Ongeti Connie Makinia, MBChB, Department of Radiology and Imaging, Moi University, P. O. Box 4606 30100, Eldoret, Kenya; Abuya Joseph Mochama, MBChB, MMed, Department of Radiology and Imaging, Moi University, P. O. Box 4606-30100, Eldoret, Kenya, and Mabeya Hillary M. MBChB, MMed, Department of Reproductive Health, Moi University, P. O. Box 4606-30100, Eldoret, Kenya,

Corresponding Author: Dr. J. M. Abuya, Department of Radiology and Imaging, Moi University, P. O. Box 4606-30100, Eldoret, Kenya.

# SONOGRAPHIC CHARACTERISTICS AND HISTOPATHOLOGICAL FINDINGS OF GYNECOLOGIC MASSES AT MOI TEACHING AND REFERRAL HOSPITAL

C. M. Ongeti, J. M. Abuya and H. M. Mabeya

## ABSTRACT

*Background:* **The burden of gynecologic pelvic masses is high globally with a prevalence as high as 56% in some regions. Sonography is an important initial diagnostic tool followed by histopathology for confirmation. These two diagnostic tools guide the clinical management of pelvic masses.**

*Objective***: To describe the sonographic characteristics and compare them with the histopathological findings of pelvic masses.**

*Design:* **A cross sectional study.**

*Setting:* **This study was conducted at the Radiology and Imaging department at the Moi Teaching and Referral Hospital, in Eldoret, from October 2013 up to October 2014.**

*Subjects:* **Sixty-nine patients who were referred with a clinical indication of a pelvic mass, had a pelvic ultrasound scan, underwent surgery and specimen taken for histopathology.**

*Results:* **A total of 69 patients with gynecologic masses were enrolled into the study. Mean age was 44.4 years (Standard Deviation=14.9) with 29% (n=20) aged between 25 and 34 years. A total of 52.9% (n=36) masses were characterized sonographically as solid and 47.1% (n=33) as cystic. Of these, 20.6% (n=14) were reported to have features of malignancy such as irregularity of contour, multiple vascularized septations, solid components or ascites. Uterine fibroids (42%, n=29) was the most common ultrasound diagnosis followed by ovarian cyst (20%, n=14) and dermoid cyst (7%, n=5). Histopathology reported 30.4% (n=21) as uterine fibroids, 23.2% (n=16) as benign ovarian cysts; 25% (n=17) were reported as malignant with leiomyosarcoma 10.1% (n=7) being the commonest malignancy.**

*Conclusion***: Most pelvic masses were benign uterine fibroids with unusually high proportion confirmed to be leiomyosarcoma.**

## INTRODUCTION

Gynecologic pelvic masses are a major cause of morbidity and mortality among women. Gynecologic masses may be benign or malignant, and distinguishing between the two is a key role of diagnostic modalities (1). Sonography is now the primary tool for evaluating pelvic masses in greater detail (2). Although sonographic features of a pelvic mass frequently do not allow for a specific histopathological diagnosis, sonography usually provides important clinical parameters for the evaluation of a pelvic mass and can point toward suspicious masses for further evaluation as to whether they are benign or malignant (3). Pelvic sonography can confirm the presence or absence of a suspected pelvic mass. Also, sonographic features such as size, consistency, probable organ of origin and relationship to other structures can be valuable parameters in the decision making process (3).

Sonography can be used for discrimination between benign and malignant adnexal masses and for making a specific diagnosis in adnexal tumors (e.g. dermoid cyst, endometrioma, hemorrhagic corpus luteum, etc.). It is also done for diagnosing uterine endometrial pathology in women with bleeding problems, and for confirming or ruling out pelvic pathology in women with pelvic pain(4). In recent years, diagnostic ultrasound has undergone rapid advances, with the development of three- dimensional transvaginal grayscale volume and power Doppler imaging. Although the possibility of malignancy cannot be confirmed with certainty on sonography, the risk of malignancy index (RMI) is a scoring system that helps to diagnose malignancies during sonography. RMI uses sonographic features of a pelvic mass as one of the parameters

assessed to arrive at a diagnosis of malignancy (5-7).

The burden of gynecologic pelvic masses varies widely geographically and by age group. In general, post-menopausal women have higher prevalence than pre-menopausal women (8)(9). There is limited information on the burden, characteristics, types and the proportional burden of malignant pelvic masses in sub-Saharan Africa. There is conflicting information on the pattern of occurrence of malignant pelvic masses in the literature (10, 11). In this study, we sought to describe the sonographic characteristics of gynecologic pelvic masses, establish the sonographic prevalence of malignancy and compare ultrasound diagnoses with histopathology diagnoses.

## MATERIALS AND METHODS

This was a cross sectional study that was conducted in Moi Teaching and Referral Hospital, in Eldoret, Kenya. It was done to validate sonography of pelvic masses using histopathology as gold standard and was conducted within a period of one year from October 2013 up to October 2014. The recruited symptomatic female patients with a clinical diagnosis of a gynecologic pelvic masses (palpable or non-palpable) and sent to the radiology department for sonographic assessment. Sonography was conducted followed by surgical treatment and histopathological examination of biopsy specimen obtained during surgery.

Aloka's Prosound Alpha 7 (Tokyo, Japan) and Phillips HD 11xe (Eindhoven, Netherlands) were used for sonographic examination. For transabdominal examination, the patient was examined with bladder adequately distended. A 3.5 MHz probe frequency was used with the patient in

supine position. Morphological characteristics of the pelvic organs were measured in transverse and sagittal planes. If closer evaluation of a particular mass was necessary, the patient was counselled, and a transvaginal scan done. The ultrasound images were then archived and reviewed by the Investigator together with a Consultant Radiologist.

A structured questionnaire was used to record demographic variables, clinical characteristics, sonographic and histopathological findings. Data was analyzed using Stata version 11. Univariate analysis was used to calculate frequencies of sonographic findings, surgical characteristics and histopathology of gynecologic masses. Ethical clearance for this study was obtained from Moi Teaching and Referral Hospital ethical review committee. A consent form explaining the rationale and benefits of the study to the public health system was used to seek informed consent from potential interviewees.

## RESULTS

A total of 69 patients with gynecologic masses were enrolled into the study. The mean age of study participants was 44.4 years (Standard Deviation=14.9) with most participants (29%; n=20) aged between 25 and 34 years. Study participants presented with the following complaints: 63.8% (n=44) abdominal pain,

60.9% (n=42) abdominal swelling, 29% (n=20) per vaginal bleeding, 1.5% (n=1) constipation and 1.5% (n=1) urinary retention. The median duration of symptoms was 180 days (Inter-quartile Range=305). Twenty eight percent (n=19) were referrals from other facilities. During physical examination, pelvic masses were palpable in 82.6% (n=57) of the case patients; 79% (n=49) were firm, whereas 73.4% (n=47) were mobile. Most, 33.9% (n=22) gynecologic masses measured 12 to 14 weeks above the pubic symphysis whereas the largest masses, 13.9% (n=9), measured 30 weeks and above.

*Sonographic Characteristics of Gynecologic Masses:* A total of 52.9% (n=36) masses were characterized as solid and 47.1% (n=33) as cystic. Of the cystic masses, 84.4% (n=27) were complex cysts. Of the masses, 20.6% (n=14) were reported to have features of malignancy such as irregularity of contour, multiple vascularized septations, solid components or ascites. By organ of origin, 49.3% (n=33) were uterine, 41.8% (n=28) ovarian and 9% (n=6) tubo-ovarian. The widest diameter of the largest masses measured more than 10 centimeters (38.2%, n=26), followed by five to ten centimeters (47.1%, n=32) and less than five centimeters (14.7%, n=10). Uterine fibroids (42%, n=29) was the most common ultrasound diagnosis followed by ovarian cyst (20%, n=14) and dermoid cyst (7%, n=5
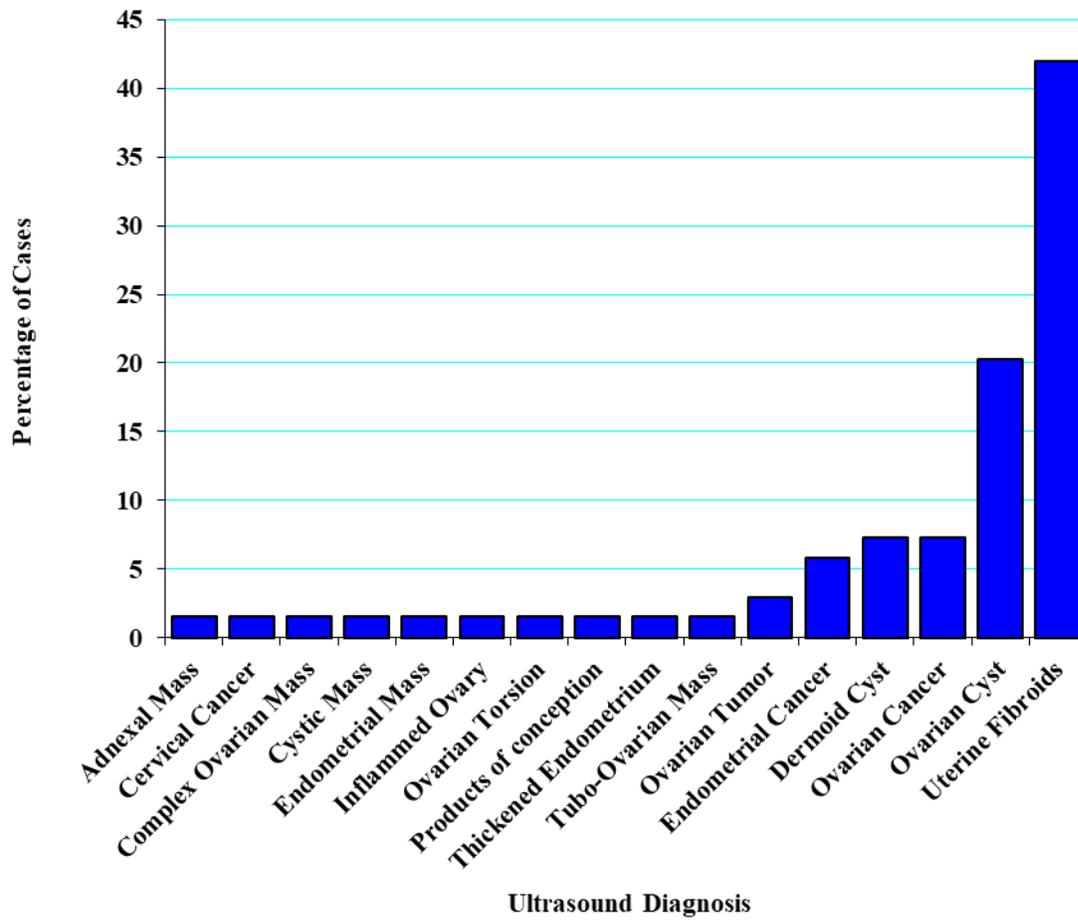
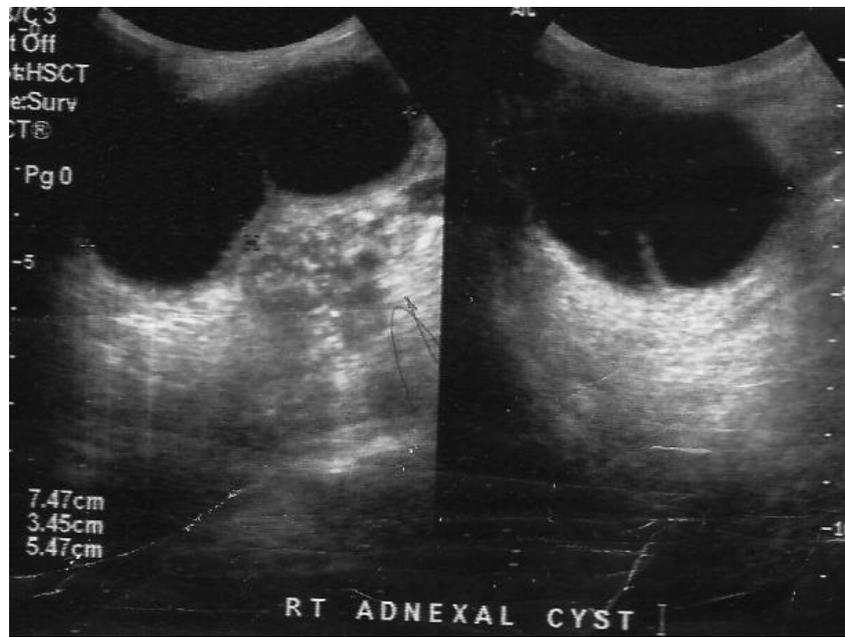**Figure1: Distribution of Ultrasound Diagnoses of Gynecologic Masses**

**Figure 2: Ultrasound scan of a 32 year old with a right adnexal cystic mass which had thin septations confirmed to be a serious cystadenoma on histopathology**
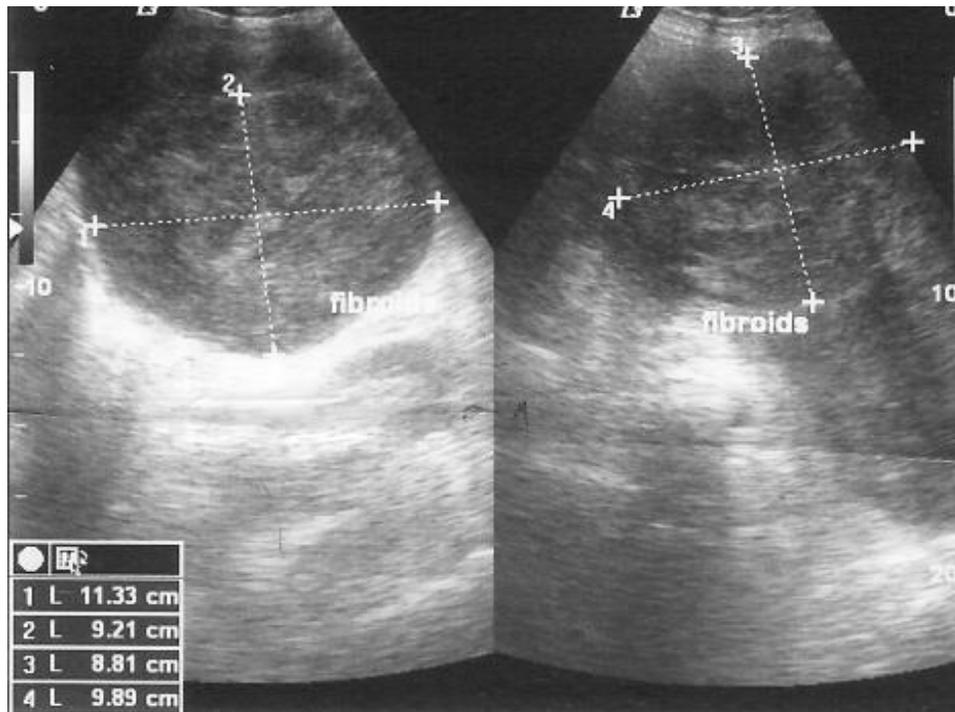


**Figure 3: Pelvic scan of a 54 year old with multiple large uterine fibroids confirmed to be leiomyosarcoma on histopathology**

*Histopathological Diagnosis of Pelvic Masses:* Upon histopathological examination, 30.4% (n=21) of the masses were reported to be uterine fibroids, 23.2% (n=16) were benign ovarian cysts and 10.1% (n=7) were leiomyosarcomas. A quarter (n=17) of the masses were reported to be malignant. Histopathogy diagnoses were compared with sonographic diagnoses. All masses except one identified to be fibroids on histology were correctly identified as such during sonography (Table 1). Sixty nine percent (n=11) of masses confirmed on histology to be ovarian cysts were identified as such by sonography. None of the leiomyosarcomas reported on histology had a similar diagnosis during sonography. Those with malignant masses (mean=58.4, CI 52.3 – 64.5) were significantly older than their counterparts (mean=39.1, CI=35.7 – 42.4) with benign masses. The mean age of those with uterine fibroids was 39.7 (35.5-43.8) compared to 61.4 (47.2-75.6) for leiomyosarcoma.
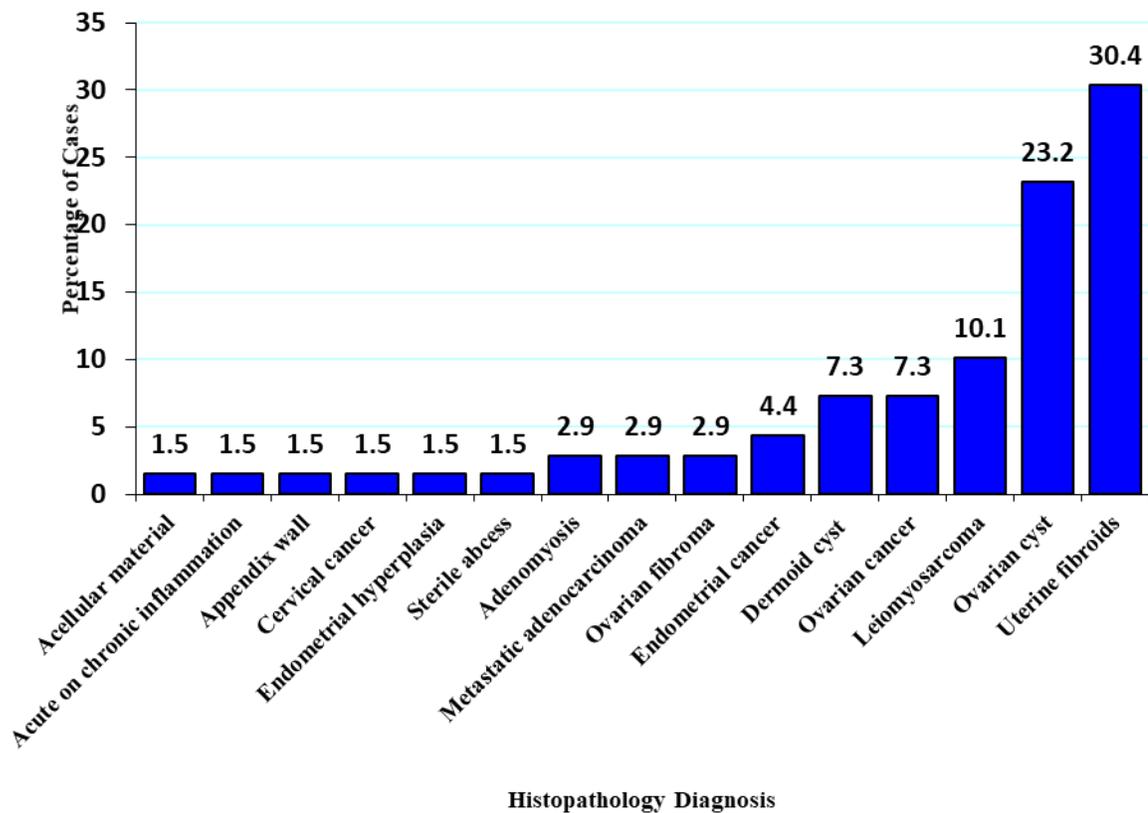


**Figure 4: Distribution of Gynecologic Pelvic Masses by Histopathology Diagnosis**

**Table 1**

*Comparison of Ultrasound Diagnoses to Histopathological Diagnoses of Gynaecologic Pelvic Masses*

| Ultrasound diagnosis | Histological diagnosis | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | Uterine fibroids | Ovarian cysts | Leiomyo sarcoma | Ovarian cancer | Dermoid cyst | Endometrial cancer | Others | |
| Uterine fibroids | 20 | 0 | 4 | 0 | 1 | 0 | 4 | 29 |
| Ovarian cysts | 0 | 11 | 0 | 1 | 0 | 0 | 3 | 15 |
| Leiomyosarcoma | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ovarian cancer | 0 | 1 | 0 | 3 | 0 | 0 | 1 | 5 |
| Dermoid cyst | 0 | 0 | 0 | 0 | 3 | 0 | 2 | 5 |
| Endometrial cancer | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 2 |
| Others | 0 | 4 | 3 | 1 | 0 | 2 | 3 | 13 |
| Total | 21 | 16 | 7 | 5 | 4 | 3 | 13 | 69 |

## DISCUSSION

In this study we sought to describe sonographic characteristics of pelvic masses and compare sonographic diagnoses to histopathogy diagnoses. Morphologically, sonography characterized most masses to be solid followed by cystic masses. Most masses were of uterine origin and were benign. Sonography characterized a fifth of the masses to be malignant while histopathology confirmed a quarter of the masses to be malignant. While the distribution of benign masses was expected, it was surprising that leiomyosarcoma was the commonest malignant mass followed by ovarian cancer, endometrial cancer and cervical cancer.

Ultrasound is a cardinal adjuvant to clinical examination in the evaluation of pelvic masses. Sonography is instrumental in confirming the presence of a mass, the organ of origin, the consistency, contour, size, and vascularity of the mass (12, 13). These anatomic characteristics are crucial in determining the ultrasound diagnosis and may be relied upon to make distinctions between benign and malignant masses. A mass whose size is greater than 10 centimeters among other factors like ascites, complex cysts or solid components may be suggestive of malignancy (14).

Gynecologic pelvic masses are recognized to occur in women of all ages in varying frequencies (15). Age is a strong determinant of the type of pelvic mass in women; whereas malignancies are common in those aged above 50 years benign conditions dominate the under 50 year category (16, 17). Our finding that malignant masses were significantly higher among the older women is therefore consistent with the earlier studies. For instance, other studies reported the mean age of leiomyosarcomas to be 60 years (18) which is similar to our finding of 61 years. Sonographers, therefore, should have a high index of suspicion when scanning older women.

Although the incidence of benign conditions is similar to what has been reported by other similar studies (19), the incidence of malignancy in this set up is higher. Munir *et al* in a similar study found that 7.5% of the masses were gynecologic malignancies while 1.9% were non gynecologic malignancies (12). The high incidence of malignancies in this study may suggest that the burden of cancer is rising in the country. However, it could also be because the study site is a referral hospital

serving patients from counties in most of western Kenya.

The distribution of cancers in this group was unusual. Leiomyosarcoma were the commonest in this study and all the seven were missed by ultrasound. A study conducted at Kenyatta National Hospital, in Nairobi, reported ovarian cancer as the commonest malignancy and made up 20-25% of gynecologic malignancies (11). To our knowledge, this is the first study documenting such a high occurrence of leiomyosarcoma. In Nigeria, for instance, cervical cancer constituted 78% of gynecological cancers followed by ovarian cancer (10, 20); leiomyosarcomas made up only 0.5% of gynecologic masses (10). A similar distribution has been observed in Ghana (21). A study in Nepal also found cervical cancer to be the most common gynecologic malignancy (22). An analysis of 968 patients in Pakistan, however, obtained slightly different results. Ovarian cancer was the most common followed by cervical cancer (23).

## CONCLUSION

In conclusion, most pelvic masses were characterized by sonography to be solid uterine fibroids. A quarter of the pelvic masses were confirmed on histology to be malignant with unusually high occurrence of leiomyosarcomas among elderly women. Ultrasound did not report features of malignancy in a substantial number of pelvic masses that were confirmed by histopathology to be malignant especially leiomyosarcomas. When considering the prospects of malignancy, sonography findings should be interpreted in combination with other predictive criteria such as the Risk of Malignancy Index.

## REFERENCES

1. Schorge J, Schaffer J, Halvorson L, Hoffman B, Bradshaw K, Cunningham F. Williams Gynecology. 1 ed: McGraw-Hill Professional; 2008.

2. Gawai MA. Role of Ultrasound in the Diagnosis of Pelvic Masses. Karnataka, Bangalore: Rajiv Gandhi University of Health Sciences; 2006.

3. Aleksander L, Tatjana B, Zoran V. Sonographic Evaluation of Benign Pelvic Masses. Donald School Journal of Ultrasound in Obstetrics and Gynecology. 2009;3:58-68.

4. Valentin L. Imaging in gynecology. Best Practice & Research in Clinical Obstetrics & Gynaecology. 2006;20:881-906.

5. Tingulstad S, Hagen B, Skjeldestad FE, Onsrud M, Kiserud T, Halvorsen T, *et al.* Evaluation of a risk of malignancy index based on serum CA125, ultrasound findings and menopausal status in the pre-operative diagnosis of pelvic masses. Br J Obstet Gynaecol. 1996;103:826-31.

6. Tingulstad S, Hagen B, Skjeldestad FE, Halvorsen T, Nustad K, Onsrud M. The risk-of-malignancy index to evaluate potential ovarian cancers in local hospitals. Obstet Gynecol. 1999;93:448-52.

7. Davies AP, Jacobs I, Woolas R, Fish A, Oram D. The adnexal mass: benign or malignant? Evaluation of a risk of malignancy index. British Journal of Obstetric & Gynaecology. 1993;100:927-31.

8. Borgfeldt C, Andolf E. Transvaginal sonographic ovarian findings in a random sample of women 25–40 years old. Ultrasound Obstet Gynecol. 1999;13:

.

9. Valentin L, Skoog L, Epstein E. Frequency and type of adnexal lesions in autopsy material from postmenopausal women: ultrasound study with histological correlation. Ultrasound in Obstetrics & Gynecology. 2003;22:284-9.

10. Yakasai IA, Ugwa EA, Otubu J. Gynecological malignancies in Aminu Kano Teaching Hospital Kano: a 3 year review. Nigerian Journal of Clinical Practice. 2013;16:63-6.

11.      Ministry of Health K. National Guidelines for Cancer Management. Nairobi: Government of Kenya; 2013.

12.      Munir SS, Sultana M, Amin D. The Evaluation of Pelvic Mass. Biomedica. 2010;26:70-5.

13.      Wani SMD, Hammad MK. Ultrasonography in the diagnostic evaluation of gynecologic pelvic mass. JK-Practitioner. 2002;9:239-41.

14.      McDonald JM, Doran S, DeSimone CP, Ueland FR, DePriest PD, Ware RA, *et al.* Predicting risk of malignancy in adnexal masses. Obstetrics & Gynecology. 2010;115:687-94.

15.      Borgfeldt C, Andolf E. Transvaginal sonographic ovarian findings in a random sample of women 25–40 years old. Ultrasound in Obstetrics & Gynecology. 1999;13:.

16.      Hernandez E, Miyazawa K. The pelvic mass. Patients' ages and pathologic findings. Journal of Reprodive Medicine. 1988;33:361-4.

17.      Schem C, Bauerschlag DO, Meinhold-Heerlein I, Fischer D, Friedrich M, Maass N. [Benign and borderline tumors of the ovary]. Therapeutische Umschau. 2007;64:369-74.

18.      Gonzalez-Bosquet E, Martinez-Palones JM, Gonzalez-Bosquet J, Garcia Jimenez A, Xercavins J. Uterine sarcoma: a clinicopathological study of 93 cases. European Journal of Gynaecologic Oncology. 1997;18:192-5.

19.      Jabeen S. Role of Transabdominal Sonography in Diagnostic Evaluation of Pelvic Masses. Journal of Postgraduate Medical Institute. 2006;20:335-9.

20.      Ugwu EO, Iferikigwe ES, Okeke TC, Ugwu AO, Okezie OA, Agu PU. Pattern of gynaecological cancers in University of Nigeria Teaching Hospital, Enugu, south eastern Nigeria. Nigerian Journal of Medicine. 2011;20:266-9.

21.      Nkyekyer K. Pattern of gynaecological cancers in Ghana. East Africa Medical Journal. 2000;77:534-8.

22.      Dhakal HP, Pradhan M. Histological pattern of gynecological cancers. Journal of Nepal Medical Association. 2009;48:301-5.

23.      Jamal S, Mamoon N, Mushtaq S, Luqman M, Moghal S. The Pattern of Gynecological Malignancies in 968 Cases from Pakistan. Annals of Saudi Medicine. 2006;26:382-4.