Original Article

Pathologic Profile of Hysterectomy Cases in Saudi Arabia: A Tertiary Center Experience

Nourah Hasan Alqahtani, Methal I. Albayat[1], Yara A. Al Nashwan[1], Areej Manssour Alnemer[1]

Departments of Obstetrics and Gynecology, [1]Pathology, College of Medicine, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia

Abstract

Background: Hysterectomies are increasingly being replaced by more conservative management modalities and are now only used for limited clinical indications. The agreement between these indications and the final pathology is understudied.

Objectives: This study aimed to correlate the preoperative clinical diagnoses with the pathological findings detected in hysterectomies in Saudi women of different age groups.

Materials and Methods: This retrospective study analyzed the preoperative clinical indications and the subsequent clinical and pathological data of all hysterectomies conducted at a single tertiary care hospital in the Eastern Province of Saudi Arabia between January 2010 and December 2021.

Results: There was no decline in the frequency of hysterectomies across the study period. Abnormal uterine bleeding was the most common clinical indication across all age groups, followed by symptomatic fibroid and uterine prolapse in women aged <50 and ≥50 years, respectively. A total of 9.2% of the cases were indicated for therapeutic reasons, either as an emergency procedure for peripartum hemorrhage or for suspected uterine premalignant and malignant lesions. Besides these, 41.2% of patients had more than one pathology, with the most common combination being leiomyoma and adenomyosis (43.4%). The difference in age between malignant and benign cases (52.3 vs. 48.8 years, respectively) was not statistically significant ($P = 0.109$).

Conclusions: Most of our cohort had benign lesions. Perceptible misuse of the procedure in this cohort was unlikely, as a large proportion of the patients had more than one pathology corresponding to each clinical indication.

Keywords: Diagnosis, hysterectomy, indications, pathology

Address for correspondence: Dr. Areej Manssour Alnemer, Department of Pathology, College of Medicine, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia.
E-mail: aanemer@iau.edu.sa

Submitted: 31-Aug-2022 **Revised:** 24-Oct-2022 **Accepted:** 13-Jun-2023 **Published:** 15-Jul-2023

INTRODUCTION

Hysterectomy, the most common major gynecological procedure, is increasingly being replaced by conservative medical and minimally invasive surgical treatment modalities worldwide.[1-3] Although hysterectomy is a one-step, definite cure for many gynecological problems, alternative therapy is favored to reduce the adverse impact on the physical and

Access this article online	
Quick Response Code:	Website: https://journals.lww.com/sjmm
	DOI: 10.4103/sjmms.sjmms_438_22

How to cite this article: Alqahtani NH, Albayat MI, Al Nashwan YA, Alnemer AM. Pathologic profile of hysterectomy cases in Saudi Arabia: A tertiary center experience. Saudi J Med Med Sci 2023;11:257-63.

psychosexual health of women and their quality of life.[4,5] Hysterectomy procedures have also majorly shifted from open abdominal to vaginal and laparoscopic surgeries to minimize the associated complications.[2,3,6,7]

Yet, hysterectomy remains an important gynecological procedure and is indicated for several problems. Several studies worldwide have found that the most common cause for removing the uteri was fibroids, followed by abnormal uterine bleeding (AUB) and prolapse.[1,2,6,8-11] However, in Saudi Arabia, the status of hysterectomy in terms of frequency, types, and clinical indications as well as pathologic findings is understudied. An accurate appraisal of the current status is important for understanding and meeting the health care needs.

The current study was conducted with the aim of correlating the pre-operative clinical diagnoses with the pathological findings detected in hysterectomies to assess if the procedure was justified in various age groups, and to investigate the trend of frequency of hysterectomies in an academic tertiary care center from the Eastern Province of Saudi Arabia.

MATERIALS AND METHODS

Study design, setting, and patients

This retrospective descriptive, cross-sectional study included all patients who underwent hysterectomy at King Fahd Hospital of the University (KFHU), Al Khobar, Saudi Arabia, between January 01, 2010, and December 31, 2021. KFHU is the largest public, academic tertiary care center in the Eastern Province of Saudi Arabia. A systematic chart review was carried out after obtaining approval from the local institutional review board.

Consecutive cases of hysterectomies were studied by searching the SNOMED code, with no hysterectomy case being excluded. Data collected included age of the patients at the time of the procedure, clinical indications, preoperative endometrial biopsy reports, types of surgeries, and the pathological findings in the hysterectomy specimens.

Pathology

All hysterectomy specimens were received in the Pathology Laboratory in 10% formalin and kept for 24–48 hours for fixation. A minimum of two sections were taken from cervix, corpus, both tubes, and ovaries, if present. In addition, any detected lesion was adequately sectioned for histologic examination.

The pathologic diagnosis of adenomyosis was based on the finding of endometrial stroma and glands within the myometrium more than one low-power field from the endo-myometrial junction in well-oriented sections.

Data analysis

Patients were stratified according to their age in the following three groups: young, <40 years; perimenopausal, 40–49 years; and older, ≥50 years. Data were tabulated in Microsoft Excel. All the statistics were conducted using the GraphPad Prism software (version 7). T-test was used for comparison, and a two-tailed P value < 0.05 was considered statistically significant.

RESULTS

A total of 404 patients who underwent hysterectomy in the specified period were included (age range: 29–84 years; mean: 50.2 ± 8.8 years; 95% CI = 49.3–51.1). Of these, 117 (29%) underwent vaginal hysterectomy; 85% of these were done in the past 4 years. The remaining patients underwent abdominal hysterectomy.

The frequency of hysterectomies over the study period is shown in Figure 1. The overall frequency of the procedure was low, with no decline in the rate over the study period apart from a slight drop coinciding with the COVID-19 lockdown period. Paradoxically, the number of hysterectomies conducted in 2021 was 4.5 times higher than those performed in 2010.

Clinical indications

Only 29 (7.2%) hysterectomies were performed in women aged <40 years. Apart from a single case of endometrial carcinoma in a 39-year-old woman, the indications for all cases were benign, including 17 cases (58.6%) of emergency postpartum hemorrhage (PPH). The details of the clinical indications are shown in Table 1 for the three age groups.

The perimenopausal age group (aged 40–49) comprised 197 cases (48.8%). The clinical indications were dominated

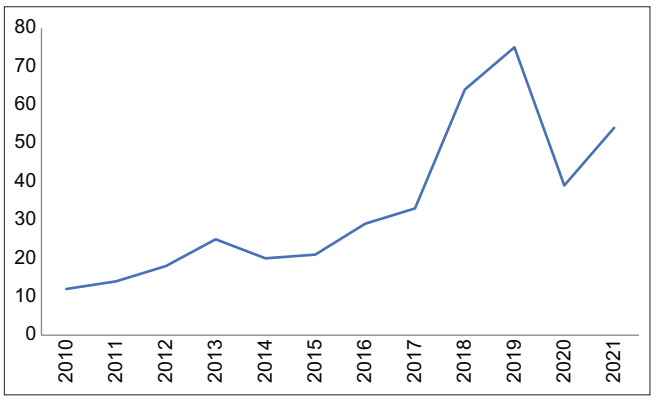

Figure 1: The frequency of hysterectomies over the study period

Table 1: The clinical indications of hysterectomies in different age groups

Age groups (years)	Clinical indications							
	Adenomyosis	AUB	Fibroids	Prolapse	PPH	Pelvic/ovarian tumors	Uterine neoplasm or preneoplasm	Endometriosis
30–39 (*n*=29; 7.2%)	0	2	8	1	17	0	1	0
40–49 (*n*=197; 48.8%)	10	101	74	5	2	0	4	1
50 and more (*n*=178; 44.1)	0	60	44	49	0	12	13	0
Total (*n*=404)	10	163	126	55	19	12	18	1

AUB – Abnormal uterine bleeding; PPH – Postpartum hemorrhage

by AUB followed by symptomatic fibroids (51.3% and 37.6%; respectively) [Table 1]. There were 10 cases excised due to suspected adenomyosis, 5 cases due to prolapse, 2 cases due to bulky uteri (both showed benign leiomyomas combined with adenomyosis), 2 cases were indicated due to pregnancy-related complications (placenta increta and uterine rupture), and 1 case each was indicated for endometriosis, molar pregnancy, and simple hyperplasia.

For women aged ≥50 years (n = 178, 44.1%), the majority of cases were because of AUB (33.7%), followed by uterine prolapse (27.5%) and symptomatic fibroids (24.7%). The neoplastic-related indications accounted for 25 cases in this group, of which 12 were extrauterine pelvic/adnexal masses. In terms of perseveration, the adnexa uteri was preserved in 36% of all patients in this study.

Pathologic diagnoses

Overall population

Endometrial cancer was revealed in 17 cases (4.2%), of which 2 patients were aged <50 years (average age: 52.3 years). Leiomyoma was seen in 272 cases (67.3%) in different presentations, adenomyosis in 132 cases (32.7%), endometrial polyp (PO) in 49 cases (12.1%), hyperplasia in 52 cases, and atypical hyperplasia in 11 cases. Endometriosis and chronic endometritis were both found once. There was no statistically significant difference in age between the malignant and benign categories (52.3 vs. 48.8 years; P = 0.109).

Young age group

For patients aged 29–39 years, of the 12 cases not indicated due to emergency peripartum hemorrhage, 8 had benign leiomyomas, including one combined with PO, while one case each was with adenomyosis; atypical hyperplasia and adenomyosis; and uterine PO alone and with adenomyosis. Chronic endometritis was seen once, and there was a single case of endometrial carcinoma diagnosed in a 39-year-old patient. The PPH cases showed pregnancy-related complications including uterine rupture, and mural necrosis associated with placenta accreta/increta and retained product of conception and intrauterine fetal death.

Perimenopausal age group

For patients aged 40–49 years, of the 101 cases indicated due to AUB, 31 had adenomyosis, 18 had leiomyomas, 16 had leiomyomas and endometrial PO, and 5 had PO and adenomyosis. In addition, adenomyosis alone and with PO was seen in eight and three cases, respectively, while there was one case of endometrial PO. Simple hyperplasia was revealed in nine cases: six had leiomyomas and three had both leiomyomas and adenomyosis. Atypical hyperplasia was seen in six cases, adenomyosis in two cases, endometrial PO and adenomyosis in one case, and endometrial cancer in one case.

All the symptomatic fibroids were confirmed as benign leiomyomas. Besides, further pathological findings showed adenomyosis (n = 14), PO (5), and a combination of the three lesions (1). The 10 cases that were clinically suspected to have adenomyosis revealed this lesion alone (n = 3), combined with leiomyoma (2), both leiomyoma and PO (3), PO (1), and simple hyperplasia along with leiomyoma (1). For the five prolapse cases, leiomyoma, atypical hyperplasia, adenomyosis, and high-grade dysplasia of the uterine cervix were each found once. In one case of prolapsed uterus, no significant pathology was noted. The pregnancy-related cases revealed placenta increta, and the diagnoses were confirmed in the cases indicated for simple hyperplasia and molar pregnancy. In one case due to widespread adnexal endometriosis, endometrial PO, leiomyomas, and adenomyosis were also found.

Older age group

In women aged ≥50 years with AUB, which was the most frequent presentation, malignancy was found in 4 (6.7%) patients, of which 1 also had adenomyosis. Hyperplasia was found in 20 cases (2 complex with cytologic atypia; one with coexisting PO). Of 18 cases with simple hyperplasia, 6 cases also had leiomyomas and adenomyosis, while 1 had PO. Leiomyoma was detected as a single pathology in 11 cases, with adenomyosis in 17 cases, and with adenomyosis and endometrial PO in 3 cases. Adenomyosis alone was the diagnosis in 4 cases. Uteri excised for symptomatic fibroids (n = 44) showed benign leiomyomas in all cases: 1 along with PO and 3 with adenomyosis. For the 49 cases

of prolapse, there was no pathology in 15 cases (30.6%). Endometrial PO was found in two cases, leiomyomas alone in 12 cases, and in one case each combined with adenomyosis; PO; PO and adenomyosis; and hyperplasia and adenomyosis. There were eight cases of adenomyosis alone, and one case each of adenomyosis combined with PO and hyperplasia. Disordered proliferative endometrium was seen in four cases: two with leiomyoma and two with leiomyoma and adenomyosis. Atypical hyperplasia was seen once along with PO. Uteri removal for pelvic/ovarian masses is summarized in Table 2. Hysterectomies done for uterine neoplastic indications showed 11 cases of endometrial cancer, 1 case of molar pregnancy, and 1 case with only leiomyoma with adenomyosis.

Collectively, besides the cancer, atypical hyperplasia and the therapeutic cases of prolapse, and pregnancy-related, life-saving hysterectomies, there were 166 cases that showed more than one pathology, of which leiomyoma with adenomyosis was the most common (n = 72). However, 141 cases showed only leiomyomas, indicating that hysterectomy could have been avoided in these cases.

DISCUSSION

This study demonstrated that the overall annual rate of hysterectomy in the Eastern Province of Saudi Arabia is low, with no decrease across the studied 12-year period. This is in contrast to findings of continued decline reported over the past decades in studies from Australia, Austria, England, the Netherlands, Switzerland, Portugal, Denmark, and India.[1,3] In the United States, the rate shows an ongoing decline since 2002, except among the geriatric women (aged >75 years);[11] however, in Saudi Arabia, this age group women account for a very low population group in general. In contrast to these studies, the current study found that the number of cases in 2021 was 4.5 times higher than those in 2010. However, as this increase was without any shift in institutional practice regarding indications for hysterectomy, it may, at large, reflect the increased capacity of the hospital, and specifically, the increase in 2021 is likely to compensate for the backlog caused by the COVID-19 pandemic. Understandably, a decrease in the use of hysterectomy is often concomitant with an increase in its substitutes, such as hormonal therapy or minimally invasive surgical techniques for benign indications. Besides preserving the fertility in young women, management strategies such as ablation and uterine artery embolization have the advantage of quicker recovery and minimizing the negative effect associated with hysterectomy such as cardiovascular diseases, stroke, urinary incontinence, psychosexual problems, early menopause, and disturbed body image, as highlighted in a study from Egypt.[4,5,12]

Table 2: Details of cases indicated due to pelvic or ovarian masses

Case number	Age	Diagnosis of the extra-uterine lesion	Uterine pathology
1	50	Fibrothecoma	Leiomyoma
2	50	Hemorrhagic corpus leuteum cyst	Multiple leiomyomata
3	53	Endometriosis	Leiomyoma
4	57	Clear cell CANCER in a background endometriosis in the right ovary Endometriotic cysts in the left ovary	Adenomyosis, leiomyomas, adenomyoma
5	57	Endometriosis	Leiomyoma
6	57	Endometriotic cyst	Adenomyosis, leiomyoma
7	58	Fibrothecoma	Adenomyosis
8	63	Serous cyst adenoma	Leiomyoma
9	67	Positive for colonic adeno cancer	Normal (cystic atrophy)
10	67	Fibroma	Disordered proliferative endometrium
11	67	Endometriotic cyst	Normal (cystic atrophy)
12	70	Endometriosis	Normal (cystic atrophy)

There are four different surgical approaches of hysterectomy: abdominal, vaginal, laparoscopic, and robot-assisted. Complications are maximum with abdominal (1.7%), followed by vaginal (0.8%) and laparoscopic (0.3%).[7] In a survey conducted in the United States, only 8% of physicians stated that they would choose the abdominal route for themselves or their spouses.[7] Likewise, the cost of abdominal approach is also the highest.[7] However, in the current study, abdominal hysterectomies accounted for 71% of all cases, while the remaining cases were vaginal. This rate is slightly higher than reported in the United States, where a nationwide study reported a rate of 66% for abdominal hysterectomies in 2003.[7]

In our cohort, the adnexa uteri was preserved in 36% of the cases, which was much higher than the findings from Germany, where bilateral oophorectomies were performed in only 23% of all hysterectomies across the country.[13] In terms of age, the majority of our patients were aged between 40 and 50 years old, which is similar to the age groups reported from China, India, Pakistan, Iran, and Greece, but younger those reported from England and Australia, where most cases were in patients aged 60–70 years old.[1-18]

Benign diseases accounted for the vast majority of our cohort (95.8%), which is consistent with previous study findings of benign causes accounting for 97% of the hysterectomies.[19] Overall, in the present study, uterine fibroids, or leiomyomas, accounted for the most frequent pathologic finding, which is in coherent with the findings

from many studies worldwide;[2,6,7,9-11,16,20] few studies have reported leiomyomas to be the second most common pathologic finding after adenomyosis.[10,21] This is expected as the estimated prevalence of fibroids in the general women population varies from 70% to 80%.[11] In Saudi Arabia, a study conducted in Abha also documented fibroids as the most frequent indication of hysterectomies.[22]

AUB accounted for the most common clinical indication in our cohort. AUB, as defined by Fédération Internationale de Gynécologie Obstétrique, includes abnormally heavy menses (more than 80 ml/month) and any bleeding that was abnormal in timing.[10] Therefore, postmenopausal bleeding is part of AUB. The etiology of AUB in our cohort varied from malignancy, simple and atypical hyperplasia, to benign pathologies including leiomyomas, adenomyosis, and endometrial PO. This is not different from the etiologies reported in previous studies.[8,10,23] Similarly, AUB has been reported to be the most common clinical reason to perform hysterectomies in several studies,[16,24,25] The prevalence of AUB as a hysterectomy indication has widely varied from 11% to 66%;[1,8] it was 40.3% in the current study. This broad difference in literature is probably reflecting the dissimilarity of patients' age group, as AUB is commonly seen in the perimenopausal age group, and postmenopausal bleeding is the most common indication of hysterectomies in patients aged ≥60.[10,26]

In contrast to fibroids, the prevalence of adenomyosis in females varies widely from 5% to 70%.[10] This broad range possibly reflects the difficulty in preoperatively diagnosing adenomyosis using ultrasound, and differences between pathologists in defining a lesion after hysterectomy. Therefore, the clinic-pathologic correlation of adenomyosis is inferior to that for leiomyomas.[10] As such, while alternative methods of treatment may be pursued when there is a clear cause of AUB such as leiomyoma, adenomyosis will continue to pose a diagnostic challenge that will often require hysterectomy.

Prolapse accounted for 13.6% of our cases, and 6% and 14.7% in other studies.[7,27] It was the second most common indication in women aged ≥50 years in our cohort. Similarly, it has been found to be the most common indication of hysterectomy in Finland, replacing fibroid since 2010.[28] There were no pathological changes in some studies, ranging from 26% to 71% of the cases, and it was 29.1% in the current study.[29] Hysterectomy indicated for prolapse is controversial, as there is no strong evidence to suggest that it lowers the risk of recurrence after pelvic organ prolapse surgery. Likewise, uterus preserving surgical options has no negative impact on long-term recurrence risk.[20] However, some authors recommend hysterectomy and thorough pathologic studying for the possibility of squamous cell carcinoma induced by chronic irritation in prolapse uteri.[27] Intractable PPH was seen in only 4.7% of our cohort, similar to a study from Europe.[30] This is also coherent with the reported low rate of PPH in Saudi Arabia (0.63 per 1000 deliveries) in comparison with the global range of 0.24–8.9 per 1000 deliveries.[1] Endometriosis was seen only once in our setting. It was also a rare indication in an Austrian study, but as high as 12.2% and 17.7% in two different studies from the United States.[1,2,4] Endometrial PO were seen in different combinations in 12.1% of our cohort. Other studies have found PO to be responsible for up to one-fourth of AUB cases.[23] Chronic endometritis and molar pregnancy accounted for a minor fraction of our pathologies, similar to previous findings from Saudi Arabia.[22]

Our results depict that 15.6% of AUB were attributed to hyperplasia, 17.5% of which were with atypia. Studies have shown that 10% of AUB are related to hyperplasia. With the availability of hormonal therapy, hyperplasia is no longer considered an indication of hysterectomy unless it is refractory to conservative medical treatment. Consequently, the rate of hyperplasia as an indication for hysterectomy declined over time in this study. Endometrial cancer was seen in about 4% of the patients in our study, with an average age of 52.3 years. The low malignancy rate in the study may likely be because the studied population was young, whereas endometrial cancer is a disease most commonly affecting the elderly.

Strengths and limitations

This is the first study to provide baseline information regarding hysterectomy status in a Saudi population. However, the major limitation of this study is that it was retrospective and only includes data from a single tertiary care hospital. Therefore, additional studies from other tertiary hospitals in different regions of the country are needed before a generalization of hysterectomy trends can be made for the population of Saudi Arabia. Furthermore, the reason for the significant number of concurrent pathologies being found after hysterectomies but not diagnosed/suspected preoperatively needs to be evaluated and taken into consideration when deciding the management of AUB.

CONCLUSIONS

This study found that the rate of hysterectomy in our hospital did not decline over the 12-year study period. Perceptible misuse of the procedure is unlikely, as a large proportion of the patients had more than one

pathology corresponding to each clinical preoperative diagnosis. Nonetheless, the management strategy should be individualized, and there is a need to shift toward more cost-effective minimally invasive methods in Saudi Arabia.

Ethical consideration

The study was approved by the Institutional Review Board of Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia (Ref. no.: 2018-01-003). The requirement for patient consent was waived owing to the study's retrospective design. The study followed the principles of the Declaration of Helsinki, as revised in 2013.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Peer review

This article was peer-reviewed by three independent and anonymous reviewers.

Author Contributions

Conceptualization: N.Q. and A.N.; methodology: N.Q., M.B., Y.N., and A.N.; data analysis, N.Q., M.B., Y.N., and A.N.; writing – original draft preparation: Y.N. and A.N.; writing – review and editing: N.Q., M.B., and A.N.; supervision: N.Q. and A.N.

All authors have read and agreed to the published version of the manuscript.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Edler KM, Tamussino K, Fülöp G, Reinstadler E, Neunteufel W, Reif P, *et al*. Rates and routes of hysterectomy for benign indications in Austria 2002-2014. Geburtshilfe Frauenheilkd 2017;77:482-6.
2. Abiodun O, Ola O, Oguntoyinbo O. Audit of hysterectomy in a private missionary hospital an 8 year retrospective study. Irjmbs 2020;20:19-23.
3. Moawad G, Liu E, Song C, Fu AZ. Movement to outpatient hysterectomy for benign indications in the United States, 2008-2014. PLoS One 2017;12:e0188812.
4. Abd el Gwad N, Mahmoud A, El-Sayad S, Abd El Fatah B. Body image, self-esteem and quality of sexual life among women after hysterectomy. Port Said Sci J Nurs 2020;7:228-43.
5. Ramdhan RC, Loukas M, Tubbs RS. Anatomical complications of hysterectomy: A review. Clin Anat 2017;30:946-52.
6. Multinu F, Casarin J, Tortorella L, Huang Y, Weaver A, Angioni S, *et al*. Incidence of sarcoma in patients undergoing hysterectomy for benign indications: A population-based study. Am J Obstet Gynecol 2019;220:179.
7. Wright KN, Jonsdottir GM, Jorgensen S, Shah N, Einarsson JI. Costs and outcomes of abdominal, vaginal, laparoscopic and robotic hysterectomies. JSLS 2012;16:519-24.
8. Talukdar B, Mahela S. Abnormal uterine bleeding in perimenopausal women: Correlation with sonographic findings and histopathological examination of hysterectomy specimens. J Midlife Health 2016;7:73-7.
9. Schmitt JJ, Carranza Leon DA, Occhino JA, Weaver AL, Dowdy SC, Bakkum-Gamez JN, *et al*. Determining optimal route of hysterectomy for benign indications: Clinical decision tree algorithm. Obstet Gynecol 2017;129:130-8.
10. Rizvi G, Pandey H, Pant H, Chufal SS, Pant P. Histopathological correlation of adenomyosis and leiomyoma in hysterectomy specimens as the cause of abnormal uterine bleeding in women in different age groups in the Kumaon region: A retroprospective study. J Midlife Health 2013;4:27-30.
11. Babalola EO, Bharucha AE, Schleck CD, Gebhart JB, Zinsmeister AR, Melton LJ 3rd. Decreasing utilization of hysterectomy: A population-based study in Olmsted County, Minnesota, 1965-2002. Am J Obstet Gynecol 2007;196:214.
12. Desai S, Campbell OM, Sinha T, Mahal A, Cousens S. Incidence and determinants of hysterectomy in a low-income setting in Gujarat, India. Health Policy Plan 2017;32:68-78.
13. Stang A, Merrill RM, Kuss O. Hysterectomy in Germany: A DRG-based nationwide analysis, 2005-2006. Dtsch Arztebl Int 2011;108:508-14.
14. Liu F, Pan Y, Liang Y, Zhang C, Deng Q, Li X, *et al*. The epidemiological profile of hysterectomy in rural Chinese women: A population-based study. BMJ Open 2017;7:e015351.
15. Khemani K, Junnare K, Ingole S, Shekhawat GS. Non descent vaginal hysterectomy: A study on safety, feasibility, indications and complications. Sch Int J Obstet Gynec 2021;4:423-6.
16. Rashid A, Qamar H, Pario S. Frequency and morphology of benign histopathological lesions in total abdominal hysterectomy specimens. Prof Med J 2020;27:481-6.
17. Moradan S, Ghorbani R, Lotfi A. Agreement of histopathological findings of uterine curettage and hysterectomy specimens in women with abnormal uterine bleeding. Saudi Med J 2017;38:497-502.
18. Zygouris D, Chalvatzas N, Gkoutzioulis A, Anastasiou G, Kavallaris A. Total laparoscopic hysterectomy without uterine manipulator. A retrospective study of 1023 cases. Eur J Obstet Gynecol Reprod Biol 2020;253:254-8.
19. Callegari LS, Gray KE, Zephyrin LC, Harrington LB, Gerber MR, Cochrane BB, *et al*. Hysterectomy and bilateral salpingo-oophorectomy: Variations by history of military service and birth cohort. Gerontologist 2016;56 Suppl 1:S67-77.
20. Neis KJ, Zubke W, Fehr M, Römer T, Tamussino K, Nothacker M. Hysterectomy for benign uterine disease. Dtsch Arztebl Int 2016;113:242-9.
21. Sawke NG, Sawke GK, Jain H. Histopathology findings in patients presenting with menorrhagia: A study of 100 hysterectomy specimen. J Midlife Health 2015;6:160-3.
22. Sobande AA, Eskandar M, Archibong EI, Damole IO. Elective hysterectomy: A clinicopathological review from Abha catchment area of Saudi Arabia. West Afr J Med 2005;24:31-5.
23. Smith PP, O'Connor S, Gupta J, Clark TJ. Recurrent postmenopausal bleeding: A prospective cohort study. J Minim Invasive Gynecol 2014;21:799-803.
24. Parsons LH, Pedersen R, Richardson DL, Kho KA. The prevalence of occult endometrial cancer in women undergoing hysterectomy for benign indications. Eur J Obstet Gynecol Reprod Biol 2018;223:108-12.
25. Anbreen F, Qadir S, Naeem H, Farhat N, Ghafoor M, Hassan S. Type, time-trend and indications of hysterectomy. Gomal J Med Sci 2018;16:92-6.
26. Bettaiah R, Reddy CANCER. Laparoscopic hysterectomies: Our 10 years-experience in a single laparoscopic center. J Obstet Gynaecol India 2016;66:274-81.

27. Awale R, Isaacs R, Singh S, Mandrelle K. Uterine prolapse: Should hysterectomy specimens be subjected for histopathological examination? J Midlife Health 2017;8:179-82.
28. Hakkarainen J, Nevala A, Tomás E, Nieminen K, Malila N, Pitkäniemi J, *et al*. Decreasing trend and changing indications of hysterectomy in Finland. Acta Obstet Gynecol Scand 2021;100:1722-9.
29. Ramachandran T, Sinha P, Subramanium. Correlation between clinico-pathological and ultrasonographical findings in hysterectomy. JCDR 2011;5:737-40.
30. Kallianidis AF, Maraschini A, Danis J, Colmorn LB, Deneux-Tharaux C, Donati S, *et al*. Epidemiological analysis of peripartum hysterectomy across nine European countries. Acta Obstet Gynecol Scand 2020;99:1364-73.