



Factors Affecting Feto-Maternal Outcome of Operative Vaginal Delivery among Mothers Who Gave Birth at Jimma University Medical Center

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Abstract:

Background: Operative vaginal deliveries are vaginal deliveries accomplished with the use of avacuum device or forceps. If it is technically feasible and can be safely accomplished, termination of second-stage labor by operative vaginal delivery is indicated in any condition threatening the mother or fetus that is likely to be relieved by delivery. Hence, the objective of this study is to identify factors associated with the outcome of operative vaginal delivery among mothers who gave birth in Jimma University medical center.

Method: A facility-based cross sectional study design was conducted in maternity ward on 242 mothers who gave birth by operative vaginal delivery from December- 01/2016 –May-30 /2017. The data collected using a check list, recordings of intrapartum fetal and maternal state, immediate fetomaternal outcomes. The study participants were recruited using consecutive sampling method. The data was collected at exit using structured interviewer-administered questionnaire which was developed by reviewing different literature and the remaining information abstracted from patient charts. Data entered to Epidata 3.1 and exported to SPSS version 21 for analysis. Bivariate analysis was done to identify candidate variables using $p < 0.25$. Multivariate Logistic regression was used to control the effect of confounding variables and to identify factors affecting the fetomaternal outcome. Statistical significance declared at $P < 0.05$ using adjusted OR with 95% CI.

Result: Out of the 2348 pregnant mothers who gave birth in the labor ward of JUMC during the 6 months of the study period 242 (10.3%) were by operative vaginal delivery (OVD). The commonest indication for operative vaginal delivery is found to be non-reassuring fetal heart rate pattern 136(56.2%). Out of all neonates delivered by operative vaginal delivery 210 (86.8%) had favorable outcome. Of all mothers who gave birth by operative vaginal delivery 232(95.9%) had favorable outcome. Type of instrument used for operative vaginal delivery (AOR=0.228, 95%CI: 0.078, 0.671) and presence of grade two (AOR=0.163, 95%CI: 0.031, 0.858) and three meconium stained amniotic fluid (AOR=0.088, 95%CI: 0.024, 0.327).are factors affecting neonatal outcome while neonatal birth weight (AOR=0.007, 95%CI: 0.000, 0.151) is factor affecting maternal outcome of operative vaginal delivery.

Conclusion: Prevalence of operative vaginal delivery is found to be 10.3% with the commonest indication of non reassuring fetal heart rate pattern. Nearly all of mothers and neonates had favorable outcome.

Keywords: Associated Factors; Feto-Maternal Outcome; Operative Vaginal Delivery; Jimma University Medical Center

1. Background

Operative vaginal deliveries are vaginal deliveries accomplished with the use of a vacuum device or forceps. If it is technically feasible, can be safely accomplished. Termination of second-stage of labor by operative vaginal delivery is indicated in any condition threatening the mother or fetus. According to the birth certificate data from the National Vital statistics Report, forceps or vacuum assisted vaginal delivery was used for 3.6 percent of births in the United States in 2010 and it account for around 11% and 17.3% of births in Australia and Tikur Anbessa Specialized hospital respectively [1,4]. When prerequisites have been met, the appropriate indications for consideration of either forceps delivery or vacuum extraction are prolonged second stage, non-reassuring fetal heart rate tracing or Shortening of the second stage of labor for maternal benefit. Both forceps and vacuum have the potential to cause fetal and neonatal injury; however, the incidence of maternal injury is less with the vacuum than with forceps. In order to minimize both maternal and fetal risks, the operator must be familiar with the indications, contraindications, application, and use of the particular instrument. It is recommended that OVD should be performed from either a low or outlet station [2]. Studies revealed that prevalence of OVD ranged from 3-11% in different settings [3,4]. Vacuum extractor is less likely to achieve a successful vaginal delivery and to cause serious maternal injury than applying the forceps. Although the vacuum is associated with a greater incidence of cephalo-hematoma, other facial/cranial injuries are more common with forceps [5].

Although operative vaginal delivery may be performed, as infrequently as in 1.5% of deliveries in some countries, it may be as high as 15% in other

countries. In the United Kingdom, the rates of instrumental vaginal delivery range between 10% and 15%; these rates have remained fairly constant, although there has been a change in preference of instrument [3]. But currently studies show that there is a decreasing trend of instrumental deliveries and is a major concern in health care system all over the world. Assessing the trends of instrumental deliveries and its major indications would be useful in adopting suitable measures to reduce the caesarean section rate and the problems associated with it. A five year retrospective study conducted on trends of instrumental deliveries at a tertiary teaching hospital in Pondicherry, India showed among a total of 5445 deliveries occurred during study period, 7.7% were instrumental vaginal deliveries. The year-wise rate of instrumental deliveries ranges from 6.1% to 9.8%. During the study period (except during year 2011), a declining trend for instrumental deliveries was observed [6].

According to different literatures the most common indication for OVD is shortening second stage for maternal disease condition and the commonest unfavorable outcomes of OVD varies. Study done in Shankar Nagar and Raipur, India reported that the most common indication was to cut short second stage of labor (52.5%) (Pre-eclampsia, heart disease) followed by prolonged second stage of labor (22.5%), fetal distress and maternal exhaustion. The risk of neonatal morbidity was similar between infants delivered by vacuum or forceps [7].The commonest maternal complication was postpartum hemorrhage and genital tract laceration [8]. Evidence evaluating neonatal morbidity after instrumental vaginal delivery is inconsistent. A systematic review of 10 trials comparing vacuum extraction with forceps delivery found no significant differences in APGAR scores at one and five minutes and few serious injuries in neonates, although the vacuum extractor was associated with an increase in cephalhematoma and retinal hemorrhage [9]. In

JUMC, no study conducted on feto-maternal outcome and associated factors of operative vaginal delivery.

2. Methods and Participants

2.1. Study Area and Period

The study conducted in Jimma University Medical Center (JUMC) which is located 352kms Southwest of Addis Ababa. JUMC is found in Jimma zone of Oromia regional state. It is one of the oldest teaching hospitals in the country giving services to people living in Jimma zone and serving as a referral hospital in the South-West Ethiopia. It is also serving as clinical undergraduate studies like medical students, Health officer, Dentistry, Anesthesia, Nursing, Lab-technologist, Midwifery and others and post graduate specialty teaching hospital for Obstetrics and Gynecology, Internal Medicine, Pediatrics & Child Health since 2005 and for Ophthalmology, and in Surgery since 2007 and Radiology and pathology since 2011/2012. Department of Obstetrics and Gynecology has two inpatient (Gynecology and obstetrics), one MCH clinic, one Gynecologic OPD, one family planning clinic and referral clinics (Gynecology Oncology, Benign Gynecologic Diseases, and High risk Pregnancy). It has eight Obstetricians & Gynecologists and 32 residents from year I – III. The labor ward has 7 beds in first stage, 4 delivery couches and maternity ward has 50beds, two emergency operation room-tables and one recovery-room with two beds and two resuscitation tables for newborns. There were a total of 2,654 deliveries recorded over eight months from November 1, 2015-June 30, 2016 of which 266 were by OVD.

2.2. Study Design and Population

A facility based cross-sectional study designs was employed. All mothers who gave birth at JUMC during the study period were the source population. All mothers who gave birth by operative vaginal delivery were included. All mothers for whom OVD indicated and fulfilled prerequisites (Fetal head is engaged, Vertex presentation, Cervix is fully dilated (8cm for ventouse), Membranes ruptured, Exact position of head known, Fetal size estimated (weight and GA), Informed consent, Maternal bladder is empty, Adequate maternal pelvis and back-up plan in place in case of failure to deliver) were eligible. Mothers for whom OVD indicated but with IUFD and Fetus with congenital anomaly were not eligible.

2.3. Sample size determination

The sample size was determined using a single population proportion formula $n = z^2 p (1-p) / d^2$ where p is the estimate of the proportion of operative vaginal delivery on which all components of the sample size required for this study was estimated to be 220 OVDs and 10% of 220 for expected non response rate is added, $220 + 22 = 242$. The OVD prevalence assumed to be 17.3% as obtained from a retrospective one-year study done on emergency obstetric performance with emphasis on operative delivery outcome in 2004 in Tikur Anbessa specialized hospital. All mothers who gave birth by OVD during study period were included using consecutive sampling technique till the required sample size completed. Study variables were fetal parameters (FHR, GA, neonatal birth weight), obstetric related variables (cervical dilatation, uterine contraction/maternal effort, descent/station, need for rotation, indication for OVD, type of instrument used for OVD, timing of application of OVD (on arrival/ followed), status of liquor), maternal parameters (age, parity, residency, ANC follow up), feto-maternal outcomes (Serious maternal morbidity or death, Postpartum hemorrhage, Blood transfusions, Episiotomy extension, Third and fourth degree tears, Cervical laceration, Need for major surgery(hysterectomy, Urinary retention and bladder dysfunction, Low Apgar score, Admission to NICU, Need for resuscitation at delivery, Neonatal sepsis at neonatology, Birth trauma (Fractured bone, cephalhematoma) and Condition at discharge (normal, improved, died).

2.4. Data Collection Tools and Procedures

The tool was developed by reviewing different literatures like card catalogues of books in libraries, computer-based literature searches such as science direct message center and statistics collected at national level. The questioner was administered by an interviewer from patient charts and exit interview. The checklists were also formally prepared in English and translated in to local languages (Afan Oromo and Amharic). The Obstetrics and Gynecology residents and three midwives' were oriented to collect the required data. The checklist grouped into 4 sections was used for extracting information from the patient chart. The first part recorded information about patient's age, gravidity, parity and estimated gestation age. Second part recorded the parameters of labor which were fetal heart rate, liquor state, cervical dilatation, descent of head, uterine contraction and maternal BP. The third part recorded the fetal outcomes which were assessed in terms of live birth (Apgar score at first and fifth minutes), need of resuscitation, admission to neonatal ward for

special care and the reasons of admission. The fourth part included information of the mode of delivery (OVD) and immediate maternal outcomes. Immediate maternal outcome were recorded as favorable and unfavorable if the woman got PPH, perineal tear (third degree and above), need of blood transfusion, urinary bladder injury, hysterectomy or bowel injury.

2.5. Operational Definitions

- **Operative vaginal deliveries (OVD):** Are vaginal deliveries accomplished with the use of a vacuum device or forceps.
- **Asphyxia:** A conditions in which viable newborn fails to attain or initiate respirations after delivery.
- **APGAR-score:** A method of assessing fetal conditions at time of delivery.
- **Low APGAR score:** APGAR score of less than seven
- **Birth trauma:** any trauma to the newborn as a result of labor and delivery like Cephal-hematoma, sub-aleal hemorrhage, retinal hemorrhage, shoulder Dystocia, clavicular fracture, and scalp lacerations.
- **Favorable outcome:** Mother and Neonate with no complications.
- **Unfavorable outcome:** Mother and Neonate developed complications (maternal Complication slike PPH, genital tear, need of blood transfusion, need of major surgery, death, and neonatal complications like low APGAR score, need of resuscitation, admission to NICU, neonatal death.
- **Episiotomy extension:** Is an incision that is deeper or longer than is necessary to permit the birth of newborn.

2.6. Data Processing and Analysis

The collected data cleaned, entered in to Epi-data 3.1 and exported to SPSS for windows version 21 for data analysis. Descriptive statistics used to describe the main features of the data. Bivariate analysis was done to identify candidate variable using $p < 0.25$. Multivariate Logistic regression was used to control the effect of confounding variables. Variables having $P < 0.25$ from bivariate analysis were included in multivariable logistic regression analysis. Finally, statistical significance declared at $P < 0.05$ using Adjusted OR with 95% CI.

3. Results

3.1. Sociodemographic Characteristics

Response rate for this study is 100%. Out of 2348 laboring mothers who gave birth in the labor ward of JUMC during the 6 months of the study period 242(10.3%) were by operative vaginal delivery (OVD). Out of all 38% of them were in the age group of 20-24 years, the mean age was 24.7years \pm 5years SD and most 144(59.5% of them were come from outside Jimma town. Almost all 237 (97.9%) of mothers who gave birth by OVD were married and majority of them were Muslim by religion, Oromo by ethnicity and housewives accounting for 161(66.5%), 201(83.1%) and 101(41.7%) respectively. Those mothers who can't read and write, and with educational level of grade 1-8 each account for one third of cases and 128(52.9%) of mothers monthly income is 500-1742ETB. (See **Table 1**).

Variable	Variable category	Frequency	Percent
Age	15-19	27	11.2
	20-24	92	38
	25-29	79	32.6
	30-34	31	12.8
	35-39	13	5.4
Place of residency	Jimma Town	98	40.5
	Outside Jimma town	144	59.5
Ethnicity	Oromo	201	83.1
	Amhara	13	5.4
	Tgrie	3	1.2

	Gurage	7	2.9
	Dawuro	12	5
	Other	6	2.5
Religion	Muslim	161	66.5
	Orthodox	55	22.7
	Protestant	24	9.9
	Other	2	0.8
Occupation	Housewife	101	41.7
	civil servant	39	16.1
	Farmer	82	33.9
	Merchant	11	4.5
	Other	9	3.7
Educational status	Illiterate	77	31.8
	read and write only	4	1.7
	grade 1-8	81	33.5
	grade 9-10	25	10.3
	grade 11-12	31	12.8
	>12	24	9.9
Income of the family per month	500 ETB and below	10	4.1
	501-1742 ETB	128	52.9
	above 1742	104	43
Marital status	Married	237	97.9
	Single	3	1.2
	Divorced	1	0.4
	Widowed	1	0.4

Table1: Frequency distribution of sociodemographic characteristics of mothers who gave birth by OVD in JUMC December1, 2016 -May30, 2017.

3.2. Obstetric related variables

According to this study 168(69.4%) of mothers were primiparas and 233(96.3%) of mothers who gave birth by OVD had at least one ANC visit and 118(48.8%) had four or more ANC visits. The commonest 136(56.2%) indication for OVD is found to be NRFHRP (124(91.2%) were for bradycardia and 12(8.8%) were for fetal tachycardia) followed by prolonged SSOL 58(24.0%) and for shortening of SSOL 48(19.8%), (45(93.8%) were shortened for PE–eclampsia syndrome and 3(6.2%) were cardiac disease). Of the types of OVDs forceps is more commonly used 192(79.3%) and vacuum deliveries

were 50(20.7%) with ratio of 4:1. Most 132(54.5%) of the applied classification of OVD is low forceps/low vacuum and 110(45.5%) were outlet forceps/outlet vacuum, with 173(71.5%) of OVDs applied for those mothers who were being followed at labor ward of JUMC. 70(28.9%) of the laboring mothers had different grades of MSAF. The GA at delivery was between 37 and 42 weeks in 213 (88.0%) of the laboring mothers, 15 mothers (6.2%) had post term pregnancy and 14(5.8%) were preterm deliveries. Majority 221(91.3%) of the newborns weigh 2500-3999 grams. (See table 2)

Obstetric variable	Variable category	Frequency	Percent
Parity	I	168	69.4
	II-IV	53	21.9
	≥V	21	8.7
GA	pre-term	14	5.8
	Term	213	88
	post term	15	6.2
ANC follow up	yes	233	96.3
	no	9	3.7
Number of ANC follow p	one visit	4	1.7
	two to three visit	111	45.9
	four and above visit	118	48.8
	No visit	9	3.7
Indication for OVD	NRFHRP	136	56.2
	shortening SSOL	48	19.8
	prolonged SSOL	58	24
Type of OVD used	vacuum	50	20.7
	forceps	192	79.3
Type of OVD applied	low	132	54.5
	outlet	110	45.5
Time of application	on arrival	69	28.5
	followed	173	71.5
	clear	172	71.1
Status of liquor	G1MSAF	19	7.9
	G2MSAF	17	7
	G3MSAF	34	14
Weight of the newbornin grams	1500-2499	14	5.8
	2500-3999	221	91.3
	≥/4000	7	2.9

Table 2: Frequency distribution of obstetric related variables among mothers who gave birth by OVD in JUMC December1, 2016 -May30, 2017.

3.3. Factors Affecting Neonatal Outcome

Place of residence, occupation, income, parity, indication for OVD, type of instrument used for OVD, station at which OVD is applied, time of application and status of liquor were variables identified as a candidate variable from bivariate logistic regression analysis and then fitted into the final multivariate logistic regression model using enter method to identify independent factors affecting the fetal outcome. This study shows that there is significant association between type of instrument used for OVD and neonatal outcome, 80% of mothers who gave birth by vacuum are less likely to have favorable neonatal outcome than those with forceps deliveries (AOR=0.228, 95%CI: 0.078, 0.671). Meconium stained amniotic fluid had shown association with neonatal outcome, 84% of mothers with

G2MSAF (AOR=0.163, 95%CI: 0.031, 0.858) and 90% of mothers with grade 3 MSAF (AOR=0.088, 95%CI: 0.024, 0.327) are less likely to have favorable neonatal outcome than those with clear amniotic fluid. (See Table 3)

Variables with category		Neonatal outcome		Crude OR (95%I)	AOR(95%CI)	P value
		Fav	Unfav			
Place of the residency	Jimma Town	90	8	2.250(.966,5.241)	.653(.176,2.429)	0.525
	Outside Jimma town	120	24	1	1	
Occupation	Housewife	95	6	1	1	
	civil servant	33	6	.347(.105, 1.152)	0.282(.062,1.278)	0.101
	Farmer	64	18	.225(.085, .596)	0.299(.061,1.462)	0.136
	Merchant	9	2	.284(.050, 1.620)	0.221(.029,1.692)	0.146
	Other	9	0	1.020(.000,2.310)	1.110(.000,3.23)	0.999
Income of the family per month	500 ETB and below	9	1	1.000(.118, 8.487)	4.650(.248,87.109)	0.304
	501-1742 ETB	103	25	1	1	
	above 1742	98	6	.490(229, 1.051)	1.551(.325, 7.397)	0.582
Parity	I	146	22	1	1	
	II-IV	51	2	3.842(.873,16.917)	2.719(.525,14.070)	0.233
	≥V	13	8	.245(.091, .658)	0.294(.072, 1.197)	0.088
Indication for OVD	NRFHRP	115	21	1	1	
	shortening SSOL	44	4	2.009(.653, 6.183)	0.698(.155, 3.146)	0.64
	prolonged SSOL	51	7	1.330(.532, 3.328)	0.906(.198, 4.143)	0.899
Type of OVD used*	Vacuum	34	16	.193(.088, .423)	0.228(0.078, 0.671)	0.007
	Forceps	176	16	1	1	
Type of OVD applied	Low	110	22	1	1	
	Outlet	100	10	2.000(.903, 4.429)	1.604(.577, 4.458)	0.365
Time of application	on arrival	52	17	.290(.136, .622)	0.436(.118, 1.615)	0.214
	Followed	158	15	1	1	
Status of liquor*	Clear	163	9	1	1	
	G1MSAF	17	2	.469(.094, 2.352)	0.574(.081, 4.088)	0.579
	G2MSAF	13	4	.179(.049, .663)	0.163(.031, .858)	0.032
	G3MSAF	17	17	.055(.021, .143)	0.088(.024, .327)	0

***Shows significant predictor variable with p<0.05**

Table 3: Factors affecting neonatal outcome using multivariate logistic regression among mothers who gave birth by OVD in JUMC December1, 2016 -May30, 2017.

3.4. Factors affecting maternal outcome

Income, indication for OVD, station at OVD application and weight of newborn at delivery were variables identified as candidate variable from bivariate logistic regression analysis and then fitted into the final multivariate logistic regression model using enter method to identify independent factors affecting the maternal outcome. Neonatal birth weight had shown strong association with maternal outcome, almost all mothers with neonatal birth weight >4000grams (99.6%) are less likely to have favorable maternal outcome than those with neonatal birth weight of 2500-3999grams (AOR=0.007, 95%CI: 0.000, 0.151) respectively. (See Table 4)

Variables with category		Maternal outcome		Crude OR(95%CI)	AOR(95%CI)	P value
		Fav	Unfav			
Income of the family per month	500 ETB and below	8	2	0.058(0.007,0.467)	0.004(.000, 0.133)	0.057
	501-1742 ETB	122	6	1	1	
	above 1742ETB	102	2	0.208(0.041,1.053)	0.060(0.004, 0.961)	0.073
Indication for OVD	NRFHRP	132	4	1	1	
	shortening SSOL	43	5	0.261(0.067, 1.014)	0.166(0.026,1.067)	0.058
	prolonged SSOL	57	1	1.727(0.189,15.796)	1.632(.146,18.298)	0.691
Type of OVD applied	Low	123	9	1	1	
	Outlet	109	1	7.976(0.994, 63.969)	8.262(0.670,101.942)	0.1
weight of the newborn in	1500-2499	12	2	0.167(0.031, 0.919)	0.355(0.050, 2.546)	0.303
	2500-3999	213	8	1	1	
* Shows significant predictor variable with p<0.05, Fav-Favorable, Unfav-unfavorable						

Table 4: Factors affecting maternal outcome using multivariate logistic regression among mothers who gave birth by OVD in JUMC December1, 2016 -May30, 2017.

4. Discussion

Prevalence of OVD application is 10.3% in JUMC and the finding is consistent with other studies. Although operative vaginal delivery may be performed, as infrequently as in 1.5% of deliveries in some countries, it may be as high as 15% in other countries. For example, in the United Kingdom, the rates of instrumental vaginal delivery range between 10% and 15%; these rates have remained fairly constant. Of the total 242 OVDs, forceps and vacuum deliveries account for 8.2% and 2.1% of all the deliveries during the study period respectively with ratio of 4:1, but according to study conducted at Tikur Anbessa Hospital the ratio is 2:1 and it is not in line with the currently increasing proportion of vacuum deliveries which is 1:4. The higher difference in the proportion of forceps to vacuum

deliveries from other studies can be due to the commonest indication being NRFHRP which needs faster delivery and the inconsistent supply of functioning vacuum extraction devices in our study [1, 2, 4, and 9].

Fetal distress (NRFHRP) was the commonest indication (56.2%) for OVD among the 242 cases followed by prolonged SSOL (24.0%) and those used to cut short SSOL (19.4%) and the finding is consistent with other studies. For example, a five year retrospective study done on Trends of instrumental deliveries at a tertiary care teaching hospital in Puducherry, India shows among the study participants the indications were non-reassuring fetal heart (45.3%), prolonged second stage of labor (33.9%), maternal indication to shorten second stage of labor (13.1%). The study done at the Tikur

Anbessa Hospital also shows that the most common indication for OVD is fetal distress (45.3%) [4, 6].

According to our study the overall rate of complication is 17.3% (maternal=4.1% and neonatal=13.2%). The commonest maternal complication was postpartum hemorrhage (3.3%) and this can be explained by genital tract laceration which account for 62.5% of the PPH and prolonged labor also contributes PPH secondary to uterine atony. But the finding of rate of PPH among operative vaginal deliveries is much lower than study done at Aminu Kano Teaching Hospital, Kano Nigeria which is 9.5% and this may be due to lack of practice in documenting estimated blood loss and determining postoperative hematocrit after at least suspected PPH cases [4, 8]. Vacuum deliveries are associated with significant fetal morbidity and among vacuum deliveries fetal morbidity is 32% and 20% were complicated with subgaleal hemorrhage. The rates of severe birth asphyxia and ENND were 4.9% and 3.7% respectively. This compares to the findings of various studies for example according to study carried out at the Aminu Kano Teaching Hospital, Kano Nigeria the rate of asphyxia and ENND is 4.8% and 3.8% respectively. But, this may not be truly attributable to the procedure as the asphyxia may be the outcome of the events of labor that indicated the intervention than from the operative vaginal procedure itself [8, 10-12].

Among the 242 OVDs, neonates with low APGAR scores (4-6) at first and fifth minutes were 95(39.3%) and 16(6.6%) respectively, and those with very low APGAR score (0-3) at first and fifth minutes were 10(4.1%) and 2(0.8%) respectively. Compared to other studies the rate of low APGAR score(<7) is higher and this can be explained by the fact that fetal distress was the commonest indication for OVD according to our study and also the commonest cause of low Apgar scores at the 1st and fifth minute among indications of operative vaginal deliveries [4,13-15]. Our study and most other studies showed that there is significant association between type of instrument used for OVD and neonatal outcome, 80% of mothers who gave birth by vacuum are less likely to have favorable neonatal outcome than those with forceps deliveries. According to one of the study, cephalhematoma, in particular, is more common after vacuum-assisted extraction than forceps delivery (approximately 15 versus 2 percent). The risks of fetal injury are generally instrument specific, with vacuum deliveries accounting for statistically significantly higher rates of cephalhematoma, and subgaleal and retinal hemorrhages, and forceps

deliveries accounting for a no significantly higher rate of scalp/facial injuries [9,16-19].

Meconium stained amniotic fluid had shown association with neonatal outcome, 90% of mothers with grade 3 MSAF are less likely to have favorable neonatal outcome than those with clear amniotic fluid. As different studies show the association can be explained by passage of meconium secondary to already existing intrauterine fetal compromise or asphyxia [9, 20-22]. Neonatal birth weight had shown strong association with maternal outcome, 99.6% of those mothers who gave birth to neonate with birth weight >4000grams are less likely to have favorable maternal outcome when compared to those with normal birth weight. This finding as it is proven on different literatures, macrosomia attributes for PPH secondary to both uterine atony and perineal lacerations [9, 23, 24].

5. Conclusion

In conclusion, the prevalence of OVD among the 2348 laboring mothers who gave birth at JUMC during the study period is 10.3%. The commonest indication for OVD is NRFHRP (56.2%) followed by prolonged SSOL (24.0%) and shortening SSOL (19.8%). Among mothers who gave birth by OVD, 86.8% had favorable neonatal outcome. Near to all (95.9%) of mothers who gave birth by OVD had favorable maternal outcome. Type of instrument used for OVD and presence of MSAF are factors affecting neonatal outcome. Neonatal birth weight is significant factor affecting maternal outcome.

6. Recommendations

Nearby health facilities should be equipped with and use instruments needed for OVD as majority (59.5%) of mothers were referred from other facilities, application of OVD doesn't need referral to tertiary Hospital. Although the ANC coverage among mothers with OVD is higher (96.3% had at least one ANC visit and 48.8% had four and above ANC visit) than the national and Oromia figure, mothers should be encouraged to have the recommended number of ANC follow up and further study is needed to know and address the reason why mothers are not having the ANC visit as per the recommendation. The ratio of forceps to vacuum delivery according to this study is 4:1 but currently vacuum has worldwide acceptance because of technical simplicity to apply and relatively less maternal trauma, so using vacuum for OVD should be encouraged. Documenting estimated blood loss and determining postoperative hematocrit after at least suspected PPH cases should

be practiced by health professionals attending OVDs, as none of patients chart contains adequate data about the circumstance of delivery and that can be evidenced by relatively lower rate of PPH. The PPH cases were higher among mothers who gave birth to

neonates with birth weight >4000grams and the study had shown the association. Thus, there is need to anticipate postpartum hemorrhage in operative vaginal deliveries special in case macrosomia suspected.

7. Abbreviations

✓ ANC- Antenatal Care	✓ ObGy –Obstetrics and Gynecology
✓ ARM-Artificial Rupture of Membrane	✓ OL –Obstructed labor
✓ FHR - Fetal Heart Rate	✓ OVD- Operative Vaginal Delivery
✓ IUFD - Intrauterine fetal death	✓ PE- preeclampsia
✓ ENND-Early neonatal death	✓ PPH - postpartum hemorrhage
✓ EFW- Estimated fetal weight	✓ PNA-Perinatal asphyxia
✓ GA- Gestational Age	✓ ROM- Rupture of Membrane
✓	✓
✓ HCT-Hematocrit	✓ SSOL-second stage of labor
✓ HTN-Hypertension	✓ SVD- Spontaneous vaginal delivery
✓ JUMC- Jimma University Medical Center	✓ SGH-subgaleal hemorrhage
✓ MSAF- meconium stained amniotic fluid	✓ WHO -World health organization
✓ NICU- Neonatal intensive care unit	

8. Acknowledgment

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9. Ethics Approval and Consent to Participate

Ethical clearance and an approval letter obtained from Jimma University institute of health-institutional reviewing board, then support letter obtained from JUMC administrative office. Study participants were informed about the objective and details of the study including publication. Informed verbal consent obtained from each subject. Confidentiality was maintained by using anonymous codes and the patients’ chart number.

10. Consent to publish

All parties involved agreed to publish on international peer reviewed journal. During data collection, all participants informed and agreed on the major objective of the study as it was for academic purpose including publication.

11. Availability of Data and Materials

The dataset used for the purpose of an other study is available. The SPSS (software) which is completed with raw dataset can be also shared. Relevant data generated or analyzed for the purpose of this manuscript only are included.

12. Competing/Conflict of interest

All authors declare that they have no any financial and non-financial competing interests. None of the authors of this paper has a financial or personal relationship with other people or organizations that could inappropriately influence or bias the content of the paper. It is to specifically state that “No Competing interests are at stake and there is No Conflict of Interest” with other people or organizations that could inappropriately influence or bias the content of the paper.

13. Authors' contributions

YS had made substantial contributions to conception, design, analysis and interpretation of data specific to this manuscript. AW and ZH contributed for the collection of the original data and critically reviewed for important intellectual content. All authors read and approved the final manuscript.

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