

MATERNAL OBESITY: IMPACT IN PREGNANCY OUTCOME AT TERTIARY REFERRAL HOSPITAL

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ABSTRACT

Pregnant women who are obese have an increased risk for complications, both for themselves and their babies during pregnancy and childbirth. This study aimed to determine the outcome of obesity in pregnancy in 2017. This was an analytical cross-sectional, observational study of pregnant women with obesity in Dr. Soetomo General Hospital, Surabaya within the period of January 1st – December 31st, 2017 using medical records. In a total of 162 subjects, the main age group was 21-34 years old (56.8%). The majority of education level was undergraduate (90.7%), and 58% of the subjects were workers. Most of obese mothers had preeclampsia (56.1%). Based on mode of delivery, 128 patients (79%) delivered by caesarean section or instrumental vaginal delivery. The neonatal outcomes with macrosomia were 4 infants (14.3%), 2 infants (5.5%), 1 infant (1%), in grade III, grade II, and grade I, respectively. There were 22 infants (61.1%) in grade II with low Apgar score. The neonatal outcomes with preterm were 44 infants (44.9%), 12 infants (33.3%), 13 infants (46.4%), in grade I, grade II, and grade III, respectively. Most complications in obese mothers were preeclampsia, caesarean section delivery, and neonatal outcomes with macrosomia, low Apgar score, and preterm birth.

Keywords: Maternal obesity, maternal and perinatal outcome, complication.

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INTRODUCTION

Globally, there are about 38.9 million pregnant women with overweight and obesity in 2014. The number of overweight and obese pregnant women has increased in high-income and middle-income countries (1). Obesity is an independent predictor of caesarean delivery. The increasing Body Mass Index (BMI) increases proportionately with the rate of cesarean delivery (2). BMI is calculated by dividing a person's weight in kilograms by the square of their height in meters (kg/m^2). There are three grades of obesity based on BMI, they are obese I (BMI 30.0-34.9 kg/m^2), obese II (35.0-39.9 kg/m^2), obese III (BMI ≥ 40.0 kg/m^2) (3,4).

Obesity is most often experienced by women, both at the world level and in Indonesia, and the number increases every decade. Pregnant women who are obese have an increased risk for complications, both for themselves and their babies during pregnancy and childbirth (3). Complications that can be experienced by pregnant women with obesity include the risk of thromboembolism, preeclampsia, eclampsia seizures, and increased labor induction rates (5) for adverse neonatal outcomes such as macrosomia, shoulder dystocia, and stillbirth (6,7). It can also affect labor outcomes because there is a cumulation of fat in the pelvis that makes pregnant women with obesity give birth by caesarean section, although, caesarean deliveries can increase maternal complications (7,8). Delivery assistance is needed by adequate health workers due to complications, so it can be treated immediately (9). This study aimed to determine the outcome of obesity in pregnancy in 2017.

METHODS

This was analytical cross-sectional, observational study enrolled in obese pregnant women in Dr. Soetomo General Hospital, Surabaya during the period of January 1st – December 31st, 2017. This study used secondary data by medical records. Sample size was determined using the cross-sectional sample size calculation with the result of $n = 162$. The inclusion criterion in this study was obese pregnant women who gave birth at Dr. Soetomo, Surabaya within the period of 1 January 2017 - 31 December 2017. Whereas, the exclusion criterion was incomplete medical record data. The variables of this study were the characteristics of obese pregnant women, maternal outcomes, infant outcomes, and delivery outcomes. The variables were analyzed descriptively, presented in table by number and percentages. Ethical approval for the collection and analysis of data in our study was obtained by the Ethics Committee of Dr. Soetomo General Hospital, Surabaya.

RESULTS

Table 1 presents the characteristic of subjects based on age, education level, and employment status. The pregnant women with grade I obesity were 98 patients, in grade II obesity were 36 patients, and in grade III obesity were 28 patients. Of the patients with grade III obese pregnant women, there were 2 patients who died after delivery. The highest number of age group was the group at the age of 21-34 years in all grades with a total of 92 patients.

Table 2 shows distribution of pregnancy outcome in maternal obesity. Based on the complications, most of obese mother had preeclampsia. Based on the mode of delivery, 128 patients (79%) delivered by caesarean section or instrumental vaginal delivery. The neonatal outcomes with macrosomia were 4 infants (14.3%), 2 infants (5.5%), 1 infant (1%), in grade III,

grade II, and grade I, respectively. There were infants with low Apgar score in grade II as many as 22 (61.1%). The neonatal outcomes with preterm were 44 infants (44.9%), 12 infants (33.3%), 13 infants (46.4%), in grade I, grade II, and grade III, respectively.

Table 1. Characteristic of subjects

Characteristic	Obesity Grade n (%)		
	Grade I (n=98)	Grade II (n=36)	Grade III (n=28)
Age (years)			
≤20	4 (4)	1 (2.8)	0
21-34	53 (54)	21 (53.8)	18 (64.3)
≥35	41 (42)	14 (38.9)	10 (35.7)
Education			
High	88 (89.9)	36 (100)	23 (82.1)
Low	10 (10.2)	0	5 (17.9)
Employee			
Yes	57 (58.2)	19 (52.8)	18 (64.3)
No	41 (41.8)	17 (47.2)	10 (35.7)

Table 2. Distribution of Pregnancy Outcome in Maternal Obesity

Characteristic	Obesity Grade n (%)		
	Grade I (n=98)	Grade II (n=36)	Grade III (n=28)
Maternal Outcome			
Complication			
Preeclampsia	41 (41.8)	28 (77.8)	22 (78.6)
Gestastional diabetes	7 (7.1)	1 (2.8)	0
Combination Preeclampsia and Gestastional diabetes	5 (5.1)	2 (5.5)	3 (10.7)
Other complication	45 (46)	5 (13.9)	3 (10.7)
Mode of delivery			
Caesar section	64 (65.3%)	24 (66.7%)	28 (100%)
Instrumental delivery	5 (5.1)	7 (19.4)	0
Spontaneous	29 (29.6%)	5 (13.9%)	0 (0%)
Neonatal Outcome			
Macrosomia	1 (1)	2 (5.5)	4 (14.3)
Apgar score			
High	53 (54)	14 (38.9)	17 (60.7)
Low	45 (46)	22 (61.1)	11 (39.3)
Preterm			
Yes	44 (44.9)	12 (33.3%)	13 (46.4)
No	54 (55.1%)	24 (66.7)	15 (53.6)

DISCUSSION

Obesity is a risk factor for metabolic syndromes, which is related to the increased risk of various non-communicable diseases (NCDs) (10). Obesity in pregnant women also has high risk of complication during pregnancy and delivery and affects to neonatal outcomes. This study found most complications in obese mother were preeclampsia, caesarean section delivery, and neonatal outcomes with macrosomia, low Apgar score, and preterm birth. Some studies reported that obese women in pregnancy had higher risk of preeclampsia compared to normal BMI (11). If the medical treatment delay, including delay in identified pregnancy risk and dangerous sign, delay in accessibility to health facilities and taking good health services, maternal mortality may occur (12).

Preeclampsia is a pregnancy disorder that affects 2-8% of all pregnancies and remains a leading cause of maternal and perinatal morbidity and mortality worldwide (13,14). The risk of preeclampsia increases 2-fold with every increase in body weight by 5-7 kg/m². In grade III obesity, it increases almost 5-fold. The possibility can be caused by the risk of hypertension (15). Preeclampsia is also related to other disorder, such as anemia in pregnancy (16).

The mode of delivery used in obese pregnant women was mostly caesarean section. A study conducted in Germany reported that obese pregnant women with caesarean delivery outcomes increased at grade I as much as 25.1%, at grade II as much as 30.2% and at grade III with the highest increase

reaching 43.1% (17). Similiar study in Europe reported an increase in women with caesarean delivery with an increase in BMI. The percentage of obese pregnant women with caesarean delivery was 24.9%, 15.8% for overweight pregnant women and 10.2% with normal BMI (18).

The rate of caesarean section in obese pregnant women is more than 20% compared to a normal BMI. An increase in labor with cesarean section may due to macrosomia. Macrosomia infants are a consequence that can increase labor through caesarean section in obese pregnant women (7). A cohort study in Canada and Paris reported that macrosomia in Canada was 1.5 times more frequent than in Paris (9.5% vs. 7.1%). Macrosomia is strongly associated with an increase in BMI, and the risk is increasing in grade III obesity (19).

In Belgium's population, neonatal intensive needs increased by 38% by obese pregnant women because the Apgar score <7 increased to 31% (20). A case study in Sweden reported that there is a two-fold increase in grade III obesity with a low infant Apgar score (21). This findings in our study was in contrast with previous study which may due to differences in the number of samples. In the study conducted in Belgian population in the Brussels and Willonia regions with 38,675 births, the scope was very broad (20). A study conducted in Sweden used a sample of 3,480 obese pregnant women at grade III (21). Whereas, the scope in this study was very narrow in only one hospital with a total sample of 162 patients. Preterm baby outcomes occur at all grade of obesity. A study in Sweden showed that premature birth rates increase with an increase in BMI in grade I (0.27%), in grade II (0.35%), and in grade III (0.52%). Premature events can increase with increasing BMI in overweight and obesity and can increase in adolescence and old age, as well as in pregnant women with low education and smokers (22). This findings was in contrast to previous case studies which stated the link between obesity and prematurity was not significant after the factors (multigravida, diabetes mellitus, hypertension and anemia) that influence are removed (23).

This study has several limitations. In this study, secondary data from medical records were taken so that researchers sometimes had difficulty finding incomplete data and were not written in the medical records of each patient. There were also some medical records that could not be found by the staff in the filing because they were tucked.

CONCLUSION

This study found that most obesity pregnant women have complications with preeclampsia and caesarean section delivery. Whereas, neonatal outcomes with macrosomia, low Apgar score, and preterm birth were found mostly in grade III, grade II grade I, respectively.

REFERENCES

1. Chen C, Xu X, Yan Y. Estimated global overweight and obesity burden in pregnant women based on panel data model. *PLoS One*. 2018 Aug 9;13(8):e0202183–e0202183.
2. Weiss JL, Malone FD, Emig D, Ball RH, Nyberg DA, Comstock CH, et al. Obesity, Obstetric Complications and Cesarean Delivery Rate--A Population-Based Screening Study. *Am J Obstet Gynecol*. 2004 Apr 1;190(4):1091–7.
3. Centre for Public Health Excellence at NICE (UK), (UK) and National Collaborating Centre for Primary Care. *Obesity: The Prevention, Identification, Assessment and Management of Overweight and Obesity in Adults and Children*. London; 2006.
4. WHO. *Obesity: preventing and managing the global epidemic*. Report of a WHO consultation. Vol. 894, World Health Organization technical report series. Switzerland; 2000.
5. Aprilia DN, Prasetyo B, Sulistiawati S. Correlation Between Nutritional Status of Pregnant Women Based on Upper Arm Circumference and Preeclampsia/Eclampsia Severity Degree at Jagir Public Health Center During January 2014 - March 2014. *Biomol Heal Sci J*. 2018;1(2):120–3.
6. Ramachenderan J, Bradford J, McLean M. Maternal obesity and pregnancy complications: a review. *Aust N Z J Obstet Gynaecol*. 2008 Jun;48(3):228–35.
7. Sebire NJ, Jolly M, Harris JP, Wadsworth J, Joffe M, Beard RW, et al. Maternal obesity and pregnancy outcome: a study of 287,213 pregnancies in London. *Int J Obes Relat Metab Disord J Int Assoc Study Obes*. 2001 Aug;25(8):1175–82.
8. Chongsuvivatwong V, Bachtiar H, Chowdhury ME, Fernando S, Suwanrath C, Kor-Anantakul O, et al. Maternal and fetal mortality and complications associated with cesarean section deliveries in teaching hospitals in Asia. *J Obstet Gynaecol Res*. 2010;36(1):45–51.
9. Handriani I, Melaniani S. The Effect of Referral Process and Complications to Maternal Mortality. *J Berk Epidemiol*. 2015;3(3):400–11.
10. Hasan N, Hadju V, Jafar N, Thaha RM. Prevalence of metabolic syndrome (MetS) and determinants among obese teachers in Makassar, Indonesia. *Int Med J Malaysia*. 2019;18(2):29–38.
11. Mbah AK, Kornosky JL, Kristensen S, August EM, Alio AP, Marty PJ, et al. Super-obesity and risk for early and late pre-eclampsia. *BJOG*. 2010 Jul;117(8):997–1004.
12. Syarifuddin, Thaha R, Abdullah AZ. Intermediate determinants in maternal mortality: Case study Tojo Una, Una District. *Indian J Public Heal Res Dev*. 2019;10(4):908–13.
13. Lumbanraja SN. Determining the maternal characteristics that predicts the adverse outcomes for patients with preeclampsia. *J Univ Malaya Med Cent*. 2013;16(1):1–6.
14. Jeyabalan A. Epidemiology of preeclampsia: impact of obesity. *Nutr Rev [Internet]*. 2013 Oct;71 Suppl 1(0 1):S18–25. Available from: <https://pubmed.ncbi.nlm.nih.gov/24147919>
15. Fitzsimons KJ, Modder J, Greer IA. Obesity in pregnancy: risks and management. *Obstet Med*. 2009 Jun;2(2):52–62.
16. Lumbanraja SN, Yaznil MR, Siregar DIS, Sakina A. The correlation between hemoglobin concentration during pregnancy with the maternal and neonatal outcome. *Open Access Maced J Med Sci*. 2019;7(4):594–8.
17. Stepan H, Scheithauer S, Dornhöfer N, Krämer T, Faber R. Obesity as an obstetric risk factor: does it matter in a perinatal center? *Obesity (Silver Spring)*. 2006 May;14(5):770–3.
18. Antonakou A, Papoutsis D, Tzavara C. Maternal obesity and its association with the mode of delivery and the neonatal outcome in induced labour: Implications for midwifery practice. *Eur J Midwifery*. 2018;2(April).
19. Fuchs F, Senat M-V, Rey E, Balayla J, Chaillet N, Bouyer J, et al. Impact of maternal obesity on the incidence of pregnancy complications in France and Canada. *Sci Rep*. 2017 Sep;7(1):10859.
20. Minsart A-F, Buekens P, De Spiegelaere M, Englert Y. Neonatal outcomes in obese mothers: a population-based analysis. *BMC Pregnancy Childbirth*. 2013 Feb;13:36.
21. MI. Maternal morbid obesity and the risk of adverse

- pregnancy outcome. *Obstet Gynecol.* 2004;103(2):219–24.
21. Cnattingius S, Villamor E, Johansson S, Edstedt Bonamy A-K, Persson M, Wikström A-K, et al. Maternal obesity and risk of preterm delivery. *JAMA.* 2013 Jun;309(22):2362–70.
- Aly H, Hammad T, Nada A, Mohamed M, Bathgate S, El-Mohandes A. Maternal obesity, associated complications and risk of prematurity. *J Perinatol.* 2010 Jul;30(7):447–51.