



**ORIGINAL ARTICLE**

## Effect of Hysterectomy with Ovarian Conservation on Ovarian Function

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### ABSTRACT

**Background:** Hysterectomy is the commonest gynecological surgery in females. The aim of this study was to assess the effect of doing hysterectomy with ovarian conservation on the ovarian function.

**Methods:** It was an observational cross-sectional study which was conducted in the department of obstetrics and gynecology, Zagazig University Hospitals on 80 cases scheduled to undergo hysterectomy with ovarian preservation due to benign condition during the period from August 2015 to August 2018. Participants were subjected to assessment of ovarian function by ultrasonographic assessment of ovarian volume, morphology and hormonal levels pre-operative and postoperative. The research was accepted by the Institutional Review Board of the Faculty of Medicine in Zagazig University. The research was done according to the Code of Ethics of the World Medical Association (Declaration Helsinki) for Studies involving humans.

**Results:** There was a statistically non-significant decrease in FSH level preoperatively to one month postoperatively that significantly increased again three months postoperatively.. There was a non-significant difference between right ovarian volume preoperatively and one month postoperatively. There was a significant difference between right ovarian volume preoperatively and three months postoperatively.

**Conclusions:** we concluded that there was no evidence of adverse effect on the ovarian function of the conserved ovaries 3 months after doing hysterectomy in premenopausal patients as by hormonal and U/S criteria.

**Keywords:** Hysterectomy; Ovarian Function; Ovarian Volume; Ovarian Conservation.



### INTRODUCTION

Hysterectomy is the one of the widest gynecological surgery in the developed and developing countries. It comes only second to caesarean section in the USA. However, since hysterectomy disrupts the anatomical relationships, local nerve and blood supply, also it is supposed that ovarian function could be adversely affected [1].

The ovarian reserve is defined as the number and the quality of oocytes in the ovary. Tests of ovarian reserve include: basal endocrine markers (such as day (D2) FSH, LH, estradiol and inhibin B), dynamic biochemical tests (such as the Clomiphene Citrate Challenge test, the exogenous FSH stimulation test and the GnRH stimulation test) and

basal biophysical tests (including Doppler studies of the blood flow in the ovaries, ovarian volume and antral follicles counts) [2].

Atabekoğlu and his group [3] assumed that the adverse affection of the ovarian reserve following hysterectomy may be explained by the acute hypoxia affecting the ovaries after ligation of the uterine arteries during surgery.

### METHODS

This was observational cross-sectional study, which was conducted in the department of Obstetrics and Gynecology, Zagazig University Hospitals on 80 cases scheduled to undergo hysterectomy with ovarian conservation due to benign uterine conditions. All cases of hysterectomy with ovarian preservation, which was admitted in the Department

of Obstetrics and Gynecology Zagazig University, were included in the study in the period from August 2015 to August 2018, so the sample size was 80 cases.

All the study details were explained to the participants and they signed an informed written consent before the inclusion in our study. And the study had been accepted by (IRB) the Institutional Review Board of the Faculty of Medicine-Zagazig University. The study was done according to the Code of Ethics of the World Medical Association (Declaration Helsinki) for Studies involving humans. Inclusion criteria: women who are planned for hysterectomy for benign uterine condition. Exclusion criteria: patients who have underlying lesion require removal of the ovaries, past history of adnexal or uterine procedures for any pathology (except cesarean section), Suspected ovarian malignancy depending on the clinical or ultrasonographic findings, or any history of receiving hormonal treatment during the previous 6 months, menopausal symptoms, liver diseases and patients drop out during the follow up.

All the studied participants were subjected to:

A comprehensive history taking, general, abdominal, local examination and routine preoperative investigation were done to every patient before inclusion.

A blood sample was withdrawn from each participant before surgery at the 2<sup>nd</sup> or 3<sup>rd</sup> day for detection of ovarian reserve tests including FSH and E<sub>2</sub> by electrochemiluminescent (Roche, Diagnostic, Germany). Ultrasonographic assessment of uterus and ovaries: Shape, dimensions and morphology of the uterus and ovaries were performed by two dimensional mode scan. Meanwhile, evaluation of ovarian volume was conducted in both ovaries of all patients. The formula for estimation of ovarian volume is (length x depth x width x 0.533).

All participants had undergone hysterectomy after round discussion decision; 62 participants had undergone abdominal hysterectomy and 18 participants had undergone vaginal hysterectomy.

Postoperative reevaluation of ovarian function by ultrasound and hormonal profile of ovaries were

done for participants who completed the study twice postoperatively at one-month duration and at 3-month duration.

#### **Outcome variables**

To assess the ovarian function after hysterectomy with ovarian conservation by assessing the following parameters before and after surgery: Ovarian volume by U/S. Hormonal profile by measuring FSH and estradiol.

#### **Statistical Analysis**

The results were statistically revised and analyzed using Epi-Info version 6 and SPP for Windows version 8 [5].

### **RESULTS**

The age of studied participants ranged from 41 to 46 years with mean 43.15 years as shown in table (1). About 43%, 35% and 23% of the studied patients had hysterectomy for treatment of uterine fibroid, adenomyosis and uterine prolapse respectively as shown in table (2). However, there was a non-significant change between FSH levels preoperatively and three months postoperatively as shown in table (3) & figure (1)A. Serum estradiol level show statistically significant non-increase in its level from 115.8 preoperatively to 127.4 one month postoperatively that significantly increased again to 395 three months postoperatively. However, there was a significant difference in estradiol levels preoperatively and three months postoperatively as shown in table (4) & figure (1)B. There was a non-significant difference between right ovarian volume preoperatively and one month postoperatively and also between right ovarian volume one and three months postoperatively. There was a significant difference between right ovarian volume preoperatively and three months postoperatively as shown in table (5) & figure (1)C. There was a non-significant difference between left ovarian volume preoperatively and one month postoperatively. There was a significant difference between left ovarian volume preoperatively and three months postoperatively and between volume one and three months postoperatively as shown in table (6) & figure (1)D.

**Table (1):** Age distribution of the studied patients

Parameter	N=80
<b>Age (years):</b>	
<b>Mean ±SD</b>	43.15 ± 1.502
<b>Range</b>	41 – 46

**Table (2):** Distribution of the studied patients according to cause of hysterectomy

Parameter	N=80	%
<b>Cause:</b>		
<b>Fibroid</b>	34	42.5%
<b>Adenomyosis</b>	28	35.0%
<b>Prolapse</b>	18	22.5%

**Table (3):** Comparison between FSH levels pre and postoperatively among the studied patients

FSH (IU/ml)	Median	Range	Z	P
<b>Preoperatively</b>	8.2	2.5 – 83.6	-0.8	0.423 <sup>‡</sup>
<b>One month postoperatively</b>	5	3.2 – 91.8	0.207	0.836 <sup>¥</sup>
<b>Three months postoperatively</b>	7	3.25 – 38	-3.733	0.001 <sup>**∞</sup>

<sup>‡</sup>P for difference between preop and one month postop

<sup>¥</sup>P for difference between preop and three month postop

<sup>∞</sup>P for difference between one and three month postop

Z Wilcoxon signed rank test

\*\*p≤0.001 is statistically highly significant

\*p<0.05 is statistically significant

**Table (4):** Comparison between estradiol levels pre and postoperatively among the studied patients

E2 (pg/ml)	Median	Range	Z	P
<b>Preoperatively</b>	115.8	5 – 310	-0.089	0.929 <sup>‡</sup>
<b>One month postoperatively</b>	127.4	5 – 527.5	-5.729	<0.001 <sup>**¥</sup>
<b>Three months postoperatively</b>	395	87.8–430.7	-3.517	<0.001 <sup>**∞</sup>

<sup>‡</sup>P for difference between preop and one month postop

<sup>¥</sup>P for difference between preop and three month postop

<sup>∞</sup>P for difference between one and three month postop

Z Wilcoxon signed rank test

\*\*p≤0.001 is statistically highly significant

\*p<0.05 is statistically significant

**Table (5):** Comparison between right ovarian volume pre and postoperatively among the studied patients

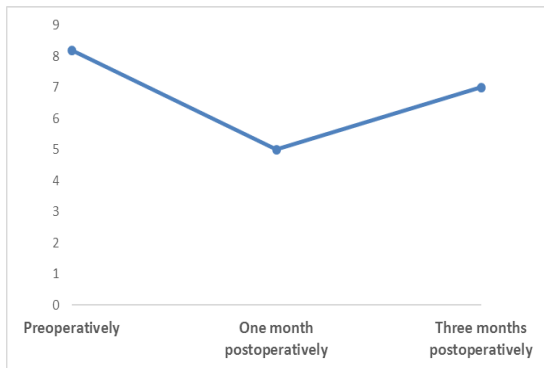
Ovarian volume (cm <sup>3</sup> )	Median	Range	Z	P
<b>Preoperatively</b>	6.4	3.04 – 13.5	-1.081	0.28
<b>One month postoperatively</b>	7.88	0.21–10.38	-3.885	< 0.001
<b>Three months postoperatively</b>	5.87	1.5 – 9.8	-1.268	0.068

p < 0.001 means highly significant Z Wilcoxon signed rank test

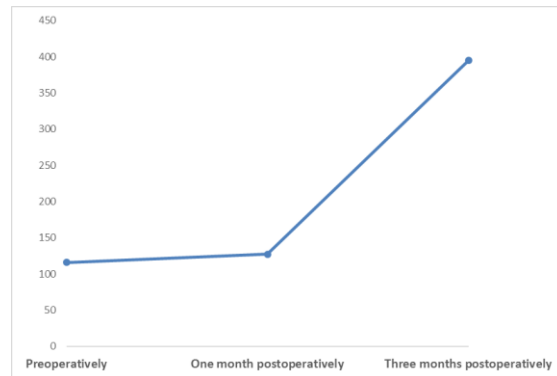
**Table (6):** Comparison between left ovarian volume pre and postoperatively among the studied patients

Ovarian volume (cm <sup>3</sup> )	Median	Range	Z	P
Preoperatively	4.5	4.16 – 16.4	-1.124	0.261
One month postoperatively	6.33	3.04–13.5	-3.031	0.002*
Three months postoperatively	6.11	2.29 – 10.8	-2.06	0.039*

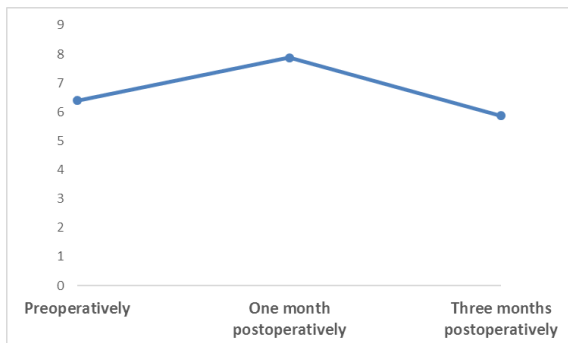
\*p<0.05 is statistically significant Z Wilcoxon signed rank test



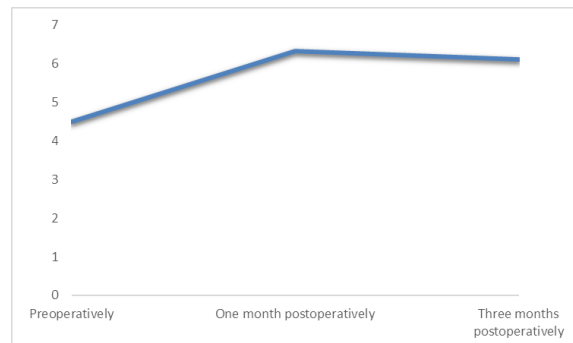
A



B



C



D

**Figure (1):** A) Line graph showing change in serum FSH among the studied patients. B) Line graph showing change in serum estradiol among the studied patients. C) Line graph showing change in volume of right ovary among the studied patients. D) Line graph showing change in volume of left ovary among the studied patients.

### DISCUSSION

Hysterectomy is the widest gynecological operation among females. Erekson and his group [6] found that more than one quarter of all female in America have had a hysterectomy, and it is suspected that up to large number of women will have a hysterectomy during their lives. It was uncertain if hysterectomy increases the risk for adverse affection of the ovarian function. As more than half of all hysterectomies are done in females younger than the age of 44 years, with the highest rates between the age of 40 to 44 years [7].

Trabuco and his group [8] found that hysterectomy, even with conserved ovaries, might accelerate

ovarian failure, but whether hysterectomy with ovarian conservation affects the ovarian reserve postoperatively remains unsolved issue.

Researches regarding the hysterectomy effect on the ovarian function are still lacking. Therefore, in this study, we tried to assess the affection of hysterectomy with ovarian conservation on ovarian function.

The study was observational cross-sectional trial, conducted in the Obstetrics and Gynecology Department in Zagazig University Hospitals on 80 patients scheduled to undergo hysterectomy with ovarian preservation due to benign uterine lesions as

uterine fibroid, adenomyosis and prolapse. Eleven women were lost during follow up.

The participant's ages ranged from 41 to 46 years old. The included patients underwent hysterectomy due to benign uterine lesion as fibroid (43% of all participants), adenomyosis (35%) and prolapse (23%).

The ovarian function of the studied participants was assessed 3 times; one before surgery and two times after surgery (one month and three months postoperatively). This ovarian function was assessed by both laboratory and ultrasonographic criteria including FSH and E<sub>2</sub> levels and ultrasonographic ovarian volume. Our results revealed that there was statistically non-significant decrease in FSH level from 8.2 IU/ml preoperatively to 5 IU/ml one month postoperatively that significantly increased again to 7 IU/ml three months postoperatively. However, there is non-significant difference between FSH levels preoperatively and three months postoperatively.

Regarding estradiol, there was statistically significant non-increase in serum estradiol level from 115.8 pg/ml preoperatively to 127.4 pg/ml one month postoperatively that significantly increased again to 395 pg/ml after three months of operation. However, there was significant change in estradiol levels preoperatively and three months postoperatively.

This was inconsistent with Chalmers and his colleagues [9] who stated that there was no evidence of adverse affection of the ovarian function, as reflected in FSH levels. Furthermore, Abdel Azim and his group [10] had concluded that there was no prove on adverse ovarian affection of the conserved ovaries one year after hysterectomy in the premenopausal female as detected by both FSH and estradiol levels. However, Deng and his group [11] stated that hysterectomy with ovarian conservation may have some effect on the ovarian function.

Our data stated that there was statistically non-significant increase in volume of right ovary from 6.4 cm<sup>3</sup> preoperatively to 7.88 cm<sup>3</sup> one month postoperatively that significantly decreased again to 5.87 cm<sup>3</sup> three months postoperatively. There is significant difference in right ovarian volume pre and three months postoperatively.

Also, left ovarian volume was statistically non-significant increase in volume of left ovary level from 4.5 preoperatively to 6.33 one month postoperatively that non-significantly decreased

again to 6.11 three months postoperatively. There was no statistically significant difference in the volume of left ovary pre and three months postoperatively.

Moorman and his group [12] studied the risk for earlier ovarian failure between females of hysterectomy with ovarian conservation, as compared with females of similar age without hysterectomy. They concluded there was increased risk for earlier ovarian failure in females with premenopausal hysterectomy. Chun and his colleagues [13] studied the effect of hysterectomy on ovarian function in early postoperative period and found that hysterectomy may have an adverse effect on the ovarian reserve in immediate postoperative period.

Chun and Ji [4] suggested that the hysterectomy may affect ovarian reserve especially in the early postoperative period. And this affection might change according to the type of surgery.

Atabekoğlu and his group [3] revealed that the affection on the ovarian reserve following hysterectomy may be due to the acute hypoxia in the ovaries after the ligation of the uterine arteries during surgery. This data was in opposite with the conclusion by Lee and his group [14] who assumed that hysterectomy did not have adverse effect on the ovarian arterial blood flow indices (pulsatile and resistance indices) based on Doppler ultrasonography findings.

Another explanation for the earlier menopause among female undergoing hysterectomy is not the operation by itself but may be explained by the underlying cause that led to the surgery that places women at increased risk for affection of the ovarian function. There is little information about the risk of affection of the ovarian function related to common indications for hysterectomy such as dysfunctional uterine bleeding, leiomyomas, or endometriosis. Certain cases of dysfunctional uterine bleeding that lead to hysterectomy are a more evident manifestation of the menstrual changes that many women may have in the months or years preceding natural menopause. Other common indications for hysterectomy such as leiomyomas or endometriosis also could be related to increased risk for early menopause is uncertain [15,16].

### CONCLUSIONS

We have concluded that no evidence of ovarian dysfunction of conserved ovaries 3 months following hysterectomy in premenopausal women as evident by hormonal and U/S criteria.



**Conflict of Interest:** No conflicts of interest were reported.

**Financial Disclosures:** Nothing to declare.

#### REFERENCES

1. Gupta S, & Manyonda I. Hysterectomy for benign gynaecological disease. *Curr. Obstet. Gynecol.* 2006;16(3), 147-53.
2. Luesley DM, Baker PN (eds). *Obstetrics and Gynaecology, an evidence-based text for MRCOG.* London: Arnold Publishing Company; 2004. p. 297-302
3. Atabekoğlu C, Taşkin S, Kahraman K, Gemici A, Taşkin EA, Özmen B, et al. The effect of total abdominal hysterectomy on serum anti-Müllerian hormone levels: a pilot study. *Climacteric.* 2012; 15: 393-7.
4. Chun S and Ji Y. Effect of hysterectomy on ovarian reserve in the early postoperative period based on the type of surgery. *J Menopausal Med.* 2020; 26(3): 159-64.
5. Abdo Z, Schüette UM, Bent SJ, Williams CJ, Forney LJ, Joyce P. Statistical methods for characterizing diversity of microbial communities by analysis of terminal restriction fragment length polymorphisms of 16S rRNA genes. *Environ. Microbiol.* 2006; 8(5), 929-38.
6. Erekson EA, Weitzen S, Sung VW, Raker CA, Myers DL. Socioeconomic indicators and hysterectomy status in the United States, 2004. *J reprod med.* 2009; 54(9), 553.
7. Keshavarz H, Hillis SD, Kieke BA, Marchbanks PA. Hysterectomy surveillance—United States, 1994–1999. *MMWr CDC Surveill Summ*, 2002; 51(1); 1-8.
8. Trabuco EC, Moorman PG, Algeciras-Schimmich A, Weaver A L, Cliby WA. Association of ovary-sparing hysterectomy with ovarian reserve. *Obstet Gynecol.* 2016; 127(5), 819-27.
9. Chalmers C. Does hysterectomy in a premenopausal woman affect ovarian function? *Med Hypotheses.* 1996; 46: 573–575.
10. Abdelazim IA, Abdelrazak KM, Elbiaa AA, Farghali MM, Essam A, Zhurabekova G.. Ovarian function and ovarian blood supply following premenopausal abdominal hysterectomy. *Prz Menopauzalny.* 2015; 14(4), 238-42.
11. Deng CY, Tang DM, Yu Q, He FF. Effect of premenopausal hysterectomy on ovarian function. *Zhongguo Yi Xue Ke Xue Yuan Xue Bao. Acta Acad. Med. Sin.* 2002; 24(6):639–42.
12. Moorman PG, Myers ER, Schildkraut JM, Iversen ES, Wang F, Warren N. Effect of hysterectomy with ovarian preservation on ovarian function. *Obstet Gynecol.* 2011; 118(6): 1271-9.
13. Chun S, Ji YI, Koo YH. Does hysterectomy with ovarian preservation affect ovarian function in early postoperative period? *Fertil. Steril.* 2013; 100(3), S161.
14. Lee DY, Park HJ, Kim BG, Bae DS, Yoon BK, Choi D. Change in the ovarian environment after hysterectomy as assessed by ovarian arterial blood flow indices and serum anti-Müllerian hormone levels. *Eur J Obstet Gynecol Reprod Biol.* 2010;151(1), 82-85.
15. Randell KM, Honkanen RJ, Tuppurainen MT, Kröger H, Jurvelin JS, Saarikoski S. Fracture risk and bone density of peri-and early postmenopausal women with uterine leiomyomas. *Maturitas,* 2006; 53(3), 333-42.
116. Chun S, Ji YI. Effect of Hysterectomy on Ovarian Reserve in the Early Postoperative Period Based on the Type of Surgery. *J Menopausal Med.* 2020;26(3):159-164.

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