

# Correlation between Maternal Body Mass Index and Anovaginal Distance in Term Primiparous Women at the Time of Active Labor

Sunil K Samal<sup>1</sup>, Setu Rathod<sup>2</sup>

## ABSTRACT

**Introduction:** The incidence of obstetric anal sphincter injuries (OASIs) is less in overweight and obese women compared to normal weight women.

**Aim and objective:** The aim of the study was to find a correlation in the thickness of anovaginal distance (AVD) as obtained by transperineal ultrasound between term obese and normal weight primiparous women at the time of active labor.

**Materials and methods:** The study was conducted in the department of obstetrics and gynecology in a tertiary care center in South India. This was a cohort study where term primiparous women at the time of active phase of labor were taken as study population after fulfilling the inclusion criteria. To measure the AVD, a transvaginal ultrasound probe was used in the perineum similar to transperineal ultrasound. The data regarding maternal characteristics, pregnancy details, and the findings at the time of labor were collected from woman's case sheets from the labor ward. The study population after considering the inclusion criteria were divided into three body mass index (BMI) groups considering the prepregnancy or early pregnancy maternal weight: normal weight (BMI <25), overweight (BMI 25–29.9), and obesity (BMI ≥30). All the three groups were compared according to the measured AVD at the time of labor.

**Results:** There were no significant differences in baseline parameters between the groups. The different BMI groups had mean AVD of 24.2 mm in normal weight group, 24.7 mm in overweight group, and 27.3 mm in the obesity group. There was significant difference ( $p = 0.028$ ) in AVD between the groups and obese women had significantly thicker AVD as compared to their normal and overweight counterparts.

**Conclusions:** The AVD in obese primiparous group was significantly thick which could be a factor for lower rates of OASI in the obese group. The anal sphincter complex might have been protected by this thicker AVD during the second stage of labor. We recommend further large randomized control trials to evaluate whether there is a correlation between the thickness of the AVD and the incidence of OASI.

**Keywords:** Anovaginal distance, Body mass index, Obese.

*Journal of South Asian Federation of Obstetrics and Gynaecology* (2021); 10.5005/jp-journals-10006-1960

## INTRODUCTION

Perineal or anal damage/injury at the time of vaginal delivery has a significant correlation with a short or thin perineal body.<sup>1,2</sup> The incidence of obstetric anal sphincter injuries (OASIs) are less in overweight and obese women compared to normal weight women.<sup>3,4</sup> This could be due to a longer or thicker perineum in obese women which is protective against severe perineal injury. The perineal body is a center point and also the insertion site for different perineal muscles situated between the anal canal and posterior vaginal wall.<sup>5</sup> The perineal muscles which inserted to the perineal body are puborectalis, bulbospongiosus, external and internal anal sphincters, and superficial and deep transverse perineal muscles.<sup>5,6</sup> There are different methods to measure the perineal body like clinical methods of palpation and inspection and different ultrasound techniques like endoanal, translabial, and transperineal ultrasound, and magnetic resonance imaging (MRI).<sup>7–9</sup> The definition of anovaginal distance (AVD) at term pregnancy was considered as the distance between the anal mucosa at one end and the posterior vaginal mucosa at the other end at the level of midanal canal.<sup>6</sup> Therefore, we considered the following hypothesis for our study that the AVD in term primiparous women at the time of labor is significantly thick in obese primiparous women compared to their normal counterparts.

<sup>1,2</sup>Department of Obstetrics and Gynaecology, Mahatma Gandhi Medical College and Research Institute, Puducherry, India

**Corresponding Author:** Setu Rathod, Department of Obstetrics and Gynaecology, Mahatma Gandhi Medical College and Research Institute, Puducherry, India, e-mail: seturathod@gmail.com

**How to cite this article:** Samal SK, Rathod S. Correlation between Maternal Body Mass Index and Anovaginal Distance in Term Primiparous Women at the Time of Active Labor. *J South Asian Feder Obst Gynae* 2021;13(5):343–346.

**Source of support:** Nil

**Conflict of interest:** None

## MATERIALS AND METHODS

This is a cohort study conducted in the Department of Obstetrics and Gynaecology, MGMC&RI, Puducherry, which included primiparous women in active phase of labor at term pregnancy from July 2018 to June 2019. Term pregnancy is defined as pregnancy after 37–42 completed weeks (>/37–</42 weeks). Active labor is defined as uterine contractions (2–3 uterine contractions in every 10 minutes) with cervical dilatation of more than one centimeter (cm), and/or rupture of membranes. The maximum cervix dilatation at which the measurement can

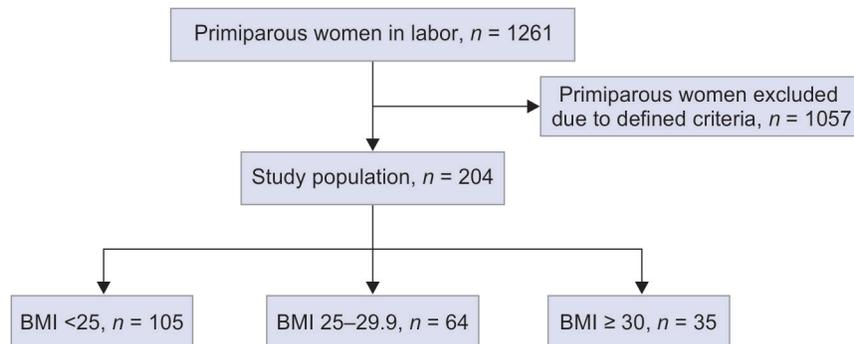
be taken was decided as 7 cm in order to avoid any bias which can occur due to change produced in the perineum by the descending presenting part in the second stage of labor. The algorithm of the study is shown in [Flowchart 1](#). After giving both written and verbal information about the study, the consent was taken for participation and documented in her medical case sheet. The inclusion criteria were all term primiparous admitted to labor ward who were in active labor. The exclusion criteria for this study were prematurity, multiparity, cervical dilation  $>7$  cm, and macrosomic fetus (fetal weight  $>4$  kg). The standardized method of measuring AVD described as putting the transvaginal probe perpendicularly to the posterior vaginal wall at the level of distal anal canal in an axial scanning plane with the women in lithotomy position which is shown in [Fig. 1](#). As the transvaginal probe moved proximally from the distal anal canal to midanal canal in a perpendicular manner, the internal anal sphincter was identified as a hypoechoic ring surrounding anal mucosa. The AVD in this study was identified as the distance measured by ultrasound calipers between the anal mucosa at one end and the vaginal mucosa at the other end at the level of the mid anal canal which is shown in [Fig. 2](#). After measuring the AVD in millimeter, it was documented in her case sheet. Maternal body mass index (BMI) was calculated by taking in to account of her prepregnancy or early pregnancy (up to 12 weeks) weight. According to BMI, three groups were created: normal weight (BMI  $<25$ ), overweight (BMI 25–29.9), and obesity (BMI  $\geq 30$ ). From the previous studies, we came to a conclusion that a minimum of 3 mm in the AVD is

required for clinical significance. According to this, a sample size of minimum 30 in each BMI group is required to achieve a power of 95% to detect 3 mm difference in the AVD. Participation for the study was invited to all primiparous women who fulfilled the inclusion criteria. Maternal characteristics, pregnancy, and delivery findings were analyzed in between different BMI groups by statistical methods like one-way analysis of variance (ANOVA) for continuous variables and Chi-squared test for categorical variables. A  $p$  value of less than 0.05 was taken as significant. The data collected were analyzed by Statistical Package for the Social Sciences (SPSS) software (IBM SPSS Statistics, Chicago, Illinois, USA; version 20). This study was approved by Institutional Human Ethical Committee bearing no. FACULTY PROJECT/2018/06/20.

## RESULT

A total of 1,261 primiparous women were screened and out of them 1,057 were excluded by considering the predefined criteria. Finally, the study population consisted of 204 primiparous women at term pregnancy in active labor. The study population divided in to three groups according to BMI as follows: normal (BMI  $<25$ )  $n = 105$ , overweight (BMI 25–29.9)  $n = 64$ , and obese (BMI  $\geq 30$ )  $n = 35$  ([Flowchart 1](#)). The baseline parameters including maternal and obstetrical characteristics of three BMI groups are presented in [Table 1](#). There was no significant difference between the three groups according to age, gestational age in weeks, and weight gain during pregnancy, cervical dilatation at the time of taking

**Flowchart 1:** Flowchart of research study



**Fig. 1:** Method to measure anovaginal distance



**Fig. 2:** Anovaginal distance in transperineal ultrasound

**Table 1:** Maternal and obstetrical characteristics

	BMI <25 n = 105	BMI 25–29.9 <30 n = 64	BMI ≥30 n = 35	p value
Age (mean ± SD)	29.4 ± 4.2	28.6 ± 5.5	27.8 ± 5.3	0.07
Gestational age in weeks (mean ± SD)	40.5 ± 1.4	40.4 ± 1.2	40.5 ± 1.4	0.86
Weight gain during pregnancy (kg) (mean ± SD)	13.8 ± 4.4	14.6 ± 6.7	14.4 ± 6.8	0.72
Cervical dilatation at the time of measurement (cm) n (%)				
≤5	68 (64.4)	40 (62.9)	24 (68.5)	0.55
>5	37 (35.5)	24 (37.1)	11 (31.5)	
Station of presenting fetal part at the time of measurement n (%)				0.18
Above the ischial spines n (%)	103 (98.1)	62 (96.9)	35 (100)	
Below the ischial spines n (%)	2 (1.9)	2 (3.1)	0	

**Table 2:** Comparison of AVD in different groups

	Number	Mean AVD in mm	95% confidence interval	p value
BMI groups				0.028
Normal weight (BMI <25)	105	24.2	23.2–25.2	
Overweight (BMI 25–29.9)	64	24.7	23.5–25.9	
Obesity (BMI ≥30)	35	27.3	25.3–29	0.016

measurement, and stations of presenting part at the time of measurement.

In Table 2, comparison of mean AVD in mm and 95% confidence interval between the three BMI groups was presented. The mean AVD was 24.2, 24.7, and 27.3 mm in normal weight, overweight, and obese groups, respectively. There was a significant difference in mean AVD in obese BMI group ( $p = 0.016$ ) as compared to both overweight and normal weight BMI groups.

## DISCUSSION

In a large observational study including a total of 210,678 primiparous women from Swedish medical birth register, Lindholm and Altman in 2013 observed that incidence of OASI was less in overweight and obese primiparous women in comparison with their normal counterparts.<sup>4</sup> The authors proposed that difference in pelvic floor connective tissue might be a protective factor in obese primiparous women.<sup>4</sup> We have observed in our study that obese (BMI >30) term primiparous women at the time of active labor had a thicker AVD compared to normal and overweight women which is statistically significant. This signifies that thickness that includes anal mucosa at one end and the vaginal wall mucosa at the other end at the level of the mid anal canal in obese women is longer than their normal and overweight counterparts. Hjertberg et al.<sup>6</sup> in 2018 compared AVD between normal, overweight, and obese primiparous women in active labor and concluded that the AVD measured by transperineal ultrasound by using transvaginal probe is significantly thicker in obese pregnant primiparous women compared to their normal and overweight counterparts. As lower rates of OASI have been seen in obese women after delivery, the authors concluded that thicker AVD might have a protective role in preventing injury to anal sphincter complex at the time of delivery. Blomberg 2014 found that maternal obesity in all three obesity classes seemed to decrease the risk for all 3° of anal sphincter injuries.<sup>3</sup> The authors concluded that the thicker perineal floor in obese women which is contributing towards longer AVD is due to the modification of pelvic floor leading to increased muscle mass

as a result of increased abdominal pressure in obese women.<sup>3</sup> Ozyurt et al. observed by using transvaginal ultrasound probe in the mothers who delivered vaginally and planned for discharge and found a significant correlation between OASI and thinner perineal body.<sup>10</sup> Mayooraan et al. used endoanal ultrasound to evaluate the perineal body and the anal sphincter complex in pregnant women between 38 and 41 weeks.<sup>11</sup> As the authors used endoanal ultrasound which can affect the perineal tissue in different manner, it is difficult to compare with transperineal ultrasound.

## CONCLUSION

In our study, we observed that the AVD measured in transperineal ultrasound by using a transvaginal probe in obese primiparous women in active labor was significantly longer compared to normal and overweight counterparts. This thickened pelvic tissue in obese women may be a protective factor from perineal injury at the time of delivery. We recommend large randomized control trials to evaluate further whether there is a correlation between thickness of the AVD and incidence of OASI.

## REFERENCES

1. Deering SH, Carlson N, Stitely M, et al. Perineal body length and lacerations at delivery. *Obstet Gynaecol Reprod Med* 2004;49(4): 306–310. PMID: 15134158.
2. Geller EJ, Robinson BL, Matthews CA, et al. Perineal body length as a risk factor for ultrasound-diagnosed anal sphincter tear at first delivery. *Int Urogynecol J Pelvic Floor Dysfunct* 2014;25(5):631–636. DOI: 10.1007/s00192-013-2273-x.
3. Blomberg M. Maternal body mass index and risk of obstetric anal sphincter injury. *Biomed Res Int* 2014;1–8. Article ID 395803. DOI: 10.1155/2014/395803.
4. Lindholm ES, Altman D. Risk of obstetric anal sphincter lacerations among obese women. *BJOG* 2013;120(9):1110–1115. DOI: 10.1111/1471-0528.12228.
5. Yavagal S, De Farias TF, Medina CA, et al. Normal vulvovaginal, perineal, and pelvic anatomy with reconstructive considerations. *Semin Plast Surg* 2011;25(2):121–129. DOI: 10.1055/s-0031-1281481.

6. Hjertberg L, Uustal E, Pihl S, et al. Maternal body mass index and anovaginal distance in active phase of term labor. *Biomed Res Int* 2018;1–6. DOI: 10.1155/2018/1532949.
7. Valsky DV, Messing B, Petkova R, et al. Postpartum evaluation of the anal sphincter by transperineal three-dimensional ultrasound in primiparous women after vaginal delivery and following surgical repair of third-degree tears by the overlapping technique. *Ultrasound Obstet Gynecol* 2007;29(2):195–204. DOI: 10.1002/uog.3923.
8. Timor-Tritsch IE, Monteagudo A, Smilen SW, et al. Simple ultrasound evaluation of the anal sphincter in female patients using a transvaginal transducer. *Ultrasound Obstet Gynecol* 2005;25(2): 177–183. DOI: 10.1002/uog.1827.
9. Chantarasorn V, Shek KL, Dietz HP. Mobility of the perineal body and anorectal junction before and after childbirth. *Int Urogynecol J* 2012;23(6):729–733. DOI: 10.1007/s00192-012-1672-8.
10. Ozyurt S, Aksoy H, Gedikbasi A, et al. Screening occult anal sphincter injuries in primigravid women after vaginal delivery with transperineal use of vaginal probe: a prospective, randomized controlled trial. *Arch Gynecol Obstet* 2015;292(4):853–859. DOI: 10.1007/s00404-015-3708-z.
11. Mayoaran V, Deen KI, Wijesinghe PS. Endosonographic characteristics of the anal sphincter complex in primigravid Sri Lankan women. *Int J Gynaecol Obstet* 2005;90(3):245–250. DOI: 10.1016/j.ijgo.2005.04.008.