Predisposing Factors of Obstetric Fistula & its Surgical Outcomes, among Al-Sabeen maternal Hospital attendances, Sana`a –Yemen,

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Abstract:

Background : Obstetric fistula, one of the most devastating consequences of prolonged obstructed labour, is a historical issue in the developed world. However, it is still prevalent in developing country like Yemen. Obstetric fistula is still a persisting scourge in the developing countries, including Yemen in which >5000 new cases of obstetric fistula were estimated yearly. It occurs in areas where access to care at childbirth is limited, or of poor quality and where few hospitals offer the necessary corrective surgery.

Objectives : To study the Predisposing Factors (social, demographic, cultural and maternal) of Obstetric Fistula & its Surgical Outcomes, among Al-Sabeen maternal Hospital attendances, Sana`a –Yemen.

Materials and methods: A hospital-based cross-sectional descriptive study was carried out for 86 medical files of obstetric fistula patients admitted to gynecological department in Al-Sabeen maternal hospital in Sana'a city during study during October 2011 to October 2015. Using available data technique and closed ended questionnaire were used to collect the study data from medical files available in the hospital. Study data were analyzed by SPSS software(version 21).

Results : Most of obstetric fistula patient were in age groupe15-35yrs (76.8%) early age of marriage(82%) illiterate (69.8%) and still married despite having fistula (83.7%) with no antenatal care attendance in the causative pregnancy (53.5%) and have history of previous once and more caesarian section (20.0%,16.3%) most of participants delivered vaginally(53.5%) with prolonged delivery > 2 days (81.4%) most of result with p-value <0.05 statistically significant. With (80.5%) obstructed prolonged labour is leading cause to obstetric fistula still the iatrogenic cause with high percent (5.9%).

Most of obstetric fistula (90.7%) with genito-urinary type,(25%) with rectovaginal type and (16.27%) have complex fistula With p-value0.00. Majority of obstetric fistula patient conducted trans-vaginal approach(65.1%) in one stage (75.3%) and most of them (79.1%) stay in hospital>3weeks with highly success surgical repair (97.7%) all result with p-value <0.05 which statistically significant.

Conclusion : The predisposing factors of obstetric fistula are illiteracy, early age of marriage, early age get pregnancy <25yrs, no or inadequate antenatal care, obstructed prolonged vaginal delivery, the iatrogenic cause during cesarean section and previous once or more caesarian section. Genito-urinary fistula is the most predominant Obstetric fistula type among study patients and the other types are Rectovaginal and complex fistula. The most significantly surgical approach are Trans vaginal, one stage of repair, the duration of post-operative stay was significantly more 3 weeks in most of them and finally there is a significantly success repair after surgery in the vast majority of study patients.

Recommendations: The study findings emphasize the obstetric fistula is important problem faced community and major problem leading to increase maternal morbidity, significance of both treatment and prevention activities against obstetric fistula which highly preventable health condition of women in Yemen. Also needed are interventions that focus on improving access to maternal health care, emergency obstetric care, and increased rates of cesarean delivery when indicated.

Keywords : Obstetric fistula, predisposing factors and Yemen.

العوامل المؤثرة في حصول النواسير النسائية ومخرجات معالجتها جراحياً عند المرضى الذين حضروا إلى مستشفى السبعين – صنعاء خلال الفترة من أكتوبر –2011 أكتوبر 2015م

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الملخص:

نواسير الولادة تعتبر احد مضاعفات الولادة المتعسرة، وتعتبر من الماضي في الدول المتقدمة، ولكنها لا تزال احد مشاكل الولادة في الدول النامية وبخاصة اليمن. حيث انه لا تزال هناك حالات تظهر سنوياً وتكثر في الأماكن التي تفتقر إلى خدمات الرعاية الصحية والولادة، أو لقلة خبرة العاملين القائمين على أماكن خدمة الولادة.

الهدف من الدراسة:

تهدف الدراسة إلى دراسة تأثير العوامل التي تؤدي إلى حصول النواسير النسائية أثناء الولادة(الاجتماعية، الجغرافية، الثقافية، الأمومة) ومخرجات معالجتها جراحياً عند المرضى المراجعين لمستشفى السبعين – صنعاء– اليمن.

منهجية الدراسة وأدواتها: دراسة وصفية لملفات 86 حالة نواسير ولادية تم ترقيدهم في قسم النساء بمستشفى السبعين – صنعاء، خلال الفترة من أكتوبر 2011م إلى أكتوبر 2015م من خلال المعلومات المتوفرة بملفاتهم. وقد قام الباحثون بتصميم استمارة استبيان لجمع هذه المعلومات الخاصة بالمرضى الذين خضعوا للعمليات الجراحية لتصليح النواسير. وقد تم تحليل النتائج باستخدام البرنامج الإحصائي SPSS.

النتائج:

معظم حالات نواسير الولادة في هذه الدراسة كانت لدى الفئة العمرية من (15 – 35) سنة وبنسبة (76.8٪)، وفي الزواج المبكر كانت النسبة 82٪، والحوامل الأميات بنسبة 69.8٪، وعدم المتابعة لدى المرضى الغير متابعين لمراكز رعاية الأمومة والطفولة بنسبة 53.5٪، ولدى الذين لديهم عملية قيصرية سابقة واحدة أو أكثر (20٪، 16.3 ٪) على التوالي. معظم المرضى الذين لديهم نواسير قد تم ولادتهن مهبلياً بنسبة (53.5٪) ومن هؤلاء الذين كان لديهم ولادة متعسرة لأكثر من يومين (81.4٪). معظم النتائج إحصائياً كانت ايجابية بنسبة (80.5٪) لتعسر الولادة وطول فترتها والتي تعتبر العامل المهم في حدوث النواسير، كذلك الأخطاء الطبية كانت نسبتها (5.9٪). معظم النواسير الولادية (90.7٪) كانت بين الجهاز البولي والمهبل، بينما (25٪) كانت بين المستقيم والمهبل، وبنسبة (65.1٪). ومن أول تدخل جراحي كانت نسبة نجاح إصلاحها (75.3٪)، ومعظم المرضى تم ترقيدهم في المستشفى لأكثر من 3 أسابيع وبنسبة (70.1٪) مع ارتفاع نجاح العملية إلى نسبة (97.7٪).

الاستنتاج:

العوامل التي تؤدي إلى حدوث النواسير الولادية كانت: الأمية، الزواج في السن المبكر، الحمل في الأعمار اقل من 25 سنة، الحالات التي ليس لديها متابعة للحمل، تعسر الولادة، الأخطاء الطبية الناتجة عن إجراء العمليات القصيرية، الحمل والولادة لدى المرضى الذين سبق وان تم توليدهن بعملية قيصرية أو أكثر. النواسير في الجهاز البولي المهبلي كانت الأكثر بين الحالات التي تم دراستها، كما إن النواسير الأخرى كانت بين المستقيم والمهبل المزدوجة. الطريقة الناجحة التي تم إصلاح النواسير بها كانت التدخل الجراحي عبر المهبل ومن مرة واحدة. فترة بقاء المرضى في المستشفى كانت أكثر من 3 أسابيع. وأخيرا نسبة نجاح التصليح الجراحي للنواسير كانت عالية في معظم الحالات التي دراستها.

المتطلبات:

من خلال الدراسة لوحظ إن النواسير الولادية تعتبر مشكلة رئيسية تواجه المجتمع اليمني، وهي من أهم المشاكل التي تؤدي إلى إطالة مرض الأمهات .العلاج الجراحي وتفادي حدوث النواسير يرفع من صحة إلام. كذلك تحتاج وسائل التدخل المتطورة في الولادة التي بدورها تمنع حدوث هذه النواسير ومنها رفع مستوى التثقيف الصحي للام الحامل، توفير الضروريات في أماكن الولادة المستعجلة، والتوجه نحو إجراء العمليات القيصرية لتجنب الولادة المتعسرة عند الضرورة.

الكلمات المفتاحية:

نواسير الولادة، العوامل المؤثرة، اليمن.

Introduction:

worldwide each year more than half a million healthy young women die from complications of pregnancy and childbirth. Virtually all such deaths occur in developing countries [1,2]. The World Health Organization (WHO) estimates that, globally, over 300 million women currently suffer from short- or long-term complications arising from pregnancy or childbirth, with around 20 million new cases arising every year[2,3]. every minute 20 women worldwide suffer from a devastating disability including obstetric fistula due to childbirth complications[4,5].

Obstetric fistula is a preventable and treatable childbearing injury, result of prolonged, obstructed labour. It leaves women incontinent, ashamed and often isolated from their communities. A debilitating condition that has left and continues to leave hundreds of thousands of women suffering in isolation and shame, obstetric fistula is perhaps one of the most telling examples of inequitable access to maternal health care and, until recently, one of the most hidden health problem is permanent unless corrected by surgery.

Throughout the world, but mainly in parts of sub-Saharan Africa and Asia, it is conservatively estimated that more than 2 million young women live with untreated obstetric fistula. It has also been estimated that between 50 000 and 100 000 new women are affected each year[6,7]. In 2010, it was estimated that each year, more than 350,000 women die from complications during pregnancy and child birth, with almost 99% of them from developing countries including Yemen[8]. The most common of theses complications that leads to maternal mortality are; obstructed labor, anemia and excessive bleeding during child birth. One of the most common consequences of obstructed labor and the most devastating of maternal morbidities is obstetric fistula.

Obstetric fistula has been eradicated in industrialized countries because of the availability of skilled birth attendants and well developed health facilities to provide emergency obstetric care[9]. However, the problem is still very visible even remained a 'hidden' condition in developing countries., because it affects some of the most marginalized members of the population; poor, young, often illiterate girls and women in remote regions of the world . Many women with the condition are suffering in silence. They are unaware of the available treatment options or unaware of where to get treatment. Yet, the condition is treatable and preventable.

In developing countries, obstructed labor is one of the top five causes of maternal mortality. Ninty-nine percent of all maternal deaths occur in developing countries. In developed countries, obstructed labor is not permitted to progress beyond a few hours, and is no longer a source of maternal mortality. On the other hand, maternal mortality remains unacceptably high in developing countries. In developing countries, obstructed labor, hemorrhage, infection, hypertension, and unsafe abortion remains the top five reasons of pregnancy related deaths[10,11].

Obstructed labor which leads to obstetric fistula, is triggered by factors such as early marriages, unwanted pregnancies, lack of antenatal care and weak health service delivery systems. There are many types of Obstetric fistulas; There is vesico-vaginal fistulas (VVF), which occurs between the bladder and the vagina, urethro vaginal fistulas, which occur between the urethra and the vagina, recto-vaginal fistula (RVF), which occurs between the rectum and the vagina, the double fistula, which occur between the vagina, bladder and rectum and lastly iatrogenic fistula, that occur inadvertently during medical procedures like a caesarean section[8].

Obstetric Fistula is a common problem in our socioeconomic setup, especially the type of vesico-vaginal fistula. Obstructed labor remains the most important cause of vesico-vaginal fistulae in developing countries including Yemen over 90[12]. poor antenatal care, neglected prolonged labor, usually conducted by an untrained birth attendants and reduced pelvic dimensions (caused by early childbearing) are the most common causes.

Obstetric fistula is an incapacity illness often associated with prenatal child mortality at 95% or more ,obstetric fistula is a strong indication of poor socioeconomic development, it is a serious public health problem associated with high maternal mortality –an indicator of low quality of obstetric care. The best estimates for Yemen suggest that some 5,300 women and girls die each year due to pregnancy-related complications[1]. Additionally, approximately another 106,000 women and girls will suffer from injuries or disabilities caused by complications during pregnancy and childbirth each year[13,14].

Materials and methods:

A hospital-based cross-sectional descriptive study was carried out for 86 medical files of obstetric fistula patients admitted to gynecological department in Al-Sabeen maternal hospital in Sana'a city during

October 2011 to October 2015.

The study population is the medical files of obstetric fistula patients admitted to gynecological department in Al-Sabeen maternal hospital in Sana'a city during study period. All patients in the Fistula entre with continuous urine or stool leakage after obstetrical procedure were included in the study sample, whereas patients with a fistula due to gynecological problem or procedure were excluded. e.g. fistula after hysterectomy or malignancy. Thereby 86 available medical file were included in the study.

Using available data technique was used to collect the study data and closed ended questionnaire was the data collection tool used to gathering study data from medical files available in the hospital. The study data included the most predisposing factor in demographic, social and obstetric characteristic leading to obstetric fistula, some maternal information (antenatal care, previous once or more caesarian section, obstructed prolonged vaginal delivery and the iatrogenic cause during cesarean section)and finally the characteristics of surgical management type, approach ,staging and outcome. Study data were analyzed by SPSS software(version 21).

Result:

During the study period, a 86 medical files of patients who underwent obstetric fistula repair at Al-Sabeen maternal Hospital were collected and analyzed. Results showed that most of study obstetric fistula patients from rural area(58.1%). Almost study participants were illiterate, within age group 25 – 35 years(69.8% and 76.8% respectively) as showed in table(1). Also, most study participants were married early(early age of marriage) and the vast majority early age get pregnancy <25yrs (82% and 95.35% respectively). The predisposing factors of obstetric fistula are illiteracy, early age of marriage and early age of pregnancy <25yrs(p 0.00), as showed by table(1).

Table 1 : Demonstrated the most predisposing demographic, social factors of study patients.

Categories	Percent%	P value
age groupe15-35yrs	76.8%	0.05
early age of marriage	82%	0.00
Early age get pregnancy <25yrs	95.35%	0.00
Illiterate	69.8%	0.00
Rural area	58.1%	0.2

Table(2) showed that almost of study participants had No or inadequate antenatal care(90.7%), more of them had obstructed prolonged vaginal delivery(80.5%), about two fifth with the iatrogenic cause during cesarean section(5.9%) and finally 38.2% of them had previous once or more caesarian section. The obstetric predisposing factors of obstetric fistula are no or inadequate antenatal care, obstructed prolonged vaginal delivery, the iatrogenic cause during cesarean section(p 0.00) and previous once or more caesarian section(p 0.02).

Table 2 : Demonstrated the most predisposing obstetric factors of study patients.

Categories	Percent%	P value
history of previous once or more caesarian section	38.2%	0.02
No or inadequate antenatal care	90.7%	0.00
obstructed prolonged vaginal delivery	80.5%	0.00
the iatrogenic cause during cesarean section	5.9%	0.00

Table(3) Illustrate types of obstetric fistula among study patients, where genitourinary fistula were the most predominant types which including Juxtacervical, Vesicovaginal, Uretherovaginal and ureterovaginal fistula (39.5%, 60.5%, 23.9% and 11.5% respectively). The other types were Rectovaginal and complex fistula (25% and 16.27% respectively).

Table 3 : demonstrated the type of obstetric fistula among study patients.

Type of fistula		Percent%	P value
genitourinary	Juxtacervical	39.5%	0.00
	Vesicovaginal	60.5%	0.00
	Uretherovaginal	23.9%	0.00
	Ureterovaginal	11.5%	0.00
Rectovaginal		25%	0.00
complex fistula		16.27%	0.00

Finally, the characteristics of obstetric fistula management and surgical outcomes(management type, approach ,staging and surgical repair) illustrated by table(4). Where significantly most of the surgical approach are Trans vaginal(65.1% & p 0.00), one stage

of repair(95.3%& p 0.527), significantly most with none previous surgical repair attempt(88.4%), the duration of post-operative stay was significantly more 3 weeks in most of them(79.1%& p 0.00) and finally there is a significantly success repair after surgery in the vast majority of study patients(97.7%& p 0.00).as showed by table(4).

quate antenatal care attendance in the causative pregnancy and have history of previous caesarian section (20.0%,16.3%) once and more respectively. most of participants delivered vaginally(53.5%) with duration of delivery > 2 days (81.4%) and delivery in health facility (55.8%) and most of outcome of index delivery with prenatal death(76.7%) most of result with p-value <0.05 statistically significant.

Table 4 : demonstrated obstetric fistula management and surgical outcomes among study patients.

Characteristic	Categories	Percent%	Chi^2 test	P value
Surgical approach	Trans vaginal	65.1	112.83	0.00
	Trans abdominal	7.0		
	Both	27.9		
Stage of repair	one stage	95.3	148.83	0.00
	two stage	4.6		
Previous surgical repair attempt	one attempt	7.0	0.40	0.527
	>two attempt	4.7		
	None	88.4		
Duration of post-operative stay	1-3 weeks	20.9	29.07	0.00
	> 3 weeks	79.1		
Outcome of surgical repair	Success	97.7	78.18	0.00
	Not known	2.3		

Discussion:

The study results express most of obstetric fistula patient were in age groupe15-35yrs (76.8%) is age of fistula development, most of them have early age of marriage (82%) and early get pregnancy (44.1%) where they are not adequately physically developed to permit the passage of the baby and so they are trapped in obstructed labour and hence obstetric fistula this explain the early marriage itself not a direct cause of obstetric fistula .Most of patient grandmulti >5delivery(46.5) and multipara <5delivery(30.2%) illiterate (69.8%) and still married despite having fistula (83.7%), Most of our patient from ruler areas 50 cases (58%)and 36 cases (41.9%) from urban areas with p-value 0.02 and chi square test 1.22 this explain due to lack of transportation and emergency obstetric care in their village and deficiency of health worker. this finding agree with study in Sudan[15], with Ethiopia study[16] and western Kenya study[17], and correlate with study in Uganda and Zambia[2,18]. This differ from previous studies which seemed to suggest that women with obstetric fistula were neglected by their husband[19,12], this difference in the proportion of women still married difficult to explain but may be due to difference in cultural and religious beliefs in the our study in Yemen compared to other studies.

(53.5%) with no antenatal care and(37.2%) inade-

Most of vaginal delivery of obstetric fistula patient was attendant by traditional birth attendance (16.27%) may skilled or not skilled and (18.6%) by non skilled relative and by mid wife attendance and (23.25%) by doctor(20.94%)and (20.94%) by health professional unknown who done emergency caesarean section lead to surgical injury of obstetric fistula ,However (53.5%) obstructed prolonged labour is leading cause to obstetric fistula still the iatrogenic cause with high percent (41.9%) because emergency cesarean section mostly done after developed fistula or during operation because sever adhesion or rupture.

The profile is similar probably because all study were done in low resource countries where are numerous delays in accessing emergency obstetric care explain the fact that obstetric care in Yemen sometimes inaccessible, underutilized or low quality on the other hand ,lack of transportation and low awareness is not corrected and increase delivery at home by assistance traditional birth or relatives or ever midwife because the women think that going to the hospital means that there is something wrong with her, at home there is no emergency facility for those women face problem during labour most of them tend to wait thinking that the baby will come out if they pushed harder ,the thing that may result in obstructed labour and fistula

formation and increase fistula formation with ceases delivery explained because most of patient were referred to hospital due to failure of progression of labour at home but unfortunately the refer was late due to delay in decision making by midwife or relatives or lack of transportation so that where emergency cesarean section done only for delivery of dead baby and couldn't prevent the obstruction of labour and result in prolong impact of the fetus so hypoxia leading to still birth and ischemia to vaginal wall of bladder or rectum then necrosis and finally fistula formation[15].

All this result was correlate with previous study in republic of Yemen which genital tract fistula is more common Most of them are related to obstructed labor due to unattended deliveries, small pelvic dimensions, mal-presentation, poor uterine contractions and cephalo-pelvic disproportion. Obstructed labor is main cause for 83.64% following by surgical cause10.91% and unknown reason 3.64%[20] and this result was correlate with study in Khartoum 2008[15,21] and in Uganda study[2]. Similar finding in Zambia and west Africa[18,22]. Also our study correlate in study of western Kenya[17].

(90.7%) of obstetric fistula with genitourinary type,(25%) with rectovaginal type with P- value 0.00 and chis quare16.8 and (16.27%) have complex fistula genitourinary and rectovaginal fistula together With p-value0.00.Most of fistula vesicovaginal fistula(60.5%) ,(39.5%)juxtacervical fistula involving ureter (23.9%) and involving urethra (11.6%)with p-value 0.00 and chi square test 76.28.

Majority of cases of obstetric fistula patients do transvaginal surgical approach 56 cases (65.1 %) and transabdominal only 6 cases (7%) finally who render two both approach 74cases (27.9%) with(P value 0.00) chi square test 112.8 most of them only in one stage of repair 82 cases (95.3%) and have history of previous surgical repair in one attempt 6 cases (7%) and two attempt or more (4.7%) the most of cases stay in the hospital post operatively more than three weeks 68cases (79.1%)with success surgical repair 84cases (97.7%) with (P value 0.00) and chis quare test 78.18 .

All this result correlate with study of western keynia transvaginal repair (81%) and transabdominal (14%)[17]. Identify (95%)of closure rate in Sudan study and correlate with study in Uganda which successful closure of the genitourinary fistula (77.9%)[3] and Zambia (72.9%)[23] which both result lower than the success rate reported in our study finally in Hancock city in Uganda 2004 was (90%)[24].

Conclussions:

The predisposing factors of obstetric fistula are illiteracy, early age of marriage, early age of pregnancy <25yrs, no or inadequate antenatal care, obstructed prolonged vaginal delivery, the iatrogenic cause during cesarean section and previous once or more caesarian section. Genitourinary fistula is the most predominant Obstetric fistula type among study patients and the other types are rectovaginal and complex fistula. The most significantly surgical approach are Trans vaginal, one stage of repair, the duration of post-operative stay was significantly more 3 weeks in most of them and finally there is a significantly success repair after surgery in the vast majority of study patients.

Recommendations

- Advocate for healthcare systems which provide accessible, quality maternal health care, including family planning, skilled care at birth, basic and comprehensive emergency obstetric care, and reasonable treatment of obstetric fistula so Provision of accessible, well equipped maternity hospital and effective family planning initiatives. especially in rural area.
- Ensure that midwifery education includes modules aimed at prevention and clinical screening for obstetric fistula and explore the advantages and disadvantages of different training.
- To give in service training of health professionals in the use of partograph for monitoring of labor and timely identification of obstructed labor to minimize occurrence of fistula.
- raising awareness of the community through disclosing problems following teenage marriage and pregnancy, importance of regular antenatal care and giving birth under the supervision of trained personnel.
- Contribute to education of communities and families regarding prevention of obstetric fistula especially in rural areas.
- the government should improve the socioeconomic conditions by raising the income of the individuals and families through simple community-based initiatives, availing education especially to females and improving transport.
- encouragement to guide national and regional planning for training in fistula management, with the understanding that more research is needed in this area and extensive research about the obstet-

ric fistula, to obtain more information seriously for public health.

References:

1. AbouZahr, C and W. Maternal Mortality Estimates Developed by WHO, UNICEF and UNFPA. Geneva: WHO. 2004.
2. Kayondo M, W, K, M, S. Predictors and outcome of surgical repair of obstetric fistula at a regional referral hospital Mbarara, western Uganda BMC Urology.2011;11:23. http://www.biomedcentral.com/1471.
3. Arrowsmith S, H, W. Obstructed labor injury complex: obstetric fistula formation and the multifaceted morbidity of maternal birth trauma in the developing world. Obstet Gynecol Surv.1996; 51:568.
4. UNFPA. Campaign to end fistula:(2008) [http://www.endfistula.oassessed March.
5. WHO.T. Make Every Mother and Child count. Geneva, Switzerland: WHO. 2005.
6. UNFPA and Engender Health. Obstetric Fistula needs assessment report: Findings from nine African countries2003. Available at: http://www.unfpa.org. Accessed June 2.
7. FIGO. Website Fistula Initiative. 2010.
8. United Nation's Summit factsheet. MDGs goal five; Improved maternal health. United Nations. 2010.
9. Veronique F, R, T, k, I, F, R, M. health of women after severe obstetric complication in Burkina Faso: A longitudinal study. The Lancet. 2007.
10. World Health Organization Maternal Mortality Fact Sheet. Geneva: World Health Organization:(2012).Onsrud M, Sjoveain S, Mukwege D. Cesarean
11. G,T, Y, K. Obstetric Fistula in the Developing World: An Agonising Tragedy. NJOG. 2013; Jul-Dec;8(2):5-15.
12. Wall LL. Obstetric Vesicovaginal fistula as an International Public Health problem. The Lancet. 2006;368(9542) :1201-1209.
13. Maternal and Neonatal Program Effort, survey of Yemen: 2005.
14. www.unfpa.org/mothers/index.htm
15. Mohamed E, A. Contributing factors of vesico-vaginal fistula (VVF) among fistula patients in Dr.Abbo's National Fistula & Urogynecology Centre – Khartoum. 2008; 259-263.
16. Kelly J, K. Epidemiologic study of vesicovaginal fistulas in Ethiopia. The Int Urogynecol J. 1993; 4:278-281.
17. Mc fadden E,J. retrospective review of predisposing factors and surgical outcomes in obesteric fistula patients at single hospital in westeren Kenya. 2011.
18. Holme A, B, M. Obstetric fistula: a study of women managed at the Monze Mission Hospital, Zambia. BJOG. 2007; 114:1010-7.
19. Muleta M. Socio-demographic Profile and Obstetric experience of fistula Patients managed at Addis Ababa fistula hospital. Ethiopia Medical Journal. 1999; 42(1):9-16.
20. Mariam A.M. A , X. Genital Tract Fistulae in the Republic of Yemen, Sana`a. Journal of Medical Sciences.2007; 7: 473-476.DOI: 10.3923/jms473.476 URL: http://scialert.net/abstract/?-doi=jms.2007.473.476.
21. Harrison A, R. (E, hong *, et al" Antenatal care, formal education, and child-bearing, B+OG" 19; 92 .14–22.
22. Nathan LM, R, B, G. Obstetric fistula in West Africa: patients' perspectives. Am J Obstet Gynecol. :2008; (5) :40 -42.
23. Browning A, M. Women with obstetric fistula in Ethiopia: a 6-month follow-up after surgical treatment.BJOG. 2008; 115:1564-1569.
24. Roenneburg M,G,W. Repair of obstetric vesicovaginal fistulas in Africa. Am J Obst Gynecol. 2006;195: 1748-52.