Rates, Risks and Outcome of Overweight, Obesity and Excessive Weight Gain during pregnancy in Hessen from 2000 to 2015 (perinatal registry based data)

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Objectives

Worldwide, rates of obesity and overweight are rising. During pregnancy, this leads to increasing rates of gestational diabetes, pre-eclampsia, poor perinatal and neonatal outcome and Caesarean rates. More severe are the irreversible long term health issues for mothers and their offspring. Hereby we tried to summarize data from a perinatal registry in Hessen (a federal state in Germany) between 2000 and 2015

Methods

Using data of 61 4835 singleton pregnancies we evaluated frequencies and risk factors for groups of covariates maternal pre-pregnancy weight and body mass index (BMI in kg/m$^{2)}$) and excessive weight gain during pregnancy as indicated by the Institute of Medicine (now "National Academy of Medicine") in 2009. We applied a multivariate logistic regression model to evaluate outcomes of overweight or obesity and excessive weight gain during pregnancy. Relevant outcomes were still births, perinatal mortality, (emergency) caesarean deliveries and neonatal NICU admissions.

Results

The mean body weight increased from 66.96 kg to 68.68 kg (p<0,001), the mean BMI from 24.2 kg/m² to 24.81kg/m² (p=0,001), both from the first examination < 8 weeks up to delivery. It meant that the rate of pregnant women with a BMI ≥30 kg/m² rose from 9.7% to 12.4%. Excessive weight gain was most frequently observed among young uneducated women. A high BMI resulted in a significant increase of caesarean deliveries and NICU admissions (p<0,001). A summary of significant risk factors and outcomes is presented in Table 1. a)-d)

Covariate	OR(95%CI)	p-value	Global p-value
mothers' age	0.98 (0.98,0.98)		<0.001
German origin	1.42 (1.39,1.46)		<0.001
Single mothers	0.95 (0.92,0.98)		<0.001
Parity			<0.001
0	reference		
1	1.31 (1.29,1.34)	<0.001	
2	1.82 (1.76,1.87)	<0.001	
3	2.89 (2.75,3.03)	<0.001	
4	4.18 (3.84,4.55)	<0.001	
>4	5.88 (5.31,6.52)	<0.001	
Profession			<0.001
house wife	reference		
education	0.59 (0.55,0.63)	<0.001	
worker	1.18 (1.13,1.24)	<0.001	
employee	0.87 (0.85,0.89)	<0.001	
higher education	0.53 (0.51,0.54)	<0.001	

(a)

Covariate	OR(95%CI)	p-value	Global p-value
mothers' age	0.98 (0.98,0.98)		<0.001
German origin	1.04 (1.02,1.06)		<0.001
Single mothers	1.09 (1.07,1.12)		<0.001
Parity			<0.001
0	reference		
1	0.74 (0.72,0.75)	<0.001	
2	0.68 (0.66,0.7)	<0.001	
3	0.6 (0.57,0.62)	<0.001	
4	0.53 (0.48,0.57)	<0.001	
>4	0.47 (0.42,0.52)	<0.001	
Profession			<0.001
house wife	reference		
education	1 (0.96,1.05)	0.98	
worker	1.16 (1.11,1.21)	<0.001	
employee	1.16 (1.14,1.18)	<0.001	
higher education	1 (0.98,1.02)	0.97	
BMI (first examination)			<0.001
18.5-24.9	reference		
<18.5	0.54 (0.51,0.56)	<0.001	
25-29.9	3.26 (3.2,3.34)	<0.001	
30-34.9	2.97 (2.88,3.07)	<0.001	
35-39.9	2.04 (1.94,2.14)	<0.001	
>=40	1.75 (1.63,1.89)	<0.001	

(b)

BMI at first examination	Multivariate analysis	
	OR (95%CI)	p-value
Still births		0.0066 (global)
18.5-24.9	reference	reference
25-29.9	1.7 (1.24, 2.33)	0.001
30-34.9	1.8 (1.13, 2.86)	0.013
35-39.9	0.82 (0.3, 2.21)	0.69
>=40	1.73 (0.64, 4.67)	0.28
Perinatal mortality		0.0022 (global)
18.5-24.9	reference	reference
25-29.9	1.71 (1.29, 2.28)	<0.001
30-34.9	1.59 (1.02, 2.49)	0.043
35-39.9	0.86 (0.35, 2.08)	0.73
>=40	2.11 (0.93, 4.75)	0.073
Cesarean deliveries		<0.001 (global)
18.5-24.9	reference	reference
25-29.9	1.24 (1.19, 1.29)	<0.001
30-34.9	1.74 (1.64, 1.84)	<0.001
35-39.9	2.3 (2.12, 2.51)	<0.001
>=40	2.96 (2.63, 3.34)	<0.001
Emergency cesarean deliveries		<0.001 (global)
18.5-24.9	reference	reference
25-29.9	0.89 (0.84, 0.94)	0.41
30-34.9	0.79 (0.72, 0.86)	0.95
35-39.9	0.76 (0.67, 0.87)	0.058
>=40	0.58 (0.48, 0.71)	0.0096
NICU admissions		<0.001 (global)
18.5-24.9	reference	reference
25-29.9	1.26 (1.18,1.35)	<0.001
30-34.9	1.54 (1.41,1.69)	<0.001
35-39.9	1.63 (1.43,1.87)	<0.001
>=40	1.77 (1.47,2.13)	<0.001

(c)

Excessive vs. recommended weight gain	multivariate analysis	
BMI	OR (95%CI)	p-value
Still births		0.7566 (global)
<18.5	1.08 (0.39, 2.95)	0.9831
18.5-24.9	0.93 (0.73, 1.2)	0.8108
25-29.9	0.77 (0.5, 1.18)	0.3179
30-34.9	0.84 (0.44, 1.62)	0.8125
35-39.9	2.17 (0.51, 9.09)	0.4196
>=40	1.43 (0.39, 5.23)	0.7900
Perinatal mortality		0.7424 (global)
<18.5	1.02 (0.42, 2.49)	0.9981
18.5-24.9	0.96 (0.77, 1.20)	0.9104
25-29.9	0.76 (0.52, 1.11)	0.2075
30-34.9	1.02 (0.54, 1.94)	0.9962
35-39.9	2.44 (0.59, 10.26)	0.2977
>=40	1.04 (0.35, 3.11)	0.9950
Cesarean deliveries		<0.001 (global)
<18.5	1.12 (1.01, 1.26)	0.0261
18.5-24.9	1.27 (1.23, 1.3)	<0.001
25-29.9	1.22 (1.16, 1.28)	<0.001
30-34.9	1.16 (1.07, 1.26)	0.0001
35-39.9	1.18 (1.05, 1.34)	0.0041
>=40	1.22 (1.01, 1.45)	0.0333
Emergency cesarean deliveries		0.1803 (global)
<18.5	0.67 (0.41, 1.1)	0.1380
18.5-24.9	0.86 (0.77, 0.96)	0.0044
25-29.9	0.88 (0.7, 1.11)	0.3983
30-34.9	0.74 (0.52, 1.04)	0.0896
35-39.9	0.96 (0.55, 1.67)	0.9843
>=40	1.10 (0.46, 2.66)	0.9626
NICU admissions		0.0006 (global)
<18.5	1.11 (0.93, 1.32)	0.3295
18.5-24.9	1.11 (1.06, 1.16)	<0.001
25-29.9	1.01 (0.93, 1.10)	0.9397
30-34.9	1.02 (0.89, 1.16)	0.9530
35-39.9	1.14 (0.94, 1.37)	0.2776
>=40	1.33 (1.02, 1.74)	0.0343

(d)

Table 1) Multivariate analysis of risk factors for a BMI > 30 kg/m2 at first examination vs. normal weight (a); and for excessive weight gain according to IOM guidelines vs. normal weight gain (b). Outcomes for women with a high BMI (overweight, obesity I, II and III) vs. normal weight (c); and with excessive weigth gain vs. normal weight gain according to maternal pre-pregnancy-BMI (d).
(n=614 853 singletons pregnancies between 2000 and 2015)

Discussion

Modern perinatal care implies to increase the health literacy of women in childbearing age to avoid the short- and long-term consequences of overweight, obesity and excessive weight gain for mothers and their offspring. Policy makers should be aware of the risks and be stimulated to design effective interventions adapted to the social environment