**Original Research Article**

**Short-Term Impact of Prophylactic Salpingectomy on Ovarian Reserve in Perimenopausal Women Undergoing Hysterectomy: A Prospective Observational Study**

**Abstract**

**Background:** Prophylactic salpingectomy is increasingly performed during hysterectomy to reduce epithelial ovarian cancer risk, based on evidence that high-grade serous carcinomas may originate from fallopian tube epithelium. However, concerns exist about potential impacts on ovarian function due to shared vasculature between the fallopian tubes and ovaries.

**Objective:** To evaluate the impact of prophylactic salpingectomy on ovarian reserve and function in perimenopausal women undergoing hysterectomy for benign conditions.

**Methods:** A prospective observational study was conducted at SMS Medical College, Jaipur, from January to December 2024. Fifty-five perimenopausal women (aged 35-49 years) undergoing hysterectomy with bilateral prophylactic salpingectomy and ovarian preservation were enrolled. Serum Anti-Müllerian Hormone (AMH) and Follicle-Stimulating Hormone (FSH) levels were measured preoperatively and at three months postoperatively using ELISA and chemiluminescent immunoassay, respectively.

**Results:** The mean age of participants was 42.2 ± 2.69 years. Preoperative mean FSH was 7.36 ± 0.56 IU/mL and AMH was 1.30 ± 0.29 ng/mL. At three months follow-up, FSH increased slightly to 7.51 ± 0.59 IU/mL (p = 0.166) and AMH decreased marginally to 1.24 ± 0.28 ng/mL (p = 0.178). All participants maintained FSH levels within normal range (3.0-10.0 IU/mL) both pre- and postoperatively. The proportion with normal AMH levels (1.0-4.0 ng/mL) decreased from 81.8% to 76.4%, while below-normal AMH increased from 18.2% to 23.6%.

**Conclusions:** Prophylactic salpingectomy performed during hysterectomy does not significantly compromise short-term ovarian reserve in perimenopausal women. The minimal, non-significant changes in AMH and FSH levels support the safety of this cancer risk-reduction strategy when performed with proper surgical technique and ovarian preservation. These findings support the safety of prophylactic salpingectomy in terms of short-term ovarian endocrine function when the ovaries are preserved. Thus, salpingectomy may be considered a viable cancer risk-reduction strategy without adversely impacting ovarian reserve in the immediate postoperative period.

**Keywords:** Prophylactic salpingectomy, ovarian reserve, Anti-Müllerian hormone, follicle-stimulating hormone, perimenopausal women.

**Introduction**

Hysterectomy remains one of the most commonly performed gynecological procedures worldwide, particularly for benign conditions such as uterine fibroids, abnormal uterine bleeding, and adenomyosis.**1** In many cases involving premenopausal and perimenopausal women, ovarian conservation is routinely practiced to preserve endocrine function and delay surgical menopause**2**. However, evolving understanding of gynecological oncology has led to a paradigm shift toward performing opportunistic or prophylactic salpingectomy during hysterectomy, even for benign indications.**3**

The rationale for this practice stems from compelling evidence suggesting that a substantial proportion of high-grade serous ovarian carcinomas—the most lethal subtype of ovarian cancer—may originate from secretory epithelial cells of the distal fallopian tube, particularly the fimbrial end.**4** This "fimbrial hypothesis" has led to re-evaluation of risk-reducing strategies, with professional societies now recommending bilateral salpingectomy as an effective method for reducing ovarian cancer risk without compromising ovarian function.**5**

Despite its growing acceptance, prophylactic salpingectomy has raised concerns regarding potential impacts on ovarian function. The ovarian blood supply is derived from both the ovarian artery and anastomotic connections with the uterine artery through the mesosalpinx and utero-ovarian arcade.**6** Salpingectomy may disrupt this vascular network, potentially affecting ovarian perfusion and function.**7**

Ovarian reserve, representing the quantity and quality of oocytes within the ovaries, is clinically assessed using biochemical markers. Anti-Müllerian Hormone (AMH), secreted by granulosa cells of preantral and small antral follicles, is currently regarded as the most sensitive marker of ovarian reserve.**8** Follicle-Stimulating Hormone (FSH) serves as another important biomarker, with elevated levels indicating declining ovarian function.**9**

Previous studies investigating the impact of prophylactic salpingectomy on ovarian reserve have yielded conflicting results, with limitations including small sample sizes, short follow-up periods, and heterogeneous surgical techniques.**10** Given this clinical uncertainty, there is a pressing need for well-designed studies evaluating the effects of prophylactic salpingectomy on ovarian function, particularly in perimenopausal women who rely on ovarian hormonal function for systemic wellbeing.

This prospective observational study aimed to evaluate the impact of prophylactic salpingectomy performed during hysterectomy on ovarian reserve and function in perimenopausal women, measuring serum AMH and FSH levels preoperatively and at three months postoperatively.

**Methods**

*Study Design and Setting:* This hospital-based, prospective, single centred, observational study was conducted in the Department of Obstetrics and Gynecology at SMS Medical College and Attached Hospitals, Jaipur, from January 2024 to December 2024. Ethical approval was obtained from our Institutional Ethics Committee (Ref. No. 445/MC/EC/2023) and all participants provided written informed consent.

*Study Population:* The study universe comprised all perimenopausal women aged 35-49 years attending the gynecology outpatient department and scheduled for hysterectomy. Participants were enrolled consecutively based on strict inclusion and exclusion criteria.

*Inclusion Criteria:*

* Perimenopausal women aged 35-49 years undergoing hysterectomy with salpingectomy and ovarian preservation
* Absence of menopausal symptoms with baseline FSH <10 IU/mL
* Written informed consent for participation

*Exclusion Criteria:*

* Postmenopausal women
* Women undergoing hysterectomy with unilateral/bilateral oophorectomy or salpingo-oophorectomy
* Use of hormonal therapy or contraception within 3 months
* History of previous gynecological surgery
* Perimenopausal women undergoing hysterectomy without salpingectomy

*Sample Size Calculation:* Sample size was calculated based on a standard deviation of 1.87 IU/L in preoperative AMH and FSH levels, detectable mean difference of 1 IU/L, power of 80%, and alpha error of 0.05. The minimum required sample size was determined to be 55 women.

*Data Collection:* Comprehensive demographic, clinical, and gynecological assessments were performed, including age, BMI, parity, menstrual history, obstetric history, past medical history, and surgical indication. Routine preoperative investigations and pre-anesthetic evaluation were completed according to institutional protocols.

*Hormonal Assessment:* Serum AMH and FSH levels were measured preoperatively via fasting venous blood samples. AMH was measured using ELISA, and FSH using chemiluminescent immunoassay (CLIA). All hormonal assays were performed in the institutional central laboratory under quality control measures. Hormonal assessments were repeated at three months postoperatively using identical methodologies.

*Surgical Procedure:* All participants underwent total abdominal hysterectomy with bilateral prophylactic salpingectomy, with both ovaries preserved. Procedures were performed by experienced surgeons using standardized techniques to minimize compromise of ovarian blood supply. Intraoperative details including operative duration, estimated blood loss, surgical findings, and complications were recorded.

*Follow-up:* Standard postoperative care was provided according to institutional protocols. Participants were followed for three months and recalled for repeat hormonal testing. Any new onset of menopausal symptoms or additional medical interventions were documented.

*Statistical Analysis:* Data analysis was performed using IBM SPSS version 26.0. Quantitative variables were summarized using means and standard deviations, while qualitative variables were expressed as percentages and proportions. Paired t-tests were applied to compare pre- and postoperative hormone levels. A p-value <0.05 was considered statistically significant.

**Results**

*Demographic Characteristics*

A total of 55 perimenopausal women were enrolled in the study. The mean age was 42.2 ± 2.69 years, with an age distribution ranging from 38 to 47 years. A significant majority of participants (52.7%) fell within the 41–45 age group, followed by 36.4% in the 35–40 age group and 10.9% in the 46–49 bracket. This reflects a typical perimenopausal population targeted for elective hysterectomy.

In terms of religious background, 76.4% were Hindu, 14.5% were Muslim, and 9.1% belonged to other or unspecified religious groups. Most participants (60%) resided in urban areas, while 40% were from rural settings, highlighting a relatively urbanized cohort, likely due to accessibility of tertiary care services.

Educational status varied across the study population: 32.7% were illiterate, 25.5% had completed primary education, 18.2% had secondary-level education, and 12.7% had a college degree or higher. This educational gradient is important when counselling patients regarding informed consent for prophylactic procedures like salpingectomy.

Socioeconomic classification using the Modified Kuppuswamy Scale showed that 34.5% of women were from the lower middle class, 27.3% from the upper middle class, 21.8% from the upper class, and 16.4% from the lower class. The distribution suggests a predominance of middle-income women accessing elective gynaecologic surgery at the study center.

*Reproductive and Clinical Profile*

|  |  |  |  |
| --- | --- | --- | --- |
| **Obstetric History** | **Category** | **Frequency (n)** | **Percentage (%)** |
| Parity | P1 | 2 | 3.6% |
| P2 | 37 | 67.3% |
| P3 | 16 | 29.1% |
| Living Children | L1 | 2 | 3.6% |
| L2 | 37 | 67.3% |
| L3 | 16 | 29.1% |
| **Menstrual History** | **Frequency (n)** | **Percentage (%)** |
| Oligomenorrhoea | 30 | 54.5% |
| Amenorrhea | 16 | 29.1% |
| Regular Menses | 6 | 10.9% |
| Irregular Menses | 3 | 5.5% |
| **Chronic Illness** | **Frequency (n)** | **Percentage (%)** |
| None | 28 | 50.9% |
| Hypertension | 10 | 18.2% |
| Hypothyroidism | 9 | 16.4% |
| Diabetes Mellitus | 8 | 14.5% |

***Table 1:*** *Reproductive and Clinical Profile of Participants*

The majority of women were multiparous, with 67.3% being para 2 and 29.1% para 3, suggesting completed family size. Only two women (3.6%) were para 1. The number of living children corresponded exactly with parity, supporting that there was no history of child loss in most participants.

Regarding menstrual history, oligomenorrhea was the most common complaint, reported by 30 women (54.5%), followed by amenorrhea in 29.1%, regular cycles in 10.9%, and irregular or unpredictable bleeding in 5.5%. These menstrual patterns are typical of late reproductive and perimenopausal transitions.

Nearly half of the participants (49.1%) had one or more chronic illnesses. Hypertension was the most common comorbidity (18.2%), followed by hypothyroidism (16.4%) and type 2 diabetes mellitus (14.5%). The presence of these chronic conditions underscores the need for individualized perioperative management in this demographic.

*Surgical Outcomes*

The mean surgical duration was 95.6 ± 7.36 minutes, reflecting a moderate operative time consistent with combined hysterectomy and salpingectomy procedures. The estimated blood loss was 190 ± 24.3 mL, with no cases requiring blood transfusion, indicating low intraoperative morbidity.

Intraoperative findings were varied: a bulky uterus was observed in 40% of cases, endometrial thickening or polyps in 21.8%, and fibroids in 10.9%. Other findings included adnexal adhesions (7.3%) and tubo-ovarian cysts (3.6%). No intraoperative complications such as haemorrhage, ureteric injury, or need for conversion to laparotomy were reported.

Histopathological examination of surgical specimens confirmed benign pathologies in all cases. Secretory or proliferative endometrium was reported in 30.9% of women, leiomyoma in 23.7%, endometrial hyperplasia in 25.5%, and simple cystic changes in 9.1%. Importantly, no precancerous or malignant lesions were detected, affirming the elective, prophylactic nature of salpingectomy in this cohort.

*Preoperative Biochemical Parameters*

Participants were medically stable preoperatively, with mean hemoglobin levels of 11.7 ± 0.40 g/dL, platelet counts of 2.39 ± 0.16 lakh/mm³, and random blood sugar levels of 96.1 ± 11.6 mg/dL. TSH was within normal limits at 2.85 ± 0.27 µIU/mL, ensuring euthyroid status for accurate hormone interpretation.

*Hormonal Outcomes*

*Preoperative Values:*

* Mean FSH: 7.36 ± 0.56 IU/mL (range 6.5-9.1)
* Mean AMH: 1.30 ± 0.29 ng/mL (range 0.82-2.05)
* All participants (100%) had FSH within normal range (3.0-10.0 IU/mL)
* Normal AMH levels (1.0-4.0 ng/mL) in 81.8%, below normal (<1.0 ng/mL) in 18.2%

*Postoperative Values (3 months):*

* Mean FSH: 7.51 ± 0.59 IU/mL (range 6.70-9.50)
* Mean AMH: 1.24 ± 0.28 ng/mL (range 0.78-1.94)
* All participants (100%) maintained FSH within normal range
* Normal AMH levels in 76.4%, below normal in 23.6%

These findings suggest preservation of ovarian reserve and function in the short-term postoperative period. Although there was a slight downward trend in AMH and a minor increase in FSH, both remained within expected physiological limits.

*Statistical Comparison*

The increase in FSH from 7.36 to 7.51 IU/mL was not statistically significant (p = 0.166). Similarly, the decrease in AMH from 1.30 to 1.24 ng/mL was not significant (p = 0.178). The proportion of women with below-normal AMH increased marginally from 18.2% to 23.6%.

Fig 1. Fig 2.

***Discussion***

This prospective study demonstrates that prophylactic salpingectomy performed during hysterectomy does not significantly compromise short-term ovarian reserve in perimenopausal women. At three months postoperatively, only minimal, statistically insignificant changes were observed in serum AMH and FSH levels, with all values remaining within physiological limits. These findings support the oncologic and endocrine safety of opportunistic salpingectomy in this population.

Our results align with a growing body of literature suggesting that removal of the fallopian tubes, when performed with careful surgical technique and ovarian preservation, does not result in clinically meaningful impairment of ovarian reserve. The non-significant decrease in AMH levels (from 1.30 to 1.24 ng/mL) observed in our study is comparable to that reported by Findley et al.**11**, who found no significant difference in AMH values following salpingectomy during laparoscopic hysterectomy. Similarly, Tehranian et al.**12** reported that the rate of AMH decline over time did not differ significantly between women undergoing salpingectomy versus those who did not, reinforcing the notion that the procedure does not independently compromise ovarian endocrine function.

The preservation of FSH within the normal range across all participants in our study further supports the integrity of the hypothalamic-pituitary-ovarian (HPO) axis postoperatively. FSH is a sensitive marker of ovarian aging and dysfunction; elevated levels typically precede menopausal transition.**9** Our findings suggest that short-term ovarian responsiveness remains unaffected following salpingectomy, reinforcing the physiological reserve indicated by stable AMH levels.

Mechanistically, concerns about vascular disruption have been a key barrier to broader adoption of prophylactic salpingectomy, particularly among younger or perimenopausal women. Anatomical studies confirm that the ovarian blood supply derives from the ovarian artery as well as anastomoses with the uterine artery via the mesosalpinx.**6,14** Theoretically, interruption of this arcade during salpingectomy could reduce ovarian perfusion. However, in our study, no clinical signs of vascular compromise or postoperative ovarian dysfunction were observed, which may reflect the experience of the surgical team and meticulous preservation of mesovarian vasculature. This is consistent with prior experimental models showing that when salpingectomy is performed with care, ovarian blood flow and histologic integrity are preserved.**7**

A recent meta-analysis by Gelderblom et al.**13** reinforces this perspective by concluding that opportunistic salpingectomy has no significant short-term impact on ovarian reserve markers, including AMH and FSH. Our study adds to this evidence base by providing region-specific data from an Indian tertiary care setting and focusing on a perimenopausal population—a group for whom the preservation of ovarian hormonal activity carries systemic health implications, including cardiovascular, skeletal, and neurocognitive effects.

Another important aspect is the clinical context of the study population. The majority of participants had completed their fertility and were undergoing hysterectomy for benign indications, making them appropriate candidates for opportunistic salpingectomy. The lack of malignant findings on histopathological examination emphasizes the prophylactic intent of the procedure. This aligns with recent gynaecologic oncology recommendations encouraging bilateral salpingectomy during hysterectomy as a primary prevention strategy against high-grade serous carcinoma.**3,5**

Importantly, our data suggest that even women with chronic comorbidities such as hypertension, diabetes, or hypothyroidism—conditions present in nearly half of our study group—can safely undergo prophylactic salpingectomy without increased risk of short-term ovarian endocrine dysfunction. This finding is clinically relevant, as these patients often require individualized surgical and hormonal considerations.

From a public health standpoint, the integration of prophylactic salpingectomy into routine gynaecological surgery represents a potentially cost-effective and low-risk intervention for ovarian cancer prevention. The “fimbrial hypothesis” has redefined the pathogenesis of high-grade serous carcinomas, shifting the preventive focus toward earlier interventions in the fallopian tubes.**4** When applied judiciously in women with completed fertility undergoing surgery for benign disease, this strategy offers oncological benefit without compromising hormonal integrity, as demonstrated in our study and others.**11,12**

Despite the reassuring results, our study highlights a slight numerical increase in the proportion of women with below-normal AMH levels (from 18.2% to 23.6%). Although not statistically significant, this trend warrants further investigation in larger cohorts with longer follow-up durations. AMH decline may be gradual and become more evident beyond the three-month window assessed in this study. Similarly, subtle variations due to assay variability or intrinsic ovarian aging cannot be ruled out and should be considered when interpreting individual hormone levels.

There have been no detailed, prospective reports that have estimated ovarian cancer risk reduction with opportunistic salpingectomy, neither among women at baseline population risk nor among women at a high risk of developing the disease. The situation is complicated for women with a BRCA mutation—bilateral salpingo‐oophorectomy is a proven means of risk reduction and salpingectomy alone is not the standard of care. Based on the existing data, salpingectomy alone should only be reserved for women with a lifetime risk of ovarian cancer of less than 5%.15

Ultimately, this study adds to the growing evidence base that prophylactic salpingectomy, when performed with ovarian preservation, is a safe, feasible, and hormonally non-disruptive procedure for perimenopausal women. It supports broader clinical implementation of this cancer risk-reduction strategy without incurring endocrine harm in the short term. However, definitive conclusions about long-term hormonal health require ongoing surveillance and randomized controlled trials with larger sample sizes and longer duration.

*Limitations*

Several limitations should be acknowledged. The study assessed ovarian reserve only up to three months postoperatively. This limited follow-up period may not capture delayed or long term changes in ovarian function that could manifest over time. There was no comparison group of women undergoing hysterectomy without salpingectomy. This restricts the ability to definitively attribute observed hormonal changes solely to the salpingectomy procedure. The study relied solely on biochemical markers without functional assessments such as antral follicle count. Additionally, potential assay variability, particularly for AMH measurements, may affect result accuracy.

*Future Directions*

Longer-term follow-up studies are needed to assess whether the observed trends persist or resolve over time. Comparative studies with control groups undergoing hysterectomy without salpingectomy would strengthen the evidence base. Investigation of additional ovarian reserve markers and functional assessments could provide more comprehensive evaluation of ovarian status post-salpingectomy.

**Conclusions**

This prospective observational study demonstrates that prophylactic bilateral salpingectomy performed during hysterectomy does not significantly compromise short-term ovarian reserve in perimenopausal women. The minimal, non-significant changes in serum AMH and FSH levels at three months postoperatively, with all values remaining within physiological limits, support the safety of this cancer risk-reduction strategy when performed with appropriate surgical technique and ovarian preservation.

These findings provide valuable evidence supporting the incorporation of opportunistic salpingectomy into routine gynecological practice for perimenopausal women undergoing hysterectomy for benign indications. This approach offers meaningful ovarian cancer risk reduction without adversely impacting short-term ovarian endocrine function, making it a viable preventive strategy that balances oncological benefit with preservation of hormonal health.

**Clinical Significance Statement**

Prophylactic salpingectomy can be safely offered to perimenopausal women undergoing hysterectomy as an effective ovarian cancer risk-reduction measure without compromising short-term ovarian reserve, supporting its integration into routine gynecological surgical practice.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, manuscript.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1. NA

2. NA

3. NA

**References**

1. Papadopoulos MS, Tolikas AC, Papadopoulos GM. Hysterectomy—current methods and alternatives for benign indications. Obstet Gynecol Int. 2010;2010:356740.
2. Matthews CA. A critical evaluation of the evidence for ovarian conservation versus removal at the time of hysterectomy for benign disease. J Womens Health (Larchmt). 2013;22(8):761-766.
3. Madueke-Laveaux OS, Elsharoud A, et al. What We Know About the Long-Term Risks of Hysterectomy for Benign Indication—A Systematic Review. J Clin Med. 2021;10(22):5335.
4. Lee Y, Miron A, Drapkin R, et al. A candidate precursor to serous carcinoma that originates in the distal fallopian tube. J Pathol. 2007;211(1):26-35.
5. Hanley GE, McAlpine JN, Pearce CL, Miller D. The performance and safety of bilateral salpingectomy for ovarian cancer prevention in the United States. Am J Obstet Gynecol. 2017;216(6):594.e1-594.e9.
6. Tamash Y, Hammer N, Varga I, et al. Arterial blood supply of the mesosalpinx appears segmentally organized in absence of uterine tubes arteries. Physiol Res. 2022;71(Suppl 1):S107-S114.
7. Atilgan R, Pala Ş, Kuloğlu T, et al. Comparison of bilateral proximal tubal occlusion and total salpingectomy on ovarian reserve: an experimental study. Turk J Med Sci. 2020;50(4):1117-1124.
8. Practice Committee of the American Society for Reproductive Medicine. Testing and interpreting measures of ovarian reserve: a committee opinion. Fertil Steril. 2020;114(6):1151-1157.
9. Wang S, Zhang Y, Mensah V, et al. Discordant AMH and FSH among women undergoing IVF: which is better? J Ovarian Res. 2018;11(1):64.
10. Morelli SS, Mandeli J, Goldschlag DE. Prophylactic salpingectomy for ovarian cancer: evaluating ovarian reserve and surgical outcomes. Fertil Steril. 2013;100(6):1704-1710.
11. Findley AD, Siedhoff MT, Hobbs KA, Steege JF, Carey ET. Short-term effects of salpingectomy during laparoscopic hysterectomy on ovarian reserve: a pilot randomized controlled trial. Fertil Steril. 2013;100(6):1704-1708.
12. Tehranian A, Mehdizadeh Kashi A, Bahmanzadeh M, Soltani MH. The impact of opportunistic salpingectomy during abdominal hysterectomy on ovarian reserve: a randomized controlled trial. Med J Islam Repub Iran. 2017;31:84.
13. Gelderblom ME, IntHout J, Dagovic L, Hermens R, Bekkers RL. The effect of opportunistic salpingectomy for primary prevention of ovarian cancer on ovarian reserve: a systematic review and meta-analysis. Maturitas. 2022;165:13-20.
14. Sezik M, Ozkaya O, Demir F, Sezik HT. Total salpingectomy during abdominal hysterectomy: effects on ovarian reserve and ovarian stromal blood flow. J Obstet Gynaecol Res. 2007;33(6):863-869.
15. Kotsopoulos J, Narod SA. Prophylactic salpingectomy for the prevention of ovarian cancer: who should we target?. International journal of cancer. 2020 Sep 1;147(5):1245-51.