Maternal Height and 'Shoe Size' as Predictors of Intrapartum Complications in Labor with Occiput Posterior Malposition

Wisam Akram, Shatha Sami, Faten Shalal

ABSTRACT:

BACKGROUND:

Although most women have anormal labour and birth, there are sometimes complication occurring due to multiple factors,occiput posterior postion represent achallenges in diagnosis,labour& intrapartum complication care

OBJECTIVE:

To evaluate maternal height and shoe size correlates with complications associated with occiput posterior ma position during labor.

Type of the study; case control

METHODS:

A total of 45 primigravida women with android pelvis were chosen versus 45 with gynecoid pelvis according to clinical pelvimetry,Their shoe size and height were recorded. In addition women in both groups were scrutinized for occiput posterior and labor complications associated with condition including secondary arrest of dilatation, deep transverse arrest and cesarean for failed assisted vaginal delivery. Labor duration with regard to the first and second stage was also recorded for both groups and linked to shoe size and maternal height.

RESULTS:

The odd ratio for secondary arrest of dilatation, deep transverse arrest and failed assisted vaginal delivery were significantly higher among women with android pelvis than gynecoid ; 4.8, 5.6 and 4.5, respectively. A significant correlation between shoe sizes, maternal height versus duration of the first and second stage; P Value is $P < 0.0001$. Cluster analysis showed that women with shoe size between 37 cm to 40 cm are most likely to have intrapartum complication and failed assisted vaginal delivery. The rate of complications was higher in the android group than control gynecoid pelvis.

CONCLUSION:

Some correlation could be concluded between maternal shoe size and possibility of cesarean section for deep transverse arrest among women with android pelvis. However due to the anthropometric variations among women the results of this study could only be applied to patients covered by AL Yarmook Teaching Hospital including south and west of Baghdad city. Further studies are required to have better understanding of this vital subject.

KEY WORDS:occiput posterior,pelvimetry,deep transverse arrest.

INTRODUCTION:

Occiput posterior mal position of the fetal head is defined as engagement of the fetal head with the position of the occiput occupying the posterior half of the true maternal cavity [1]. The fate of occiput posterior depends largely on the size of maternal mid cavity[(2)]. In most of the cases there will be a long 3/8th circle of the fetal occiput to the anterior position and labor continues in the normal way. In few cases the fetal head rotates posterior 1/8th of the circle so the fetal head is delivered in face to pubis position. The majority of women experience arrest of rotation to the anterior position in direct left or right position leading to obstructed labor which needs assisted vaginal delivery by vacuum extraction or Kielland's forceps [(2)]. In fewer cases the fetal head remains without movement at occiput posterior and in such cases called persistent occiput posterior [(3)]. It should be stressed that in all cases of occiput posterior the fetal head is engaged onto the true maternal pelvic cavity [(4)]. Many researchers like lloki et al [(5)] have linked maternal cavity size to maternal height and shoe size so it may be logical to investigate maternal height and shoe size with labor outcome complicated by occiput posterior mal position. Accordingly the aim of the study is to evaluate whether occiput posterior labor and its complication can be linked to maternal shoe size as

AL Yarmook Teaching Hospital , AL Mustansiriyiah Medical College.

well as maternal height versus control occiput anterior women.

PATIENT AND METHODS:

Settings

The study was conducted in AL Yarmook teaching hospital from May 2013 to Junauary 2014 during this period a total of 90 patients were carefully selected to participate in the study. For all the women they were 45 woman with gynecoid pelvis showing a normal criteria of the typical gynecoid female pelvis versus 45 patients with typical android pelvis a will be detailed in the next section. The only criteria to participate in the study is a primigravida to reduce bias in results who devoid of any high risk medical or other obstetrical complications between 37 to 40 weeks. For all the patients participated in this study their approval was taken verbally.

METHODS:

As it has been highlighted above all women taken in this study were primigravida who are 4 cm dilated or more and taken from labor ward. All women with hypertension, diabetes, placental abnormalities and other high risk situations were excluded. In addition to being primigravida her last menstrual period was carefully taken and the gestational age in weeks was calculated. Their heights in addition to other parameters were measured. Her shoe size was obtained by asking the patient directly. Among those women who show flattening of the lower abdomen careful pelvic examination was done first to define the pelvic type and second to identify the occiput so the condition occiput posterior was diagnosed with confidence. The sagital suture in the fetal head was tracked carefully in either side leading either to the diamond shaped anterior fontanel or to the triangular posterior fontanel. The following pelvic landmarks were carefully scrutinized and tracked to confirm the diagnosis of android pelvis; sacral promontory and sacro sciatic notch, ischial spines, sub pubic angle, sacrum curvature as well as narrow sacro tuberous ligaments. All the data were carefully taken for each patient and as a rule all the patients put under observe by partogram. Those patients showing evidence of secondary arrest of dilatation, uterine contractions were augmented with oxytocin infusion with meticulous listening to the fetal heart sound. Women showing evidence of fetal distress were short cut to be delivered by emergency cesarean section while women reaching the second stage were managed by the active management of the second stage of labor. Women with deep transverse arrest were either given increased infusion of oxytocin should inertia of the uterus is seen or trial of ventuse delivery was done. Women who failed vacuum extraction for 2 to 3 times were delivered by emergency cesarean section. During cesarean the position of occiput was further confirmed and double checked with the already taken during first stage. All women in this study have the fetal head well engaged into the true maternal cavity by showing $1/5^{th}$ of the head is palpable per abdomen by Pawlick Grip or fetal station +1 or more during pelvic examination. Fortunately no perinatal morbidity or mortality was recorded in this study.

Statistical Analysis

Continuous data were expressed as mean and standard deviation and compared with t student test. To evaluate the correlation between pelvic type and mal position of the occiput both Odd ratio as well as Risk Ratio were calculated by logistic and Poisson regression module. Since the women with android pelvis show evidence of shorter and have lower shoe sizes than controls the correlation between maternal height and shoe size was estimated by linear regression. While the relation between labor duration and maternal height and shoe size were assessed by ANOVA test. The criteria of women with android pelvis and occiput posterior were evaluated by the multivariate cluster analysis. P values less than 0.05 were considered as significant.

RESULTS:

As far the demographic criteria and incidence of complications with gynecoid and android pelvis table 1 summarizes the overall results obtained in this study. Needless to say that secondary arrest of dilatation, deep transverse arrest, duration of labor and cesarean delivery were all higher in android pelvis. The points of maximum interest are the lower height and shoe size among women with android pelvis versus control with gynecoid pelvis; 159 cm versus 149 cm and 40.6 cm versus 37.4 cm, respectively.

Table 1: The demographic criteria between gynecoid versus android pelvis groups are shown.

Characteristics	Gynecod group (N=45)	Android group (N=45)	P Value
Age (years)	23.6889±1.3622	24.2667±1.3382	P = 0.907
Gestational age (weeks)	38.4667±1.1402	38.6222±1.0721	P = 0.5067
Height (cm centimeters)	159.6889±3.0735	149.3778±3.4986	P < 0.0001
Shoe size (cm)	40.6889±1.1042	37.4222+1.0111	P < 0.0001
Occiput posterior	11	26	P = 0.0027
Secondary arrest of dilatation	5	17	P = 0.0070
Deep transverse arrest	3	13	P = 0.0131
Cesarean delivery	3	11	P = 0.0418
Duration of labor (hours)	7.02±1.35	11.00±1.25	P < 0.0001

In addition the Odd ratio and Risk ratio for secondary arrest of dilatation, deep transverse arrest and delivery by cesarean section for failure of rotation were significantly higher in the android women versus gynecoid as shown in table 2 and 3.

Table 2: The ODD ratio and 95% confidence interval are given among women with android versus gynecoid with regard to occiput posterior malposition and its related intrapartum complications.

Complication In Android pelvis	ODD Ratio	95% Confidence interval	P Value
Gynecoid Pelvis- reference group			
Occiput posterior	4.2297	1.7176 to 10.4158	P=0.0017
Secondary arrest of dilitation	4.8571	1.6040 to 14.7080	P = 0.0026
Deep transverse arrest	5.6875	1.4937 to 21.6557	P = 0.0044
Cesarean delivery	4.5294	1.1691 to 17.5478	P= 0.0288

Table 3:The risk ratio and 95% confidence interval are given among women with android versus gynecoid with regard to occiput posterior malposition and its related intrapartum complications .

Complication In Android pelvis	Risk Ratio	95% Confidence interval	P Value
Gynecoid Pelvis- reference group			
Occiput posterior	2.363636	1.167937 to 4.783458	P = 0.0168
Secondary arrest of dilitation	3.4	1.25439 to 9.215633	P = 0.0162
Deep transverse arrest	4.33333	1.234857 to 15.206418	P = 0.0221
Cesarean delivery	3.666664	1.022941 to 13.142914	P = 0.0461

The significant association between maternal complications related to occiput posterior mal position of the fetal head as shown in table 2 and 3 coupled with significant difference in maternal height and shoe size suggest some correlation between the two groups. In order to shed some light about this relation a linear regression module was constructed for the whole 90 women participated in this study as shown in figure 1.

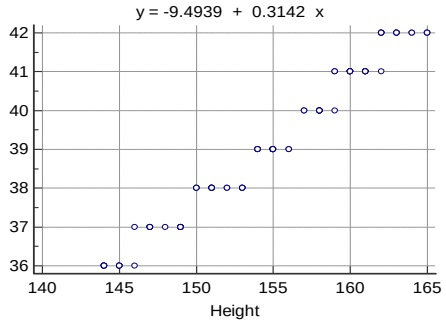
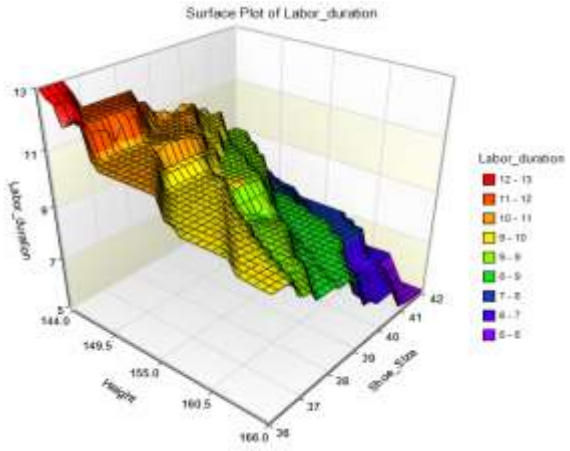


Figure 1; a linear regression between maternal height and fetal shoe size for the 90 women participated in this study, Coefficient of determination $R^{2=}$ 0.9751, F Ratio= 3449.3807, P < 0.0001

As shown in figure 1 a highly significant correlation between height and shoe size, the F ratio is 3449 and P value < 0.0001 while the R squared is 0.97 meaning the model has explained 97 % of the overall data included in the regression linear model. Digging further in this correlation figure 2 has been constructed showing the correlation between duration of first and second stage of labor versus shoe size and maternal height.



Labor duration (hours) =67.01 - 0.31 * Height - 0.22 * Shoe Size

Figure 2; a mesh surface plot has been constructed linking duration of first and second stage of labor to maternal height and maternal shoe size; F Ratio=2344.688**, P < 0.0001**.

Obviously from the mesh plot that an area for maternal height extending between roughly 149 cm to 165 cm and shoe size between 37 cm to 41 cm are associated with longer duration of first and second stage of labor required for fetal head rotation to the anterior position among all women in this study. From this mesh surface the following equation which may calculate roughly the duration of labor was constructed;

The F ratio is 2344.688 and P value less than 0.0001 indicating high degree of association between the predictors; shoe size and maternal height with duration of labor among women with occiput posterior mal position irrespective of the type of pelvis.

Table 4: Showing the results of cluster analysis for women with android pelvis versus those with gynecoid pelvis with regard to the possible complications of occiput posterior mal position.

Variable	Gynecoid Pelvis	Android Pelvis
Shoe Size	40.5833 cm	37.3095 cm
Height	159.3958 cm	148.9762 cm
Occiput Posterior	29.17%	54.76%
Deep Transverse arrest	12.50%	23.81%
Secondary arrest dilatation	16.67%	33.33%
Cesarean	12.50%	19.05%

Finally in order to give the thesis some clinical approach a cluster analysis was constructed for both the women in the android versus gynecoid pelvis. Cluster analysis is a highly accurate, conservative and predictive multivariate analysis which can unveil explanation to the most vexed and shadowed area in any science. Apparently from the first line that shoe size in women irrespective of their pelvis type between 37 and 40 cm is the range associated with maximum complications with regard to occiput posterior mal position. Coupled with this fact maternal height between 148 cm to 159 cm. it should be stressed that only shoe size is the denominator of problems rather than maternal height. And from the rest of table apparently shows that occiput posterior is more associated with complications in the android group than gynecoid one. Women who have show size bellow 37 cm are more likely cases of absolute cephalopelvic disproportion and may never reach labor ward as most of them are given appointment for elective cesarean. While women with shoe size more than 40 cm are most likely to have normal labor with easy engagement even those with occiput posterior they have easy rotation after artificial rupture of the membrane and augmentation with oxytocin infusion..

DISCUSSION:

Fairly saying this paper didn't bring anything new about the subject of occiput posterior and its complications. Simply the subject of occiput posterior is a standard chapter in any textbook of obstetrics irrespective of its level. The association between occiput posterior and secondary arrest of dilatation has been stressed by lot of researchers. Ponkey et al [6] have stressed that abnormalities of the first stage of labor including primary dysfunctional labor is strongly associated with occiput posterior. The importance of abnormalities in the first stage of labor and subsequent exposure of the fetus to asphyxia is well established fact and has been thoroughly discussed by Cheng et al [7]. Wu JM et al [8] have excellent review about this subject especially when vacuum extraction of the fetus in deep transverse arrest is more difficult than those done for other reasons. Wu JM [8] has pointed to the possibility of sphincter injury during vacuum extraction in difficult cases. Fortunately no record of such complication was recorded in this paper though fetal complications were not included in the study protocol. Deep transverse arrest is the most sinister complication of occiput posterior as failure of rotation by either augmentation of uterine contractions or assisted vaginal delivery by Kielland forceps or ventouse extraction makes the cesarean a difficult and challenging operation. Cesarean section for deep transverse arrest has a high degree of complications whether intra operative or post operative period. Nielsen et al [9] have excellent review about the possible complications of cesarean associated with deep transverse arrest. These complications include extension to the uterine arteries, bladder base injury and ligation of the ureter. In fact such complications have pushed many obstetricians to avoid cesarean for deep transverse arrest of the fetal head like Schaeffer et al [10] by trying manual rotation of the fetal head under general anesthesia just before cesarean is done as a last resort to avoid the dreaded intra operative complications associated with deep transverse arrest. As far as the main subject of this study the shoe size as well as maternal height there exist only 3 studies about this subject. Awonuga et all [11] have used tomography to evaluate the exact relation between maternal shoe size and the size of true maternal pelvic cavity. While Mahood et al [12] since 1988 have stressed the importance of shoe size and true maternal cavity with regard to labor outcome since 1988 long enough before the introduction of tomography, in addition to reference number 5, Iloki et al [5] . The problem is that all such studies

stress on the subject of cephalopelvic disproportion rather than occiput posterior. Yet in the subject of occiput posterior the maternal mid cavity volume plays a major and key role in successful rotation of fetal head to the anterior position otherwise there will be increased maternal morbidity due to instrumental or caesearean section delivery[13] . The other subject which makes a greater concern to us is the variation in anthropometric variation among different people in the world and even in the same country. This subject restricts greatly the result of this study to only women attending AL-Yarmook Teaching Hospital to avoid wrong conclusion mediated by different anthropometric characteristics among women living in Iraq.

CONCLUSION:

This study has found a significant correlation between the outcome of occiput posterior and maternal shoe size as well as maternal height. correlation could be concluded between maternal shoe size and possibility of cesarean section for deep transverse arrest among women with android pelvis as well as maternal height.

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