Research Article

Changing trends in demographic variables and techniques in female sterilization practices in a tertiary-care referral center over four decades

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Abstract

Background: Female sterilization is one of the commonest methods of contraception opted by married couple in India. This study was conducted to know the changing trends of demographic profile of these women over the years.

Objective: To study the demographic variables of couples undergoing tubectomy, different tubectomy techniques, and how they have changed over four decades in a tertiary-care referral center.

Materials and Methods: One year of each decade (1986, 1996, 2006, and 2012) was chosen for the purpose of analysis. Records of couples having undergone tubectomy in these years were analyzed. Main outcome measures included were age and education of the couple, religion, number of children, and couples without male children undergoing tubectomy. Tubectomy techniques studied included laparoscopic versus postpartum/interval/with cesarean section (Pomeroy's technique). Sterilization following medical termination of pregnancy was also noted. Numbers of couples opting for vasectomy in the same 4 years were documented.

Results: A total of 4,303 women represented these four decades. Literacy rates of couples have improved as the decades passed by. The majority of women belonging to present decade undergoing tubectomy have ≤2 children (89.9% in 2012 as against 30.9% in 1986). The number of couples with only two female children has increased from 45.5% in 1986 to 87.7% in 2012. The number of couples without male children has shown a rising trend (7.8% in 1986 to 23.5 in 2012). Laparoscopic sterilization was a predominant mode of tubectomy till 2006. There was a drastic reduction in number of women undergoing laparoscopic sterilization in 2012 with a rise in concurrent sterilization rates. The number of vasectomies continues to remain low.

Conclusion: A positive trend with a decrease in the number of children and, more notably, the number of male children at the time of sterilization was observed. Acceptance of permanent method among couples having only female children is a welcome trend.

KEY WORDS: Tubectomy, concurrent sterilization, laparoscopic sterilization

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Introduction

The Family Planning Program in India was started in the year 1952 and was the first country in the world to do so. The National Population Policy, 2000, had its immediate objective to be the task of addressing unmet need for contraception, thereby achieving the medium range objective of bringing down the total fertility rate to replacement level by 2010.

The passive, clinic-based approach of 1950s paved way to a more proactive extension approach in 1960s, the time-bound target-oriented approach in late 1960s, followed by camp-based approach to promote male sterilization in 1970s. The National Rural Health Mission was launched in 2005 stressed to meet the unmet need for contraception as an instrument to achieve population stabilization.[1] According to the recent survey by the Government of India, female sterilization continues to be a major method of contraception and about 86% of the contraception users use this method.[2] According to recent National Family Health Survey 3 data, tubectomy accounts for the major (i.e., 37.3%) of modern methods, compared with other methods (condom, intrauterine devices, etc.).[3] In Karnataka, India, this prevalence is higher with tubectomy, accounting for 57.4% of modern methods of contraception.[2] This article is a study of demographic variables of couples undergoing tubectomy, different tubectomy techniques, and how they have changed over four decades in a referral center in Karnataka, India.

Materials and Methods

The study was a retrospective study done in a tertiary-care referral center in rural coastal India. The population were couples in whom the female partner had undergone tubectomy. Information for this study was sought from records of 4 years, that is, 1986, 1996, 2006, and 2012. The 4 years in the last four decades were chosen arbitrarily. Information pertaining to sociodemographic characteristics was collected. This included age, educational status of the couple at tubectomy, religion, and the number of children (male and female) at the time of sterilization. The type of procedure done was also noted. Data were directly entered into the computer and analysis done through SPSS, version 16.

Sample Size Estimation

According to Ministry of Health and Family Welfare, Government of India, in Karnataka alone, 2,52,832 tubectomies were performed in the year 2010–2011, of which 1,57,906 were laparoscopic sterilizations (62.5%).[4] On the basis of this information, sample size with α (TYPE 1 error) of 0.05 (which is also known as significance level), power ($1 - \beta$, where β is type II error), and confidence interval of 95% was calculated using the formula:

$$\eta = \frac{(Z\alpha)^2 * P * (1 - P)}{E^2}$$

where:

- $Z\alpha = 1.96$ (critical value that divides the central 95% of Z distribution from 5% in the tails);
- P = proportion of women underwent laparoscopic sterilizations (62.5%, i.e., 0.625);
- $1 - P$ = proportion of women underwent Pomeroy's tubectomy (37.5%, i.e., 0.375); and
- E = margin of error (5% or 0.05).

Accordingly, the minimum sample size required is 360 subjects in each representative year. However, we obtained the demographic characteristics of 1,159 subjects in the year 1986, 1,654 in 1996, 1,004 in 2006, and 486 in 2012. Thus, the sample size collected was more than required for any representative year.

Results

A total of 4,303 women opted for tubectomy in the 4 years spread over four decades were studied with no significant difference in the number of women undergoing tubectomy in each year except in 2012. The total sterilizations in 1986, 1996, 2006, and 2012 were 1,159, 1,654, 1,004, and 486, respectively. There was sudden reduction in the total sterilizations in 2012. This was probably because many patients moved to the district maternity hospital, which started providing laparoscopic sterilization services from 2010 onward. It was observed that there was no significant change in the mean age of the wife or the husband over the years, which is shown in Table 1. There were an increasing number of women having improved literacy status. Similarly, the education of the husbands whose wives underwent tubectomy showed an increase in those who were graduates and post-graduates although there was no significant difference in the illiterate men or in those who had primary or high school education [Table 1]. The education status in the region is high, and there is only negligible number of men and women with no literacy status in the population being studied. The religion of the couple undergoing tubectomy was also analyzed, and there was no significant change over the four decades analyzed [Table 1], with Hindus remaining the predominant religion (in accordance with demographics of the area studied).

An important aspect of this study was analyzing the number of children the couple had at the time of tubectomy. The observations were encouraging with 89.9% of women in 2012 having ≤2 children at the time of tubectomy as against only 30% in 1986 [Table 2]. The differences were statistically significant. The number of grand multipara among women undergoing tubectomy has significantly reduced from 8.6% in 1986 to 0% in 2012 [Table 2].

We also analyzed the number of women with only one child undergoing tubectomy. As shown in Table 3, there was a significant rise from 1.6% to 4.7% (1986 to 2006) and 6.2% in 2012 [Figure 1]. We tried to investigate the reasons behind this (based on the records we had), and it was found that five of these couples (i.e., 10.6%) in 2006 were diagnosed with HIV as against none in 1996. The education status of couples with only one child undergoing tubectomy was more or less similar over the four decades, majority being high school educated.

More importantly were the number of women who did not have male children undergoing tubectomy, which increased significantly from 7.8% in 1986 to 23.5% in 2012 as shown in Table 3 and Figure 2. It was observed that the number of

Table 1: Age of the couple and education status at the time of tubectomy

Parameters	1986	1996	2006	2012	*P*
Wife's age (years)					
Mean ± SD	30.2 ± 4.2	29.9 ± 4.1	28.9 ± 4.0	30.0 ± 4.0	0.76 (NS)
Range	19–45	19–45	20–42	22–43	
Husband's age (years)					
Mean ± SD	36.6 ± 4.7	34.6 ± 4.7	34.6 ± 4.7	36.6±4.4	0.69 (NS)
Range	23–60	22–62	20–52	24–50	
Illiteracy (%)					
Wife	23.9	8.9	8.8	0.1	0.0012 (HS)
Husband	8.9	8.9	7.7	0.2	0.0002 (HS)
Primary school (%)					
Wife	53.2	54	52.5	30.5	0.0013 (HS)
Husband	64.5	50.7	52.9	34	0.0002 (HS)
High school (%)					
Wife	19.9	29.7	30.3	41.6	0.011 (S)
Husband	19.7	29.8	27.9	43.4	0.003 (HS)
Graduate (%)					
Wife	2.9	6.7	7.6	21.6	0.0001 (HS)
Husband	6	9	9.3	20.2	0.007 (HS)
Postgraduate (%)					
Wife	0	7	1.2	6.2	0.01 (S)
Husband	0.9	1.7	2.3	2.3	0.85 (NS)
Religion of the couple					
Hindu	1,029 (88.8)	1,463 (88.4)	900 (89.6)	432 (88.9)	0.86 (NS)
Muslim	70 (6)	107 (6.5)	73 (7.3)	30 (6.2)	0.09 (NS)
Christian	60 (5.2)	84 (5.1)	31 (3.1)	24 (4.9)	0.86 (NS)

NS, not significant; S, significant; HS, highly significant.

Table 2: Number of children of the couple at the time of tubectomy

No. of children at the time of tubectomy	Year, *n* (%)				*P*
	1986	1996	2006	2012	
0–2	358 (30.9)	1,102 (66.6)	791 (78.8)	437 (89.9)	0.000001 (HS)
3–5	701 (80.5)	531 (32.1)	207 (20.6)	49 (10.1)	0.000001 (HS)
≥6	100 (8.6)	21 (1.3)	6 (0.6)	0 (0)	NC
Total (N)	1,159	1,654	1,004	486	

HS, highly significant; NC, not calculable as one of the cells is zero.

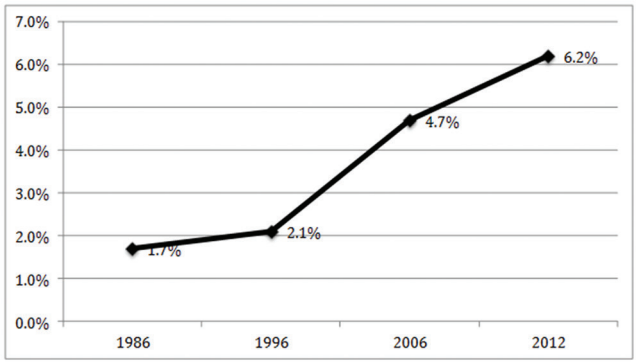

Figure 1: Number of couples with one child at the time of tubectomy.

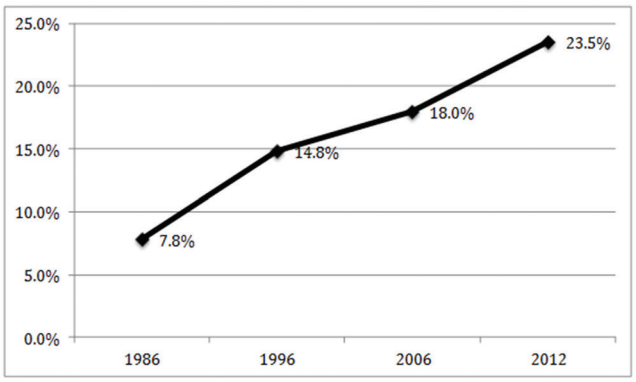

Figure 2: Number of couples with only female children at the time of tubectomy.

Table 3: Number and gender of children at the time of tubectomy

Year	1986	1996	2006	2012	*P*
No. of couples with one child at the time of tubectomy, *n* (%)	20 (1.7)	33 (2.1)	47 (4.7)	30 (6.2)	0.00003 (HS)
Couple with only female children at the time of tubectomy, *n* (%)	90 (7.8)	244 (14.8)	180 (18)	114 (23.5)	0.000001 (HS)

HS, highly significant.

Table 4: Comparison of type of sterilization procedure

Year	1986	1996	2006	2012	*P*
Pomeroy's technique, n (%)					
Postpartum	471 (40.6)	767 (46.4)	345 (34.5)	383 (78.8)	0.000001 (HS)
During cesarean	364 (77.4)	620 (80.9)	200 (57.8)	203 (53)	0.000001 (HS)
Laparotomy	101 (21.4)	137 (17.8)	136 (39.6)	173 (45.2)	0.000001 (HS)
Concurrent with other surgeries	6 (1.2)	10 (1.3)	9 (2.6)	7 (1.8)	0.19 (NS)
Laparoscopic, n (%)	688 (59.4)	887 (53.6)	659 (65.5)	103 (21.2)	0.0001 (HS)
Total (N)	1,159	1,654	1,004	486	

NS, not significant; HS, highly significant.

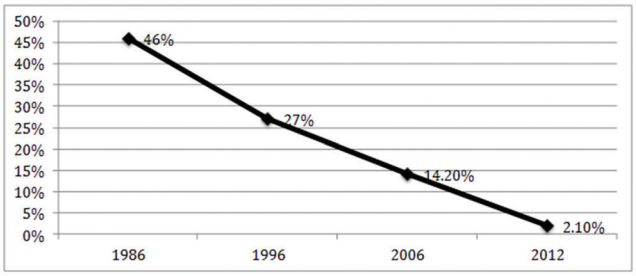

Figure 3: Number of medical termination of pregnancy s performed before tubectomy.

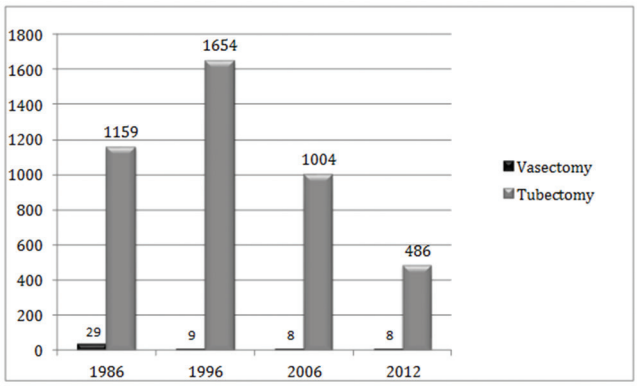

Figure 4: Number of vasectomies in comparison with tubectomies in the same 4 years.

couples having only female children having tubectomy gradually increased over the decades. It was observed that there was consistent increase in women with two female children without male children undergoing sterilization from 1986 (45.6%) to 2012 (87.7%).

There were no significant changes in the method by which tubectomy was done with laparoscopic tubectomy being the predominant technique in 4 years [Table 4]. However, in the year 2012, there was reduction in laparoscopic sterilization. Among tubectomies done by Pomeroy's method, there was a decline in those done postpartum (77.4% in 1986, 80.9% in 1996, 57.8% in 2006, and 53% in 2012) and an increase in those performed concomitantly with cesarean sections (21.4% in 1986 to 45.2% in 2012) as seen in Table 4. This could be explained by the increasing cesarean section rate in the center as it is a tertiary-care referral hospital.

Women who had an medical termination of pregnancy before undergoing laparoscopic sterilization were found to have decreased over the years from 46.2% in 1986 to 14.2% in 2006 as shown in Figure 3. The most striking comparison arose when we compared the number of vasectomies with tubectomies in the time period studied. The differences were staggering with only 54 vasectomies performed in the 4 representative years studied as against 4,303 tubectomies [Figure 4].

Discussion

The first part of the study dealt with changes in sociodemographic data of couples opting for tubectomy over four decades. The age of the couple did reduce although not significantly so from the 1980s till the early 2000s and consistently increasing in the later years. This trend was also observed in a study in Delhi in which the age of the wife had decreased similarly from 30.3 years to 28.7 years from 1981–1982 to 1991–1992.[5] It was also observed in another study that maximum number of women undergoing sterilization was between 25 and 35 years as observed in our study in all four decades. Another important observation made was the improvement in the educational status of women (and their husbands) undergoing tubectomy. This is in accordance with other studies and with the increasing literacy rates in Karnataka, which have improved from 46.21% in 1981 to 56.04% in 1991 to 66.64% in 2001.[3,6]

Several positive and encouraging trends have been noted from this study, foremost being the decrease in the number of children of the couple at the time of tubectomy. In the 1980s, majority of women opting for tubectomy had three to five children, but 20 years later, this has come down to one child to two children. This similar trend was seen in the study by Gupta et al.,[5] but in their population, the majority of acceptors remained those with ≥3 children even in the 1990s. Our population, on the other hand, showed that, by the 1990s, almost two-thirds of all acceptors had two or less children. It is contrasting to certain other study where preference to sterilization is higher in women with >3 children.[7]

An even more striking and important observation was the number of couples undergoing tubectomy without male children. In this study, women undergoing tubectomy with only female children have significantly increased from 7.8% in 1986 to 23.5% in 2012. This is not the same in a study done in northern India by Bangal et al. in 2012 where only 4% of couple adopted the permanent method in the absence of male child. This is an encouraging observation in this study. This figure has increased by more than double in the last 20 years.[8] The sex ratio in India as per the latest 2011 census is 914 females for 1,000 males; in Karnataka, this is slightly higher (954).[9] If this trend (observed in our analysis) continues and applies to other parts of India, there, hopefully, will be a change in this lopsided ratio. A woman with two female children adopting sterilization has significantly risen from 45.6% in 1986 to 87.7% in 2012. These results are promising especially in a country that is known for its preference for the male sex and where the sex ratio has always been lopsided. There is a positive thinking of being satisfied with female children and preference to male children is reducing. What is promising is how the entire scenario has almost reversed with most women now happy with two female children at the time of a tubectomy. This trend leads us to believe that a change in thinking in our society regarding preference for the male child has started and will hopefully continue. This is in contrast to another study where preference for the male child was observed before undergoing sterilization.[7]

The introduction of laparoscopic sterilization into the Indian Family Welfare Program has made female sterilization more convenient and less time consuming.[10] Laparoscopy was introduced in 1980 and was available only in cities and some government hospitals. Our center has been performing laparoscopy since 1973, and we were the referral center for the same till 2006. In Karnataka, laparoscopic tubectomy was introduced around 1979–1980.[11] Our study showed that, in all the years studied, laparoscopic tubectomy was the most common method of tubectomy performed till 2006. Before 2008, in our hospital, laparoscopic sterilization was offered as a day-care procedure (maximum duration of stay was 6 h), and the procedure was done under intravenous sedation and local anesthesia. But, the patient feedback suggested that the perioperative period was most uncomfortable, mainly due to pain factor. From 2008 onward, we took a decision to perform laparoscopic sterilization under general anesthesia, but this resulted in significant increase in the hospital stay and a gradual drop in women asking for laparoscopic tubectomy service. The government hospitals around our center have started conducting laparoscopic camps, and probably, majority of women are seeking service with them. What was noticeable, however, was the increase in the number of tubectomies concomitant with cesarean sections especially in 2012. This could be because of increasing cesarean section rate and awareness of concurrent sterilization among the couple. In a study carried out in a maternity hospital in Mumbai, there was found to be an increase in cesarean sterilization from 1.9% to 16% from 1957 till 1998 (four decades), with the greatest increase seen in the last decade studied (the 1990s).[12] There is emergence of increasing cesarean section rates, which could also be the reason for the women to decide for the permanent method of contraception.[13,14]

There has never been an encouraging numbers when vasectomies are concerned. In India, vasectomy lost its impact on the people owing to the forced male sterilization by the government in early 1980s. There has been a consistent decline in the number of vasectomies in the center.

Strengths and Limitations of the Study

The number of patients studied was more than what sampling estimation indicated. There were some significant observations, and, hence, some conclusions could be drawn. However, the cohort was retrospective; the representative year of each decade was arbitrarily chosen.

Conclusion

Declining male sex preference is a convincing result of the study. There is a consistent increase in the education status of the couple opting for sterilization. There has been a significant change in trend with respect to sex preference in women undergoing sterilization. This study reveals that there is increasing cesarean sterilization. There has been a consistent increase in women with one child undergoing sterilization. This study yielded many positive results, and this should encourage us even further when dealing with major issues our country faces such as population growth, which can be tackled with effective sterilization practices. This study serves as a benchmark of the improvements noted in the last 30 years, the only drawback being our failure in increasing vasectomy rates. Motivation of the male partner at every opportunity should thus be our goal.

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References

1. Varma GR, Rohini A. Attitude of spouse towards family planning. A study married men and women of a rural community in West Godavari District, Andhra Pradesh. Anthropologist 2008;10(1):71–5.
2. *National Family Health Survey*. International Institute for Population Sciences, Mumbai. Available at: http://www.nfhsindia.org/factsheet.html (last accessed on April 20, 2011).
3. *Union Budget and Economic Survey*. Ministry of Finance, India. Available at: http://indiabudget.nic.in (last accessed on April 15, 2011)
4. *Family Welfare Statistics in India, 2011 Edition*. Available at: http://mohfw.nic.in/WriteReadData/l892s/3503492088FW%20Statistics%202011%20Revised%2031%2010%2011.pdf (last accessed on December 22, 2014).
5. Gupta U, Kumar P, Bansal A, Sood M. Changing trends in the demographic profile and attitudes of female sterilization acceptors. J Fam Welfare 1996;42(3):27–31.
6. *India and Family Planning: An Overview*. New Delhi: Department of Family and Community Health, Regional Office South East Asia, WHO, 2000.
7. Shah RJ, Hamdani Z. Tubectomy as method of family planning, factors influencing the decision to undergo tubectomy and post tubectomy morbidity in women in a rural area of Kashmir. Indian J Pract Doc 2001;6(1):46–50.
8. Bangal VB, Giri PA. Sex combination of living children at the time of sterilization among rural women of central India. Int J Basic Appl Med Sci 2012;2(3):63–7.
9. *Report of the Working Group on Population Stabilization for the Eleventh Five Year Plan 2007-2012*. New Delhi: Government of India, Planning commission.
10. Chauhan R, Chakma T, Vinay Rao P. Laparoscopic sterilization without electricity—An experience from Mandla District, Madhya Pradesh, India. Curr Sci 2011;100(4):464–5.
11. Veeramatha CS. A comparative study of laparoscopic and conventional abdominal sterilization in Chikmagalur District of Karnataka. Health Popul Perspect Issues 1986;9(3):139–45.
12. Mehta A, Apers L, Verstraelen H, Temmerman M. Trends in cesarean section rates at a maternity hospital in Mumbai, India. J Health Popul Nutr 2001;19(4):306–12.
13. Uwar B, Patel V, Patel M. Factors affecting sterilization operation among couples of a rural area in Ahmedabad: A record-based study. Indian J Med Sci 2012;66(11–12): 267–72.
14. Porreco RP, Thorp JA. The cesarean birth epidemic: Trends, causes and solutions. Am J Obstet Gynecol 1996;175:369–74.

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