Validation of Sacral Rhomboid Diameters and Maternal Height in Antenatal Prediction of Contracted Pelvis in Primigravida

Prisha Rishi^{*1}, Abhiruchi Patel², Ameet Julka³, Garima Pardhi⁴.

^{*1} Assistant Professor, Department of Anatomy, SAIMS Medical College And Postgraduate Institute, Indore Ujjain State Highway, near MR 10 Road, Bhawrasla, Indore, M.P. 453555, India. **ORCiD:** 0000-0001-7952-0436

² Assistant Professor, Department of Anatomy, LNCT Medical College, Kanadiya, Indore, M.P. 452016, India.

³ Professor and Head, Department of Anatomy, MGM Medical College, AB Road, CRP Line Indore M.P. 452001, India. **ORCiD:** 0000-0001-8807-2030

⁴ Assistant professor, Department of Anatomy, A.B.V.G.M.C., NH 86, Sanchi Road , Shastri Nagar, Vidisha, M.P. 464001, India.

ABSTRACT

Background: Contracted pelvis when not diagnosed on time before labour leads to obstetric mishaps in developing countries.

Material and Methods: This prospective study aimed to assess the validity of sacral rhomboid diameter and maternal height (Ht) to predict contracted pelvis antenatally and to compare its individual efficacy with the combination models in antenatal prediction of the contracted pelvis.

Results: In 250 uncomplicated primigravida at 37 weeks or beyond, Height and Michaelis sacral rhomboid vertical and transverse diameters (VD and TD) were measured. Post-delivery patients were divided into two groups- Normal delivery (Group1) and contracted pelvis(CP) (Group 2 including Lower Segment Caesarean Section (LSCS) for contracted pelvis and assisted vaginal delivery due to non-progress of labour). Analysis was done using Microsoft Excel and R studio (Open source analytical tool V 1.2.335), cross-tabulation, and Pearson chi-square test. In our study, we found that the Mean maternal height and mean rhomboid dimensions (VD and TD) were significantly (p value 0.000) smaller in the CP group. In univariate analysis, Maternal height \leq 1.422 (m), VD \leq 9.5 (cm) and TD \leq 9.5 (cm) showed PPV of 59.26%, 29.63%, and 56.67% respectively. Of all parameters, Maternal height \leq 1.422 (m) was the most significant factor in the prediction of contracted pelvis and it detected 16 out of 27 women at risk of CP. However, when combination models were produced, HT+TD was the best predictor model at 10th percentile cut-off values with the highest PPV and Accuracy (77.78% and 93.3% respectively) and it detected 14 out of 18 women at risk of CP.

Conclusions: Smaller dimensions of the sacral rhomboid along with the maternal height are independent predictors of contracted pelvis. Transverse diameter of Michaelis (TD) along with maternal height at cut-off values enhanced the predictability of contracted pelvis and can be used as a promising and easily measurable screening parameter to detect the women at risk of Contracted pelvis antenatally.

KEYWORDS: Sacral Rhomboid diameters, Contracted pelvis, Antenatal Prediction, Maternal Height, Primigravida

Corresponding Author: Dr. Prisha Rishi, Assistant Professor, Department of Anatomy, SAIMS Medical College And Postgraduate Institute ,Indore Ujjain State Highway, near MR 10 Road, Bhawrasla, Indore, M.P. 453555,India. **E-Mail:** prishaa.riishi@gmail.com

Access this Article online	Journal Information				
Quick Response code	International Journal of Anatomy and Research ISSN (E) 2321-4287 ISSN (P) 2321-8967 https://www.ijmhr.org/ijar.htm DOI-Prefix: https://dx.doi.org/10.16965/ijar				
	Article Information				
DOI: 10.16965/ijar.2023.200	Received: 10 Aug 2023 Peer Review: 13 Aug 2023 Revised: 29 Oct 2023	Accepted: 05 Nov 2023 Published (O): 05 Dec 2023 Published (P): 05 Dec 2023			

INTRODUCTION

Pelvis constitutes the birth canal through which the fetus passes during childbirth. Narrowing of pelvic dimensions is one of the most important causes of obstructed labour responsible for 8% of maternal deaths in developing countries [1, 2]. Contracted pelvis is associated with significant maternal and fetal complications if not diagnosed before the onset of labour especially in limited resource areas [3].

Most women in developing countries are unable to avail high level of healthcare during the antenatal period [4], thus it is essential to develop a reliable, cost-effective, and easily measurable screening parameter that can be used even by auxiliary personnel in primary health care settings.

Madhya Pradesh is among the first five states to have a higher maternal mortality ratio as per the recent report of NITI (National Institute of Transforming India Aayog) [5]. Thus, population here needs to be assessed. Gustav Adolf Michaelis, a German obstetrician was known for his work in pelvimetry. In 1851, he described a diamond-shaped area on the lower back in the sacral region which was named as 'Rhombus of Michaelis' after him. Michaelis noted the difference in size or shape of this area in women with and without contracted pelvis and also explained its importance for the pelvic cavity [6, 7].

Maternal height is presently the only parameter included in ANC charts for the identification of women at risk of pelvic disproportion [4, 8-10]. Other factors such as external pelvic diameters, foot length, symphysio fundal height, weight gain during pregnancy have been evaluated in various studies [4, 8-10] with controversial results in some of them [4, 8, 10]. The present study aims to assess the validity of sacral rhomboid diameters along with maternal height in primigravida at term pregnancy to predict the contracted pelvis antenatally.

MATERIALS AND METHODS

Institutional ethics committee (IEC) approval: We started our study after taking approval from IEC letter No. EC/MGM / Feb-19112.

Methodology - This was a hospital-based prospective study carried out in the Department of Obstetrics and Gynaecology and Department of Anatomy, M.G.M Medical College and M.Y. Hospital, Indore, Madhya Pradesh. It included 250 Primigravidas at 37-40 weeks gestational age, aged 18-40 yrs with an uncomplicated pregnancy and singleton vertex presentation confirmed coming to the Antenatal clinic were randomly recruited in our study from Feb 2019 to Aug 2019.

Those with any pelvic deformity, past medical/surgical history, not willing to participate, and Indications of caesarean section other than the contracted pelvis including elective section, fetal birth weight>3.5 kg, and not willing to fill consent form were excluded from the study.

Women were enrolled in the study after taking informed written consent. Detailed demographic history was taken followed by physical examination, anthropometric and pelvimetric measurements, all of these were recorded in the patient proforma. First-trimester weight was recorded using Ante Natal Care (ANC) record, Height was measured in meters using a portable stature meter (Easycare).

For measuring sacral rhomboid dimensions, the following points were marked at the women back using a skin marking pen (Fig.no.1)-



Fig. 1: Marking the points of Michaelis Sacral Rhomboid.

Point A was marked by palpating L5 (5th Lumbar Vertebra) spinous process and

Point B was marked on the upper limit of the intergluteal cleft, the distance between A and B was measured as the Vertical Diameter of Michaelis (VD).

Then points C and D were marked on the posterior superior iliac spines which can be felt under the indent seen just above the buttocks, distance between C and D was measured as the Transverse diameter of Michaelis (TD) (Fig.no.1) and (Fig.no.2).



The flexible measuring tape was used for measuring Michaelis sacral rhomboid diameters in centimetres (cm), (converted into m(meters)). All the measurements were taken in a standing position.

Women were then followed up to delivery. On follow-up, the main outcome variable was the Mode of Delivery. Depending on the Mode of delivery, subjects were divided into following two groups -

1. Normal delivery group (uncomplicated spontaneous vaginal delivery) and

2. Contracted pelvis group (assisted vaginal delivery due to CP and caesarean delivery due to CP).

The data was then entered and analyzed using Microsoft Excel and R studio (Open source analytical tool V 1.2.335). For inferential statistics, student t-test, Pearson chi-square test, and cross tabulation were used. A p-value less than 0.005 was considered significant. Cut-off values used were based on 10th percentile values.

Among 250 women, 171 of them delivered through spontaneous vaginal delivery, 14 women gave birth by caesarean section and 09 gave birth by assisted vaginal delivery (both formed the Contracted Pelvis group) while 56 women were excluded on follow-up. This study has compared these measured parameters between the two groups formed depending on the mode of delivery.

OBSERVATION AND RESULTS

Out of the 250 primigravida included in our study, 56 were excluded on follow up as per the exclusion criteria of our study.194 patients were thus included in our study for analysis.

Depending on the Mode of delivery patients were grouped as Normal delivery (171), assisted vaginal delivery (09) and caesarean delivery (14).

For statistical analysis, only two groups were formed as-

A. Those who underwent Normal Vaginal Delivery were controls and formed the Reference group /Normal delivery group.

B. Those who underwent Assisted Vaginal Delivery and Caesarean delivery were the cases of Contracted pelvis and formed Contracted pelvis group (CP).

The frequency distribution of the study sample according to the mode of delivery is given in Table No. 1. It shows the comparison of mean values of different variables between Final Outcome Groups. For AGE, Birth weight the difference between the mean values of the two groups was found to be statistically non-significant (P < 0.05).

For HEIGHT (m), WEIGHT (Kg (Kilograms)), VD, and TD the difference between the mean values of the two groups was found to be statistically significant (P < 0.05).

It implies that these variables (HEIGHT (m), WEIGHT (kg), VD, and TD) vary between both Groups.

Univariate analysis-

From Table no.1 – Table no.3, it can be interpreted that-

Mean Maternal height (1.443m) was significantly lower in group 2 (p=0.000). PPV (59.26%) indicates that with the 10th Percentile taken as cut-off value (\leq 1.422 (m)), 27 women were identified to be at risk and 16(59.26%) actually had contracted pelvis.

Mean VD was 0.824cm less in group 2 and was statistically significant (p=0.000)

With the 10th Percentile (\leq 9.5 (cm)) taken as cut off value, 27 women were identified to be at risk and 8 (29.63%) actually had contracted pelvis with PPV 29.63%

Mean TD was 0.97cm less in group 2 and was statistically significant (p=0.000). When 10th Percentile was taken as the cut off value (\leq 9.5 (cm)), 30 women were identified to be at risk and 17 (56.67%) actually had contracted pelvis with PPV 56.67%.

Thus, the maternal anthropometric parameters i.e., Height, Weight, and Michaelis sacral rhomboid diameters (i.e., TD and VD) are valid in the independent prediction of Contracted pelvis antenatally (p< 0.05).

Combination Models – We have attempted to combine the individual significant parameters to check for enhanced predictive accuracy (Table No. 4).

1. <u>Ht+TD</u> – When Ht was combined with TD at the cut off values i.e. Ht+TD (10th P) $(\le 1.422 \text{ (m)} + \le 9.5 \text{ cm})$, Positive Predictive Value (PPV) and Accuracy was high (i.e.,77.78% and 93.30% respectively) as compared to Ht alone (i.e., PPV=59.26% and accuracy=90.72%) and 14 out of 18 (77.78%) women actually had contracted pelvis.

2. <u>Ht+VD</u> – When Ht was combined with VD at the cut-off values i.e. Ht+VD (10th P) (\leq 1.422 (m) + \leq 10 cm), PPV was increased from 59.26% to 66.67% but Accuracy was decreased from 90.72% to 89.69%, and 6 out of 9 (66.67%) women actually had contracted pelvis.

3. <u>TD+VD</u> – When TD was combined with VD at the cut-off values i.e. TD+VD (10th P) (\leq 9.5cm+ \leq 10 cm), PPV and Accuracy were high (i.e.77.78% and 91.35% respectively) as compared to TD alone (i.e. PPV=56.67% and accuracy=90.21%) and 7 out of 9 (77.78%) women actually had contracted pelvis. Thus, from Table no.1-4, we can interpret that-

At 10th percentile cut-off values, height gave the best results as independent predictor

(sensitivity 91.3%, specificity 85.96%, accuracy 90.72%, and PPV 59.62%) of contracted pelvis antenatally.

 Ht+TD was the best combination model at the cut-off values as predictive values (accuracy and PPV) were increased in the model as compared to individual predictive values (PPV increased from 59.26% to 77.78%)

 Table 1: Comparison of Mean Values and Standard Deviations of the different Variables between Final Outcome

 Groups.

Variable	Group	N	Mean	Standard Deviation	T Test	P Value	Result	
Age	Contracted Pelvis	23	21.609	2.5	-1 050	0 201	Non Significant	
	Normal Delivery	171	22.222	2.623	-1.055	0.291	Non Significant	
Gestational	Contracted Pelvis	23	39.099	0.94	0.024	0.257	New Cise if seet	
Age	Normal Delivery	171	38.905	0.946	0.924	0.557	Non Significant	
Weight (kg)	Contracted Pelvis	23	42.957	6.918	C 2C4	0	Significant	
	Normal Delivery	171	51.947	6.402	-0.204	0	Signincant	
Height (m)	Contracted Pelvis	23	1.443	0.07	7.000	0	Cignificant	
	Normal Delivery	171	1.561	0.066	-7.990	0	Significant	
VD	Contracted Pelvis	23	10.13	0.394	E 722	0	Significant	
	Normal Delivery	171	10.954	0.674	-3.722	0	Significant	
TD	Contracted Pelvis	23	9.504	0.201	8 00F	0	Significant	
	Normal Delivery	171	10.477	0.512	-0.995	0	Significalle	
Birth	Contracted Pelvis	23	2.763	0.29	0.055	0.241	Non Significant	
Weight (kg)	Normal Delivery	171	2.679	0.41	0.955	0.541		

511 01	inatern	ai i ai ai i i i cici s	between ti		ittome gr	oups based	
	Ра	arameters	Contracte d Pelvis Group	Normal Delivery Group	P Value	X ² Value	
	цт	<=1.42(m)	16	11	0	67 115	
	- II	>1.42(m)	7	160	U	07.445	
	TD -	<=10(cm)	17	13	0	68 101	
		>10(cm)	6	158	0	00.191	
	VD -	<=9.5(cm)	8	19	0.002	9 / 82	
		>9.5(cm)	15	152	0.002	5.402	

 Table 2: Comparison of Maternal Parameters between the final outcome groups based on the cut off values.

Table 3: Sensitivity, specificity, Positive Predictive Value (PPV), Negative Predictive value (NPV), Positive likelihood Ratio (PLR) and Accuracy of Contracted Pelvis based on the cut off values of Individual Maternal parameters.

Parameters	Sensitivity	Specificity	PPV	NPV	Accuracy	PLR
НТ	69.57%	93.57%	59.26%	95.81%	90.72%	11
TD	73.91%	92.40%	56.67%	96.34%	90.21%	9.72
VD	34.78%	88.89%	29.63%	91.02%	82.47%	3.13

Table 4: Sensitivity, specificity, Positive Predictive Value (PPV), Negative Predictive value (NPV), Positive likelihood Ratio (PLR) and Accuracy of Contracted Pelvis based on the cut off values of Combined Models of Maternal parameters.

Parameters	Sensitivity	Specificity	PPV	NPV	Accuracy	PLR
HT+TD	60.87%	97.66%	77.78%	94.89%	93.30%	26
HT+VD	26.09%	98.25%	66.67%	90.81%	89.69%	15
TD+VD	30.43%	98.83%	77.78%	91.35%	91.35%	26

DISCUSSION

The incidence of contracted pelvis in the present study was 11.8% which is comparable to that found by Deepika N et al.(2019) [10] (12.3%) and Shagun B et al.(2011) [4] (12%).

Grouping of the patients based on the mode of delivery.

In this study, patients who underwent caesarean section and assisted vaginal delivery due to contracted pelvis formed a single group (Contracted Pelvis group) and patients undergoing uncomplicated spontaneous vaginal delivery formed another group (Normal Delivery group). Similar grouping was used by liselele et al. (2000) [8], Shagun B et al.(2011) [4], Deepika N et al.(2019) [10], and Rahele et al.(2014) [11] who included assisted vaginal delivery as an instance of studied cases i.e. for Cephalo Pelvic Disproportion (CPD), CP and dystocia. On the contrary, Benjamin et al.(2012) [12] considered assisted vaginal deliveries in the Normal Delivery group as they found the anthropometric characteristics of the assisted vaginal delivery group close to those of the Normal Delivery group, which was however not observed in our study.

Anthropometric Parameters:

a. Height (Ht)- Short stature in women is known to be associated with difficulties in labour [13]. This proves to be true in our study where women were shorter in Contracted Pelvis group. The mean maternal height in the Contracted Pelvis group was 1.443(m) and in the Normal Delivery group was 1.56 (m) and the difference was statistically significant (p =0.000). Maternal height and mode of delivery are significantly associated in the study which is in line with the findings of several studies that showed similar results [4,10,12].

However, our findings were not in agreement with the study of Kara F et al., (2005) [14] and observed discrepancies in lack of significant association may be due to different cut-off points used for maternal heights. Several studies have used cut-off value \leq 150cm for height [8, 9] which is not applicable in all sets of populations.

A high percentage of women (16 out of 27) (59.26%) in this study had Contracted pelvis at the cut-off values (Ht \leq 1.42m), Better positive predictive value (59.26%), and high accuracy (90.72%) for the cut-off values of height makes it a good independent predictor of the contracted pelvis. High specificity in our study (85.96%) would result in limiting unnecessary referrals and minimisation of a burden on tertiary care centers.

b. Weight- The mean weight of the Contracted Pelvis group (42.957 kg) was significantly lower in the present study as compared to the Normal Delivery group (51.947 kg) (p=0.000). This result was not consistent with the studies done Shagun B et al.(2011) [4],Deepika et al.(2019) [10] and JB Kakoma et al.(2010) [15] which could be because they had taken the weight either at full term or in the second/third quarter of pregnancy [15] but we have taken first-trimester weight in our study.

External Pelvimetric diameters/ Michaelis sacral rhomboid diameters-

Adolf Gustov Michaelis (1851) [6, 7] described a kite-shaped/rhomboid area on the sacrum which is related to the pelvic inlet and the pelvic cavity where the fetal head negotiates the birth passage. Its Transverse Diameter (TD) and Longitudinal/Vertical Diameter (VD) constitute the transverse and craniocaudal diameters of external pelvimetry [16].

1. Transverse Diameter (TD)- The mean TD in our study was significantly smaller in the Contracted Pelvis group $(9.504\pm0.20 \text{ cm})$ when compared to the Normal Delivery group $(10.477\pm0.51\text{ cm})$ (p=0.000). This was comparable to Deepika N et al.(2019) [10] $(10.31\pm0.76$ in the Normal group and 9.25\pm0.6 in the Case group) and Shagun B et al. (2011) [4] (10.54\pm0.71 in the Normal group and 10.04\pm0.91 in Case group). Contrary to this, Benjamin et al. (2012) [12] did not find a significant difference between the two groups (p=0.648).

There was a significant association of TD with the mode of delivery in our study. When 10th Percentile cut off values (\leq 9.4cm) were used, TD was able to predict 17 out of 30 women who had contracted pelvis (56.67%) (PPV) The sensitivity was 73.91%, specificity 92.40%, and accuracy 90.21%.PLR was 9.73. This is consistent with the results of Liselele et al.(2000) [8] who also found a specificity of 92.7%, PPV 46.4%, and PLR 6.3 and Rahele et.al (2014) [11] (diagnostic accuracy 81%).

2. Vertical Diameter (VD)- The mean VD in our study was also significantly smaller in the Contracted Pelvis group $(10.130 \pm 0.394 \text{ cm})$ than in the Normal Delivery group $(10.954 \pm 0.674 \text{ cm})$ (p=0.000). This is comparable to Liselele et al.(2000) [8] (11.9 \pm 2.1 cm in group 1 and 10.9 \pm 1.8 cm in group 2(case))[8]. Contrary to this, Benjamin et al.(2011) [12] and Rahele et al.(2014) [11] did not find a significant difference between the two groups with p=0.648 and p=0.2 respectively.

Mode of delivery was significantly associated with VD in the present study. When cut-off values for VD (\leq 10cm) were used, then VD was able to predict 8 out of 27 women who had contracted pelvis (29.63%) (PPV) The sensitivity was 34.78%, specificity 88.89%, accuracy 82.47% and PLR was 3.13. This was comparable to Deepika et al.(2019) [10] (sensitivity 28%),

Shagun B et al.(2011) [4] (sensitivity 23%). However, it was insignificant in the study by Rahele et al.(2014) [11].

Thus, in univariate analysis, taking both anthropometric parameters and Michaelis sacral rhomboid diameters (TD and VD) into consideration as our primary objective, Height was the best predictor at cut-off values (\leq 1.42 m) (i.e.10th Percentile) followed by Transverse Diameter (TD) of Michaelis sacral rhomboid with cut off values (\leq 9.6 cm) to predict contracted pelvis antenatally. Attempts have been made in previous studies [4, 8, 10-12, 15] to combine multiple risk factors along with height (anthropometric parameters and pelvimetric parameters) to study the associations and enhance the efficiency of prediction of contracted pelvis antenatally.

We combined all the parameters found significant in the univariate analysis to find an appropriate model for best prediction as per the cut off values by 10th percentile

1. **Ht+TD-** This model was significantly associated with the mode of delivery When patients

of both groups were combined using cut-off values by the 10th percentile (Ht < 1.42 (m) + TD \leq 9.4 cm), this model predicted 14 out of 18 women (77.78%) (PPV) who had contracted pelvis with sensitivity 60.87%, specificity 97.66%, accuracy 93.30% and PLR 26. This made the model a better predictor (high PPV and accuracy) when compared to the prediction by a single parameter (accuracy improved from 90.72% to 93.3%). This is comparable with the results of Rahele et al. (2014) [11] (sensitivity 60.7%, specificity 84.1%, accuracy 81.2% and PPV 27.4%) and Liselele et al. (2000) [8] (sensitivity 52.4%, specificity87%, and PPV 23.7%). On the contrary, in the study by D.Solomon et al.(2018) [19] the above model was not found to increase predictive values when compared with univariate analysis.

2. Ht +VD- This model was also significantly associated with the mode of delivery. When patients of both the groups were combined using cut-off values by the 10th Percentile (Ht \leq 1.42 (m) + VD \leq 10 cm), this model predicted 6 out of 9 women (66.67%) (PPV) who had contracted pelvis with sensitivity 26.09%, specificity 98.25%, accuracy 89.69% and PLR 15. Thus, in this model, PPV was increased but the accuracy was low as compared to height alone (PPV-59.26%). This is comparable with the results of Shagun B et al. (2011) [4] (PPV -55.5%) and Deepika N et al.(2019) [10] (PPV-51.6%).

3. **VD+TD**- This model was also significantly associated with the mode of delivery. When patients of both the groups were combined using cut-off values by the 10th Percentile ($VD \le 10cm+TD \le 9.4cm$), this model predicted 7 out of 9 women (77.78%) (PPV) who had contracted pelvis with sensitivity 30.43%, specificity 98.83%, accuracy 90.72% and PLR 26. This is comparable with the results of Shagun B et al.(2011) [4] (PPV -60%) and Deepika N et al.(2019) [10] (PPV-55.6%).

On combining the independent predictors, we found that the predictive values especially accuracy and PPV increased as compared to independent prediction as in HT+TD (PPV increased from 59.26% to 77.78%) and in VD+TD (PPV increased from 60 %to 77.78%).

Out of all the combination models-

Ht+TD Model was the best predictor (sensitivity 60.87%, specificity 97.66%, accuracy 93.30%, and PLR 26) when cut-off values based on 10th Percentile (Ht \leq 1.42 (m) + TD \leq 9.4 cm) was used. This is consistent with the results of Shagun B et al.(2011) [4], Liselele et al.(2000) [8] and Rahele et al.(2014) [11] who also found this model as the best predictor model in their set of populations.

As the actual number of women in the contracted pelvis group was small, the validity of combination models needs confirmation by larger studies.

CONCLUSION

The independent risk factors for Contracted Pelvis were Maternal Height, VD, and TD. Anthropometry when combined with pelvimetry enhanced the prediction of contracted pelvis as compared to anthropometry alone as proved by the Ht+TD model in our study (improved PPV and Accuracy). We can safely conclude that Pelvimetric measurements (VD+TD) i.e., Michaelis sacral rhomboid dimensions can be used for the prediction of contracted pelvis antenatally and its related outcomes. VD and TD are easily measurable parameters, cost-effective (as flexible measuring tape is easily available everywhere), and can be used by ANMs' (Auxiliary Nursing Midwives) in the peripheral centres. This can be used in antenatal clinics on a routine basis to predict high-risk females antenatally and to refer them in the earlier stage to an equipped facility to manage the condition accordingly and thus effectively reduce preventable causes of birth-related morbidity and mortality in the state.

Author Contributions

Prisha Rishi: Conception and design, data collection, analysis and interpretation of data, writing the manuscript.

Abhiruchi Patel: Data collection and analysis of data.

Ameet Julka: assisted in drafting and revising the manuscript, Final approval of the version to be published.

Garima pardhi: revising article critically for important intellectual content.

ABBREVIATIONS

ANC- Ante Natal Care

ANMs'- Auxiliary Nursing Midwives

CM - Centimeters

CP - Contracted Pelvis

CPD - Cephalo Pelvic Disproportion

- Ht Height
- Kg Kilograms
- L5 5th Lumbar Vertebra
- LSCS Lower Segment Caesarean Section
- M Meters
- **NPV -** Negative Predictive value
- NITI National Institute of Transforming India
- PLR Positive likelihood Ratio
- **PPV -** Positive Predictive Value

TD - Transverse Diameter of Michaelis Sacral Rhomboid

VD - Vertical Diameter of Michaelis Sacral Rhomboid

Conflicts of Interests: None

REFERENCES

- Bansal A, Kalra R. Feto maternal outcome in obstructed labor: a tertiary centre study. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2019 Jun 1;8(6):2500.
- [2]. Usharani N, Bendigeri M. A study on clinical outcome of obstructed labour. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2017 Feb 1;6(2):439-43.
- [3]. Say L, Chou D, Gemmill A, Tunçalp Ö, Moller AB, Daniels J, Gülmezoglu AM, Temmerman M, Alkema L. Global causes of maternal death: a WHO systematic analysis. The Lancet global health. 2014 Jun 1;2(6):e323-33.
- [4]. Bansal S, Guleria K, Agarwal N. Evaluation of sacral rhomboid dimensions to predict contracted pelvis: a pilot study of Indian primigravidae. The Journal of Obstetrics and Gynecology of India. 2011 Oct;61:523-7.
- [5]. Aayog NI. Maternal Mortality Ratio (MMR)(per 100000 live births). Government of India. URL: https://www. niti. gov. in/content/maternal-mortality-ratio-mmr-100000-live-births (accessed 22nd May 2019). 2018.

- [6]. Neitzke G, Hoffmann S. Gustav Adolph Michaelis– Physician, Researcher, Teacher. An acknowledgement for the anniversary year 1998. Der Gynäkologe. 1999 Aug;32(8):660-4.
- [7]. Michaelis G. Das enge Becken nach eigenen Beobachtungen und Untersuchungen. American Journal of Obstetrics and Gynecology. 1977;129(6):695-696.
- [8]. Liselele HB, Boulvain M, Tshibangu KC, Meuris S. Maternal height and external pelvimetry to predict cephalopelvic disproportion in nulliparous African women: a cohort study. BJOG: An International Journal of Obstetrics & Gynaecology. 2000 Aug;107(8):947-52.
- [9]. Solomon D, Dirar A, Getachew F. Age, Anthropometric Measurements and Mode of Delivery among Primigravidae Women at Addis Ababa Governmental Hospitals, Ethiopia. J Women's Health Care. 2018;7(01):2167-0420.
- [10]. Deepika N, Kumar A, Shivagami C. Study of anthropometric measurements to predict contracted pelvis. Int J Clin Obstet Gynaecol. 2019;3:7-11.
- [11]. Alijahan R, Kordi M, Poorjavad M, Ebrahimzadeh S. Diagnostic accuracy of maternal anthropometric measurements as predictors for dystocia in nulliparous women. Iranian journal of nursing and midwifery research. 2014 Jan;19(1):11.
- [12]. Benjamin SJ, Daniel AB, Kamath A, Ramkumar V. Anthropometric measurements as predictors of cephalopelvic disproportion: can the diagnostic accuracy be improved?. Acta obstetricia et gynecologica Scandinavica. 2012 Jan;91(1):122-7.
- [13]. Buchmann EJ. Head descent, moulding and other intrapartum clinical findings in the prediction of cephalopelvic disproportion.
- [14]. Kara F, Yesildaglar N, Uygur D. Maternal height as a risk factor for Caesarean section. Archives of Gynecology and Obstetrics. 2005 Apr;271:336-7.
- [15]. Kakoma JB, Karibushi J, Ramazani KR. Height, weight, external pelvic diameters and cesarean section: a cohort study in southern province of Rwanda (Huye District). Rwanda Medical Journal. 2010 Sep;68(3):21-4.
- [16] .Siccardi M, Valle C, Di Matteo F, Angius V. A postural approach to the pelvic diameters of obstetrics: the dynamic external pelvimetry test. Cureus. 2019 Nov 9;11(11).

How to cite this article:

Prisha Rishi, Abhiruchi Patel, Ameet Julka, Garima Pardhi. Validation of Sacral Rhomboid Diameters and Maternal Height in Antenatal Prediction of Contracted Pelvis in Primigravida. Int J Anat Res 2023;11(4):8721-8728. **DOI:** 10.16965/ijar.2023.200