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## OBJECTIVE

**OBJECTIVE:** To estimate the effect of pre-pregnancy body mass index (BMI) on the success of cerclage for preventing spontaneous preterm birth (SPTB) <35 weeks gestation.

**STUDY DESIGN:** Retrospective cohort study of singleton pregnant women treated with a cerclage between 1995-2009. Only women with a history indicated (placed for multiple PTBs between 14-34 weeks and/or >1 loss with painless dilatation between 14-24 weeks) or ultrasound indicated (placed for cervical length<25 mm) cerclage were included. Exclusion criteria were BMI <20 kg/m<sup>2</sup>, lethal fetal anomaly, intrauterine fetal demise, multiple pregnancy, indicated preterm birth. BMI groups were defined by IOM criteria (normal/overweight = 20.0-29.9, obese = 30.0-40.0, morbidly obese = >40.0). Primary outcome was SPTB <35 weeks gestation.

**RESULTS:** 147 women with a cerclage (normal/overweight n=60, obese n=50, and morbidly obese n=37) met the inclusion criteria. There were no significant demographic differences between groups. The incidence of SPTB <35 weeks was 22%, 26%, and 35% among normal/overweight, obese, and morbidly obese women respectively (p=.34). Using linear regression, higher BMI was significantly correlated with lower GA at birth (p=.036). In these women, each increase in BMI by 10 decreases the GA at birth by 6.5 days.

**CONCLUSION:** While there was no significant difference in the incidence of SPTB, among women treated with cerclage, higher BMI was significantly associated with lower mean gestational age at delivery.

## BACKGROUND

- Approximately 1/3 of adult women in the United States are obese
- Obesity during pregnancy is associated with an increased risk indicated preterm delivery <37 weeks largely due to maternal medical complications.
- However, obesity has been considered protective against spontaneous preterm birth (SPTB)
  - Retrospective data suggests that obese women have longer cervical lengths and less uterine activity
- Cervical cerclage has been shown to reduce preterm birth (PTB) in women with a history of ≥3 2<sup>nd</sup> trimester losses or PTBs <37 weeks (history-indicated) or history of PTB <37 weeks and cervical shortening <25mm (ultrasound-indicated).
- Body mass index (BMI) is a proxy for comparing body fat in a standardized manner based on height and weight (figure 1)

## OBJECTIVE

To estimate the effect of pre-pregnancy BMI on the efficacy of cerclage at preventing SPTB

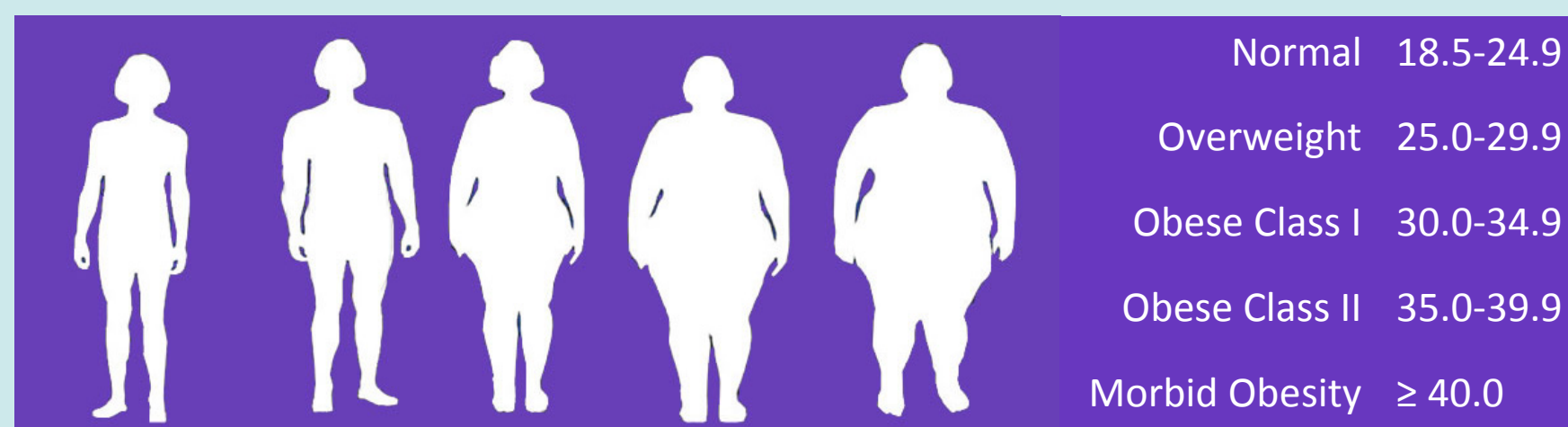


Figure 1: Institute of Medicine BMI Categories

## MATERIALS & METHODS

- Retrospective cohort study using the Thomas Jefferson Prematurity Database which consists of women with risk factors for PTB from 1995 to 2009
- Inclusion criteria: singleton gestations with a history- or ultrasound-indicated transvaginal cerclage
- Exclusion criteria: physical-exam indicated cerclage, transabdominal cerclage, ultrasound indicated cerclage placed in women without a prior PTB <37 weeks or second trimester loss, BMI <20 kg/m<sup>2</sup>, gestational age (GA) at delivery <20 weeks, indicated preterm birth, major fetal anomalies
- All cerclages were of the McDonald type and were placed by a resident. The usual suture was 5mm Mersilene tape. Intraoperative ultrasound guidance, antibiotics or tocolytics were not used.
- Women were grouped by pre-pregnancy BMI as follows:
  - Group I - BMI 20.0-29.9 (normal/overweight)
  - Group II - BMI 30.0-39.9 (obese class I and II)
  - Group III - BMI ≥40.0 (morbid obesity)
- Primary outcome: SPTB <35 weeks
- Secondary outcome: SPTB <28, 32, and 37 weeks, gestational age at delivery, and birthweight

## RESULTS

- 133 pregnancies by 122 women met the inclusion criteria
- The overall rate of prior PTB <37 weeks was 85% (all 133 pregnancies; 84.3% first pregnancy only [n=122])
  - The GA of the earliest prior PTB <37 weeks was significantly lower among women in the highest BMI category (table 1)
- There was no significant difference in the rate of SPTB <35 weeks between BMI groups (figure 2)

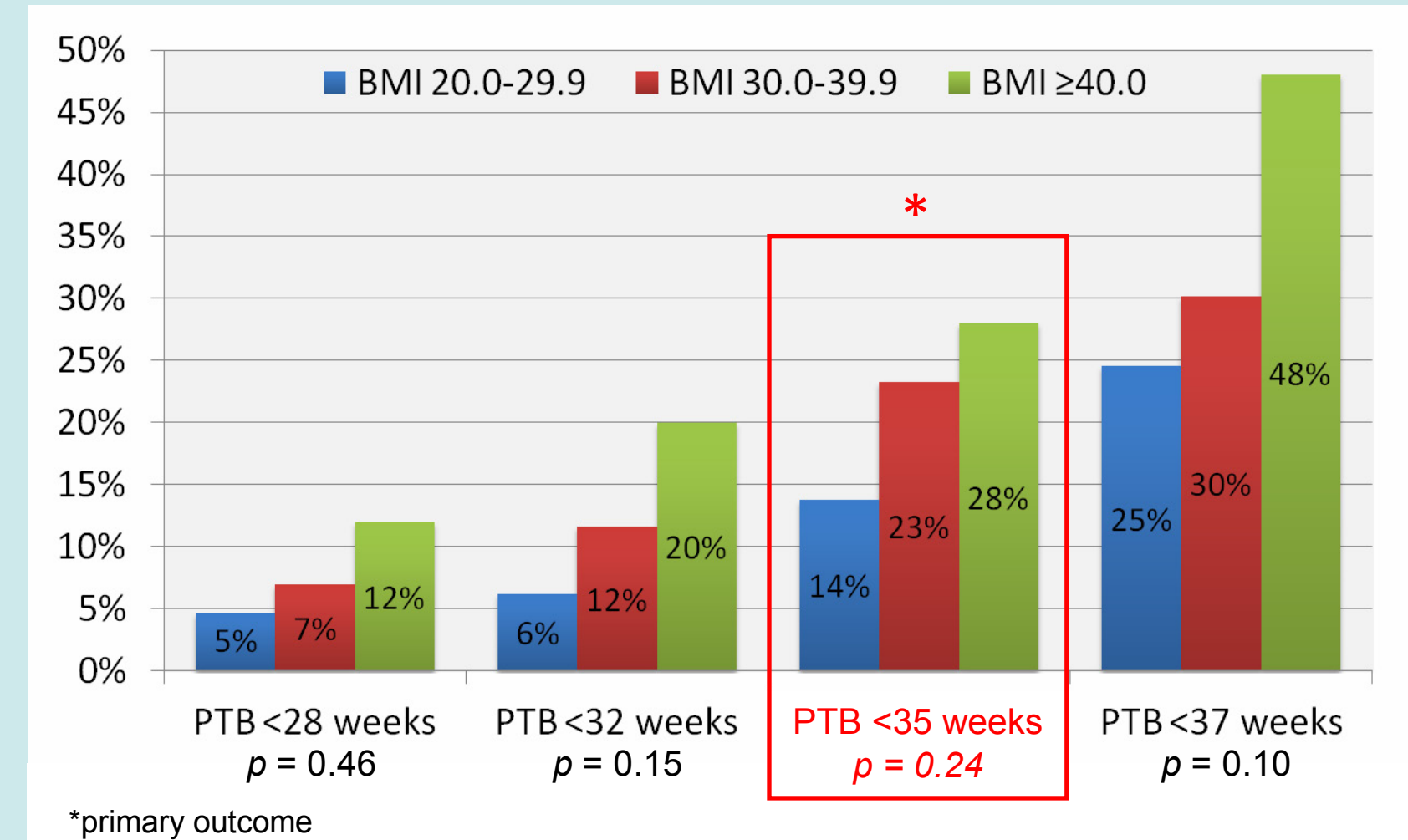
Table 1: Demographics

Variable	BMI 20.0-29.9 n = 65	BMI 30.0-39.9 n = 43	BMI ≥40.0 n = 25	p
BMI (Kg/m <sup>2</sup> )	25.3 [20.7-29.8]	34.4 [30.1-39.4]	43.3 [40.0-53.3]	
Age (y)	31 [16-4]	31 [21-41]	29 [22-38]	.641 <sup>a</sup>
African American <sup>b</sup>	40 (61.5)	32 (76.2)	18 (72.0)	.255 <sup>c</sup>
Cigarette use	10 (15.4)	8 (18.6)	3 (12.0)	.766 <sup>c</sup>
>1 Prior induced abortion	18 (27.7)	10 (23.3)	3 (12.0)	.288 <sup>c</sup>
History of cone biopsy	9 (13.8)	3 (7.0)	2 (8.0)	.471 <sup>c</sup>
GA of earliest PTB ≥20 weeks	23 [20-36]	23 [20-36]	22 [20-30]	.016 <sup>a</sup>
Cerclage placement (wk) <sup>b</sup>	14 [12-23]	14 [12-23]	14 [11-22]	.788 <sup>a</sup>
History-indicated cerclage	45 (69.2)	27 (62.8)	18 (72.0)	
Ultrasound-indicated cerclage	20 (30.8)	16 (37.2)	7 (28.0)	.686 <sup>c</sup>

Data expressed as median [range] or n (%). <sup>a</sup>Kruskal-Wallis; <sup>b</sup>data not available for one woman; <sup>c</sup>Chi-square.

## RESULTS cont.

Figure 2: Spontaneous Preterm Birth Rates by BMI Group



## Secondary Outcomes

- There was no significant difference in median gestational age at delivery or birthweight between BMI groups (table 2)
- Using logistic regression, being in a higher BMI group was significantly associated with earlier gestational age at delivery (p=.032)

Table 2: Secondary Outcomes

Variable	BMI 20.0-29.9	BMI 30.0-39.9	BMI ≥40.0	p <sup>a</sup>
GA at delivery (wks)	38 [24-41]	38 [24-41]	37 [24-41]	.641
Birthweight <sup>b</sup> (g)	3183 [725-4510]	3045 [490-4366]	3003 [568-3980]	.604

Data expressed as median [range]. <sup>a</sup>Kruskal-Wallis; <sup>b</sup>data not available for one woman.

## CONCLUSIONS

- Among women with a cerclage, pre-pregnancy BMI was not a significant predictor of SPTB <35 weeks
  - There was a non-significant trend toward increased rates of SPTB at all gestational age cutoffs
  - Morbidly obese women consistently had worse outcomes than obese and normal/overweight women
- Compared to normal/overweight, GA at delivery decreases by 1 week for obese and 2 weeks for morbidly obese women