caesarean section (EMCS) risk for primigravida versus multigravid women, within both obese categories (P<0.001). However, there was no significant difference in EMCS rates observed between Class 2 and Class 3 obese women, when matched for parity. The prevalence of moderate and extreme obesity reported in this population is high, and appears to be increasing. The increased rates of abdominal delivery, and the levels of associated morbidity observed, have serious implications for such women embarking on pregnancy.

Introduction

The prevalence of obesity in obstetric practice has increased significantly in recent years. The published estimates of obesity among adult women vary from 18 to 25%, with reports from many developed countries outlining the fact that these rates have increased by at least 50% in the last decade. We have previously investigated the prevalence of obesity among 5,162 women delivered at Galway University Hospital between 2001 and 2003, and outlined that at that time 25% of women were obese i.e. had a BMI estimation >30. We, and others, have outlined that there is a strong association between obesity and numerous complications of pregnancy and delivery. Because obesity is closely linked to adverse outcomes in pregnancy, this area of obstetric practice has deservedly received increased attention in recent years. This has led to the compilation of guidelines from postgraduate colleges in relation to obesity, and a much raised awareness of the implications and complications. While there are reports outlining the increased prevalence of obesity in obstetric populations in recent years are minimal data pertaining specifically to Class 2 and Class 3 obesity. The aim of this study was to evaluate the trends in the prevalence of moderate or Class 2 (BMI 35-39.9) obesity, and extreme or Class 3 (BMI e 40), among women attending Galway University Hospital over a 10-year period, from 2000 to 2009 inclusive, and to investigate the obstetric features of these women.

Methods

The data for this study were obtained from an obstetric computerised database, to which data had been entered prospectively during the time period of the study, at Galway University Hospital. The database used was the EuroKing system (European Information Technology, Ottershaw, Surrey, UK). Supplementary information was obtained from the hospital case notes. Height and weight were measured and recorded for all women attending their first antenatal visit, and hence a calculation of BMI performed for women attending the antenatal clinic during the 10-year period of the study. After identification of all women with Class 2 and Class 3 obesity, i.e. with BMI measurement e 35, the information obtained included maternal age, parity, gestational age at delivery, mode of delivery (spontaneous vaginal delivery, instrumental vaginal delivery [inclusive of forceps and vacuum extraction], elective and emergency caesarean section), and birth weight. The presence or absence of the following complications of pregnancy and delivery were also examined: pregnancy induced hypertension (PIH), preeclampsia (PET), gestational diabetes mellitus (GDM), venous thromboembolism (VTE) in pregnancy and shoulder dystocia (SD).

Descriptive statistics (frequency and percentages) were calculated for each of the study variables. The results were analysed separately for primigravid women (first ongoing pregnancy) and multigravid women (at least one previous delivery). The results were analysed for all women with BMI e 35, and separately evaluated for women with either Class 2 (BMI 35-39.9), or Class 3 obesity (BMI e 40). A Chi-squared test was used to evaluate the difference between proportions observed. A regression model (curve estimate for trend) was used to evaluate the prevalence over the time period of the study. Finally, an ANOVA test was used to test for differences between the average in each group, and post hoc testing performed with the Scheffe test.

Figure 1. The incidence per 1000 for each year of the study is demonstrated.

Results

During the time period of the study there were 306 women with BMI e 35, among a denominator population of total parturients of 31,869, which resulted in an overall incidence of 9.6 per 1000 women (0.96%). The incidence per thousand over the time period of the study, per year, is demonstrated in Figure 1. It is evident that the incidence in the year 2000 was 2.1 per thousand, and increased significantly to 11.8 per thousand, by the year 2009, which was a significant upwards trend (P=0.011). The mean birth weight for the study population (n=306) was 3543–613g. For women with Class 2 obesity, mean birth weight was 3520–590g and for Class 3 obesity, was 3574–643g (P=0.51). In Table 1, the BMI categorisation of the overall group of 306 women is demonstrated, outlining the proportions of women with Class 2 and Class 3 obesity respectively, and further sub-divisions of Class 3. Among the 306 women in the study group, 173 (56.5%) were in the category of Class 2 obesity, and 133 women (43.5%) were in the Class 3 or morbid obesity category.

The mean age and standard deviation (s.d.) of all women with BMI e 35 was 30.9 – 5.4 years. For primigravid women the mean age was 28.8 – 5.13

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years, and parous women were significantly older at 31.9 – 5.22 years (P<0.0001). Comparison of mean age across the parity groups revealed a significant difference in age (P<0.001), and post hoc testing revealed that women of high parity (4 or higher) were significantly older than both nulliparous women, and those with a parity of one (P<0.001). For medical complications of pregnancy, the rates of occurrence of pregnancy induced hypertension (non-proteinuric), pre eclampsia, gestational diabetes mellitus, venous thromboembolism and shoulder dystocia are outlined in Table 2. Hypertensive disorders of pregnancy (i.e. non-proteinuric disease and preeclampsia combined) occurred in 28% of women. The prevalence of gestational diabetes mellitus was 9%, of shoulder dystocia 3% and there was a 1% rate of venous thromboembolic disease. The mode of delivery for all women with BMI e 35 is shown in Table 3 and was as follows: SVD n=151 (49%); instrumental delivery n=24 (8%); elective caesarean section n=71 (23%); emergency caesarean section n=60 (20%), resulting in a total caesarean section rate of 43% (n=131).

Separate comparisons of the findings for Class 2 and Class 3 obese women, revealed a significant increase in emergency caesarean section risk for primagravid versus multigravid women, which was 36.7% versus 12.9% (P<0.001) within Class 2, and 41.5% versus 9.8% (P<0.001) for Class 3, respectively. After exclusion of women who had elective caesarean sections performed, the risks of emergency caesarean section within Class 2 were as follows: primagravida 41.3% (18/43), and multigravida 17.2% (16/93) (P<0.001). The corresponding figure for risk of emergency caesarean section for Class 3 obese women after exclusion of those who had an elective caesarean section were as follows: primagravida 51.5% (17/33) and multigravida 11.8% (9/76) (P<0.0001). However there was no significant difference in the risk of emergency caesarean section between women with Class 2 obesity, and those with Class 3 obesity, when comparisons matched for parity were made.

PIH: Pregnancy Induced Hypertension, PET: Preeclampsia, GDM: Gestational Diabetes Mellitus, SVD: Shoulder Dystocia, VTE: Venous Thromboembolism.

SVD: Spontaneous Vaginal Delivery, IVD: Instrumental Vaginal Delivery, ELCS: Elective Caesarean Section, EMCS: Emergency Caesarean Section

Discussion

This study outlines the incidence of moderate and extreme obesity in an Irish obstetric population, with a combined rate of 9.6 per 1000 women (0.96%). The Class 2 obesity rate was 5.5 per 1000 (0.55%), and the Class 3 or morbid obesity rate was 4.1 per 1000 (0.41%). Overall, it is apparent from the findings that there was a significant increase in the incidence of these combined obesity categories over the ten-year period from 2000 to 2009. The incidence in the early years of the study was in the region of 2 per 1000, and increased progressively to 11.8 per 1000 in the final year of the study. The strengths of this study include the large obstetric denominator population used (n= 31,869), and the fact that the trends over a decade were investigated. The figures published here are in broad agreement with those previously outlined from a denominator population of 8,426 Irish obstetric women, which demonstrated a class 3 or morbid obesity rate of 0.6 per 1000 in the year 2007 in a Dublin maternity hospital.

The figures observed in this study show lower rates for Class 2 and Class 3 obesity than those published from a series of 3,929 women in the West of Ireland who were recruited to a glucose tolerance screening study. The reason for this may include the fact that our study extends back to the year 2000, when rates were lower, and is more representative of the overall obstetric population. Finally, the rate published here for an Irish obstetric population is much lower than that observed in a USA study of extreme obesity in 2004, which reported a rate of 54 per 1000. Because of the changes in terminology used, and the changing prevalence of obesity, it is difficult to make more meaningful comparisons with other population groups.

For the Irish obstetric population reported here, the fact that the prevalence is increasing steadily over the last 10 years is a major cause for concern. It is well established that obesity of all classes is associated with an increased risk of caesarean section with a BMI e 35. It is clear from our data that overall caesarean section rates were in the region of 43%, with approximately half of these procedures having been done electively, and half done on an emergency basis. The risk of emergency caesarean section in a primagravid woman who is Class II or Class III obese was either 36.7% or 41.6% respectively. This represents an extremely high risk of caesarean section in any cohort of patients, and reiterates the need for counselling antenatally in terms of the associated risks. For multigravid women, the corresponding risk factors were in the region of 9-13%, which was influenced by the mode of delivery in the previous pregnancy. What is also clear from our findings is that there does not appear to be an increased risk of caesarean section, when matched for parity, between Class II and Class III obese women.

There are also limitations to this study. Firstly, while it is a retrospective study, the BMI calculations, the outcome measures, and pregnancy complications were entered prospectively at the time of delivery. Secondly, this is an observational study, and the outcome measures were not compared with those of a control group who delivered at that time, albeit that it is evident that the caesarean section rates, and rates of complications, are much higher than those observed in the general hospital population. Finally, there are variables, other than BMI, which may influence mode of delivery (i.e. maternal age, birth weight, previous obstetric history), which were not assessed in a multiple regression model. Despite these limitations, this paper provides accurate figures for the prevalence of Class 2 and Class 3 obesity in an Irish obstetric population, highlights the fact that such prevalence has increased significantly in the last decade, and describes the high rate of caesarean section among these women, and the general morbidity in pregnancy.

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