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Original Research Article

Study of the incidence of tubal ligation and long-acting reversible contraceptives in tertiary care centre: a population-based study

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ABSTRACT

Background: Tubal ligation and long-acting reversible contraceptives (LARC) provide reliable long-term contraception; however, women's choices are influenced by factors such as age, parity, previous deliveries, and counselling. This study aimed to assess and compare the acceptance of tubal ligation versus LARC among reproductive-aged women at a tertiary care centre, with the primary objective of identifying the demographic, obstetric, and socioeconomic factors affecting their choice of contraception.

Methods: A prospective cross-sectional study was conducted from April 2023 to December 2024 at a tertiary care obstetrics and gynecology centre. Sexually active women aged 19-49 years seeking post-partum family planning were recruited via purposive sampling if opting for tubal ligation or LARC. Sociodemographic, obstetric, and contraceptive data were collected and analysed using SPSS.

Results: Most participants were aged 26-32 years (79, 46.47%) and 18-25 years (75, 44.12%). FTND was the most common previous pregnancy (105, 61.76%). The uterus was anteverted in 165 (97.06%). Contraception choices included tubectomy (99, 58.23%), PPIUCD (28, 16.47%), and DMPA (34, 20%). LARC use was higher in P1L1 (28, 100%) and P1L1A2 (4, 100%), while tubectomy was associated with higher parity and previous LSCS ($p < 0.001$). Delivery mode also influenced method (LSCS 37, 56.92%; FTND 62, 59.05%; $p = 0.0069$).

Conclusions: Tubal ligation was the main contraceptive choice, especially among multiparous women and those with prior cesarean sections. LARC was preferred by younger or lower-parity women but remained underutilised. Choices were influenced by obstetric history and delivery mode, underscoring the need for better counselling, awareness, and access.

Keywords: Cesarean section, Contraception, Contraceptive agents, Intrauterine devices, Medroxyprogesterone acetate, Parity, Postpartum period, Sterilization, Tubal

INTRODUCTION

Contraception is a cornerstone of reproductive health, enabling women to time and limit pregnancies and reduce maternal and neonatal morbidity. Globally, long-acting reversible contraceptives (LARC), such as intrauterine devices and subdermal implants, alongside permanent methods (such as tubal ligation), represent the most

effective long-term options for women who desire reliable contraception. LARCs combine high efficacy with the possibility of reversibility, making them especially valuable in settings where fertility desires may evolve.^{1,2}

In many developing countries, however, sterilization remains the dominant method of contraception, particularly among postpartum or high-parity women. In

India, for instance, tubal ligation constitutes a large share of modern contraceptive uptake, overshadowing the use of reversible long-acting methods.³ This disparity may arise from provider bias, limited access to LARC, insufficient counselling, or sociocultural preferences favouring permanence once family size is “complete”.⁴

The postpartum period presents a unique and critical window for the initiation of effective contraception. Initiation of LARC immediately postpartum or before hospital discharge can prevent unintended and closely spaced pregnancies, which are known to jeopardize maternal and child health outcomes.⁵ A study in diverse settings have shown that focused antenatal and postpartum counselling, partner involvement, and facility-level support increase LARC uptake in this sensitive interval.⁶ Yet, acceptability and adoption of LARC remain suboptimal in many tertiary care centers, often because women and providers still favour sterilization for “definitive” contraception.⁷

Studies show that factors such as multiparity, age, delivery mode, and prior cesarean sections increase the likelihood of choosing tubal ligation, while younger or lower-parity women prefer LARC but are more prone to discontinuation or switching.^{8,9} Furthermore, while facility-level policies such as reimbursement for immediate postpartum LARC have boosted uptake in high-income settings, their impact in low- and middle-income tertiary centres is less well studied.¹⁰

In the Indian tertiary care context, data are scant on how often women choose tubal ligation versus LARC and what demographic, obstetric, and socioeconomic variables drive those choices. Understanding these determinants is crucial for tailoring family planning services, improving contraceptive counselling, and aligning service delivery toward greater reproductive autonomy.¹¹ Therefore, this study was to evaluate the prevalence of LARC in postpartum and family welfare clinics at a tertiary care facility, including intrauterine devices, contraceptive implants, and tubal ligation. The objectives were to evaluate the impact of these methods on women’s quality of life and to compare the choice between permanent contraception and LARC among women seeking long-term contraception.

METHODS

This prospective, cross-sectional, observational study was conducted at a tertiary care centre in India, specifically targeting women attending post-partum and family welfare clinics. The study was implemented over 21 months, from April 2023 to December 2024, within the obstetrics and gynecology department, encompassing both outpatient and inpatient settings. The institutional ethics committee approved the study before it began, and written informed consent was obtained from all patients.

Inclusion criteria

All sexually active women aged 19-49 years who were willing to adopt tubal ligation or LARC, including those already using LARC, those with previous tubal ligation, and those seeking contraception after ectopic pregnancy, miscarriage, or abortion, were included.

Exclusion criteria

Women with serious medical conditions, such as cancer, diabetes mellitus, heart disease, HIV, thyroid disorders, hypertension, liver or renal disease, obesity, rheumatoid arthritis, collagen vascular disease, tuberculosis, or coagulation disorders, were excluded.

Eligible participants were screened at obstetrics outpatient departments, post-partum clinics, and family welfare clinics. Detailed history-taking was performed to collect personal and demographic information, menstrual history, and obstetric history, including gravidity, parity, number of live births, abortions, ectopic pregnancies, and previous delivery mode (normal vaginal delivery or caesarean section). Contraceptive history, prior knowledge, and preferences were also noted. A comprehensive clinical examination was conducted, including vital signs, per abdominal examination for uterine size or tenderness, and pelvic examination with speculum and bimanual assessment.

Baseline laboratory investigations were performed for all participants, including complete blood count, random blood sugar, serum creatinine, bleeding and clotting times, and thyroid function tests (TSH, Free T3, Free T4). Ultrasonography was performed to rule out uterine or adnexal pathologies.

Participants were extensively counselled about both permanent and reversible contraceptive methods. Based on their informed choices, the participants were divided into two groups. The tubal ligation group included women who opted for puerperal bilateral abdominal tubectomy, concurrent tubectomy during caesarean section, interval tubectomy, or laparoscopic tubectomy. The LARC group included women who chose post-partum intra-uterine contraceptive devices (PPIUCD), copper IUCD, levonorgestrel-releasing IUCD, depot medroxy progesteroneacetate (DMPA) injections, or subdermal implants.

Follow-up visits were conducted at 1 week, 6 weeks, 3 months, and 6 months after the procedure. Each follow-up included an assessment of complications such as pain, bleeding, infection, IUCD position, reinforcement of counselling, and documentation of method discontinuation or switching.

Sample size

The sample size was calculated using the formula $n = (Z^2 \times p \times q) / E^2$, with an estimated proportion of 12.5%, a confidence level of 95% ($Z=1.96$), and a margin of error of 5%. The calculated sample size was 169, which was rounded to 170 participants.

Statistical analysis

Data were entered into Microsoft Excel and analysed using IBM SPSS v22. Descriptive statistics were expressed as mean, percentage, and proportion. Associations between categorical variables, such as obstetric history and contraceptive choice, were assessed using the chi-square test. Statistical significance was set at $p < 0.05$.

RESULTS

Most participants were aged 26-32 years 79 (46.47%), followed by 18-25 years 75 (44.12%) and 33-39 years 16 (9.41%). Regarding previous pregnancies, 105 (61.76%)

were FTND, 26 (15.29%) had one previous LSCS, 34 (20%) had two previous LSCS, and 5 (2.94%) had three previous LSCS. The age at menarche was 13 years in 82 (48.24%) participants, 12 years in 75 (44.12%), 11 years in 12 (7.06%), and 14 years in one (0.59%) (Table 1).

Table 1: Demographic and obstetric characteristics of study participants.

Variables	Category	N (%)
Age (years)	18-25	75 (44.12)
	26-32	79 (46.47)
	33-39	16 (9.41)
Previous pregnancy	FTND	105 (61.76)
	Prev 1 LSCS	26 (15.29)
	Prev 2 LSCS	34 (20)
	Prev 3 LSCS	5 (2.94)
Age of menarche	11	12 (7.06)
	12	75 (44.12)
	13	82 (48.24)
	14	1 (0.59)

Table 2: Pelvic examination findings and contraception choices.

Variable	Category	N (%)
Bimanual pelvic examination	Uterus anteverted	165 (97.06)
	Uterus retroverted	5 (2.94)
Choice of contraception	Puerperal bilateral abdominal tubectomy	40 (23.53)
	Concurrent tubectomy	33 (19.41)
	Interval tubectomy	17 (10)
	Laparoscopic tubectomy	9 (5.29)
	PPIUCD	28 (16.47)
	DMPA	34 (20)
	IUCD	7 (4.12)
	Subdermal implant	2 (1.18)

Table 3: Contraception choice according to obstetric history, previous pregnancy, and delivery mode.

Variables	Category	LARC (%)	Tubectomy (%)	Total (%)	P value
Obstetric history	P1L1	28 (100)	0	28 (100)	<0.001
	P1L1A1	0	0	0	
	P1L1A2	4 (100)	0	4 (100)	
	P2L2	13 (41.94)	18 (58.06)	31 (100)	
	P2L2A1	10 (58.82)	7 (41.18)	17 (100)	
	P3L2D1	2 (25.0)	6 (75)	8 (100)	
	P3L3	14 (28.0)	36 (72)	50 (100)	
	P3L3A1	0	5 (100)	5 (100)	
	P3L3A2	0	6 (100)	6 (100)	
	P4L3D1	0	5 (100)	5 (100)	
	P4L3D1A2	0	6 (100)	6 (100)	
	P4L4	0	8 (100)	8 (100)	
	P5L5A1	0	2 (100)	2 (100)	
Previous pregnancy	FTND	43 (40.95)	62 (59.05)	105 (100)	<0.0001
	Prev 1 LSCS	24 (92.31)	2 (7.69)	26 (100)	
	Prev 2 LSCS	4 (11.76)	30 (88.24)	34 (100)	
	Prev 3 LSCS	0	5 (100)	5 (100)	
Delivery mode	LSCS	28 (43.08)	37 (56.92)	65 (100)	0.0069
	FTND	43 (40.95)	62 (59.05)	105 (100)	

On bimanual pelvic examination, most participants had an anteverted uterus (165, 97.06%), whereas five (2.94%) had a retroverted uterus. Regarding contraception choice, 40 (23.53%) opted for puerperal bilateral abdominal tubectomy, 33 (19.41%) for concurrent tubectomy, 17 (10.00%) for interval tubectomy, 9 (5.29%) for laparoscopic tubectomy, 28 (16.47%) for PPIUCD, 34 (20.00%) for DMPA, 7 (4.12%) for IUCD, and 2 (1.18%) for subdermal implants (Table 2).

Among women with different obstetric histories, LARC was chosen by P1L1 28 (100%), P1L1A2 4 (100%), while tubectomy was more common in P2L2 18 (58.06%), P3L2D1 6 (75%), P3L3 36 (72%), P3L3A1 5 (100%), P3L3A2 6 (100%), P4L3D1 5 (100%), P4L3D1A2 6 (100%), P4L4 8 (100%), and P5L5A1 2 (100%). Regarding previous pregnancies, LARC was selected by FTND 43 (40.95%), one previous LSCS 24 (92.31%), and two previous LSCS 4 (11.76%), while tubectomy was chosen by FTND 62 (59.05%), one LSCS 2 (7.69%), two LSCS 30 (88.24%), and three LSCS 5 (100%). Regarding delivery mode, LARC was selected by LSCS 28 (43.08%) and FTND 43 (40.95%), while tubectomy was chosen by LSCS 37 (56.92%) and FTND 62 (59.05%), with a significant difference ($p=0.0069$) (Table 3).

DISCUSSION

This study examined the comparative utilisation of tubal ligation and long-acting reversible contraception (LARC) among post-partum women in a tertiary care setting. Tubal ligation is a permanent method, whereas LARC, including IUDs and implants, is reversible but highly effective. Both play a crucial role in preventing unintended pregnancies and improving maternal and child health outcomes. In tertiary centres, diverse patient backgrounds, reproductive goals, parity, and counselling quality influence contraceptive choices. Cultural norms and misinformation often favour tubal ligation, while barriers such as fear of side effects, provider training deficits, and access issues hinder LARC uptake.¹²

The post-partum period offers a strategic window for the initiation of contraception. Studies indicate that immediate counselling significantly increases LARC uptake, although tubal ligation remains predominant in certain cultural contexts. Younger, educated women lean towards LARC, whereas older, multiparous women often opt for sterilisation. Misconceptions about LARC require effective, evidence-based counselling by healthcare providers. A population-based approach is essential to address gaps and enhance access.¹³

The age distribution in this study showed that 46.47% of women were 26-32 years old, a trend supported by Akter et al and Wulandari et al, who also observed higher LARC and sterilisation use in this age group. Most participants were multiparous, particularly P3L3 (29.41%), suggesting that their families were complete. Laksono et al and Nyashanu et al found similar associations, although social

stigma, safety concerns, and male partner disapproval were significant deterrents.¹⁴⁻¹⁷

Of those who underwent tubal ligation or LARC, 61.76% had normal deliveries, and 38.24% had previous caesarean sections. Our results show that prior LSCS significantly influenced the decision to undergo tubal ligation. Gemici et al and Oduyebo et al reported similar trends, where tubal ligation during caesarean and post-partum LARC are both effective, with uptake influenced by education and prior delivery. Also observed early menarche (12-13 years) in most participants, which may have led to earlier reproductive health engagement. Moosazadeh et al and Ibitoye et al noted that early menarche is linked with reproductive readiness and higher early contraceptive use.¹⁸⁻²¹

Anatomical assessment showed that 97.06% of the patients had anteverted uteri, facilitating contraceptive procedures. Neumann et al reported that retroversion can complicate IUD placement and increase perforation risk, reinforcing the importance of anatomical evaluations.²⁰ In terms of preference, 23.53% chose puerperal bilateral abdominal tubectomy, 20% chose DMPA, followed by PPIUCD (16.47%). Nakiwunga et al found similar LARC preferences among women receiving antenatal counselling. A majority (58.24%) still opted for tubectomy, consistent with Negash et al, who linked this to parity and counselling.^{23,24}

Statistically significant associations were observed between obstetric history and contraceptive choice ($p=0.0000$), with higher parity favouring tubectomy. Sharif et al and Anguzu et al emphasised parity and spousal roles in contraceptive decisions. Cesarean history also influenced choices ($\chi^2=46.9467$, $p=0.0000$), echoing findings by Ng et al and Uaamnuichai et al, who reported high sterilisation rates during caesareans.²⁵⁻²⁸

This study was conducted at a single tertiary care centre with purposive sampling, which may limit generalisability. Data on socio-demographics and obstetric history were self-reported, potentially introducing recall bias. Factors such as cultural beliefs, partner influence, and long-term continuation rates of contraception were not assessed.

CONCLUSION

Tubal ligation was the predominant choice, particularly among multiparous women and those with prior caesarean sections. LARC was more common among younger or lower-parity women but remains underutilised. Contraceptive choice was strongly influenced by obstetric history, previous pregnancies, and delivery mode. Strengthening counselling, awareness, and access is essential to support informed reproductive health decisions. Future studies should evaluate long-term continuation rates, method satisfaction, and interventions to improve LARC uptake in diverse populations.

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