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COMPARATIVE ANALYSIS OF IVF PRACTICES AND ADOPTION RATIO IN NAGPUR DIVISION

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Abstract

This paper emphasizes the ratio of child adoption and utilization of assisted reproductive technology (ART) in Nagpur division, India. The study was based on cross-sectional and cohort longitudinal surveys, which include e-survey, paper survey, and random sample-public opinion/attitude type survey. Collected data *was interpreted graphically and then analysed in detail. The analysis indicated that the in vitro fertilization (IVF) technique is preferred over adoption using the division level data.*

Key words: IVF, Adoption, Nagpur, Survey.

Introduction

Childbirth is considered as a vital component of human existence; most men and women do not take parenthood for granted and consider it to be sacrosanct. A couple is considered clinically infertile when pregnancy has not occurred after at least twelve months of regular unprotected sexual intercourse. (Guilmoto and Rajan, 2013). Infertility is of public health importance in Nagpur and many parts of India because of its high prevalence ranging from 10% – 20%. Infertility impacts 48.5 million couples worldwide and has been considered a major medical and social issue by the WHO. (Mascarenhas *et al.*, 2012).

The infertile patient visits orthodox medical practitioners, herbalists, traditionalists, and spiritualists in search of reprieve.(Tobler *et al.*, 2014). Moreover, some women adopt various plans of action to have children, such as visiting traditional healers and prayer houses. (Soltani *et al.*, 2014). They would even buy babies through human trafficking (following the faking of their pregnancy) without bothering about the source or engage in secret extramarital sexual relationships. Others who can afford it seek to adopt children.

Adoption is the act of legitimately placing a child with a parent or parents other than those to whom they were inbred. In India, adoption can be divided into three types, namely local (within the country), international (outside the country), and relative adoption within a family. A common example of relative adoption is 'stepparent adoption', where the new partner of a parent may legitimately espouse a child from the parent's previous relationship. Domestic adoption can also occur through abdication. In India, abdication is done due to parental death, or when the child cannot otherwise be cared for by its parents, and a family member agrees to assume responsibility. In India, child adoption is organized via the Ministry of Women and Child Development, Government of India who regulate the affairs of abandoned children in the orphanages and motherless babies' homes under the 'Hindu Adoption and Maintenance Act, 1956 and Juvenile Justice Act, 2015'. (http://cara.nic.in/).

Various effective infertility treatments and ART have presently been established to make biological parenthood possible for couples who would otherwise have remained childless. (Gunderson S. *et al.*, 2020). According to a 2006 report by the ICMART (International Committee Monitoring Assisted Reproductive Technologies), till now more than 3 million babies worldwide have been conceived through either IVF or ICSI. (Sullivan E.A. *et al.*, 2013; Zimon A.E. *et al.*, 2019).

There are not many comparative studies carried out on child adoption versus IVF in India, especially in Nagpur. This study, therefore, was undertaken to get an insight into the adoption versus IVF ratio in Nagpur city. It aims to provide background information concerning knowledge, attitude, and practice towards child adoption and IVF amongst infertile patients. Examination of the societal perceptions of infertility can assist clinical work, providing better help to sterile couples. This study aims to achieve an improved understanding of the Nagpur's infertile population about the awareness of infertility and specific treatment options (*i.e.*, Assisted Reproductive Technologies and Adoption).

Materials and Methodology

The study was designed with a mixed quantitative and qualitative approach. The study was based on cross-sectional and cohort longitudinal surveys. The study was divided into three groups titled IVF, adoption, and views of people;survey responses were categorized according to common themes regarding the effects of reporting on participants. The survey was carried out from 15th February onwards to 15th March 2020 in Nagpur division, Maharashtra (21.1458^{o}N, 79.0882^{o}E).

IVF

The study was designed as an e-survey. A total of 39 questions were asked to the authorities of IVF clinics via email. The volunteered clinicians were selected from different corners of Nagpur district which have both rural and urban patients. Six clinics voluntarily participated in the survey out of which two were excluded due to incomplete and late response.

Adoption

The study was designed as an offline survey. A questionnaire of thirteen questions along with the permission letter by the department, was given to the adoption centers, and the responses were collected from the center authorities. Three adoption centers voluntarily participated in the survey, out of which one was excluded due to incomplete responses.

Views of people

The study was designed as a Random sample- public opinion/ attitude type of survey. The volunteers were from different corners of the Nagpur district. The people were given a situation along with options for answers to choose. Total number of 60 people voluntarily participated in the survey.

Result and Discussion

These are the retrospective review reports on a variety of specific IVF and adoption practice patterns from Nagpur. The key focus of our survey is the specific timing and IVF techniques. Presently, this kind of study is firstly being done in the Nagpur division of IVF practices, methods, and adoption. Interestingly, we found significant variations in some practice patterns and minimal difference in others.

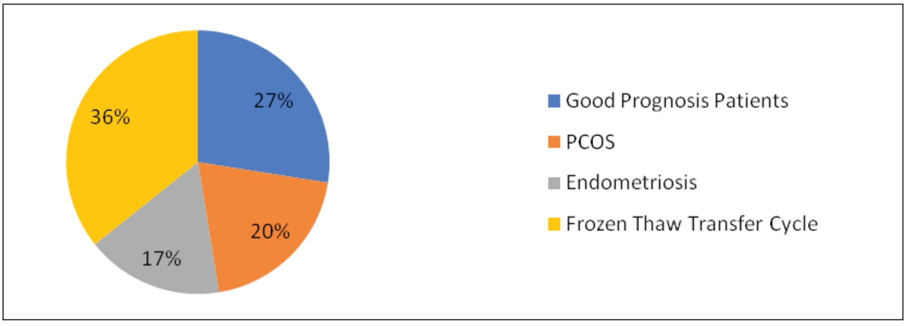
The survey reports resulted that there is much variation in the cost of IVF cycle with the same conditions due to the differing infrastructure and facilities. The protocol period for the fertility hormones differs in each case. MESA and TESA are the techniques done when indicated and the data shows that it is done in low ratio. The success rate found in clinics varies from 22% - 52%. The success rate may differ by changing the parameters from which it is calculated. If the rate is calculated based ona fresh cycle and frozen cycles, they may show low rate of success. The success rate can be increased if the parameter is pregnancy of the patients. Gonadotrophins like recombinant FSH, HMG are commonand primary type of medications given to patients and OHSS is side effect observed sometimes. Laser assisted hatching is done to cases in which women is above age 45 and to previous multiple implantation failures. PGD is preferred over CCS for screening and biopsy. HCG is given to the leading follicle of diameter 18-20 mm was found same in all cases. Mock embryo transfer is performed before actual embryo transfer and an extra embryo is cryopreserved, it was also found that the rural people agree for embryo donations, sperm donation and egg donation over urban people. Oocyte pickups depend on the age of embryo transfer is about 1 cm below the fundus and varies up to 1.5 cm. Also, males are given antibiotics after egg pickup. Ultrasound-guided embryo transfer,which is one of the advanced techniques is used in complicated cases. Improvement in cone rates

Table 1: IVF Survey Report

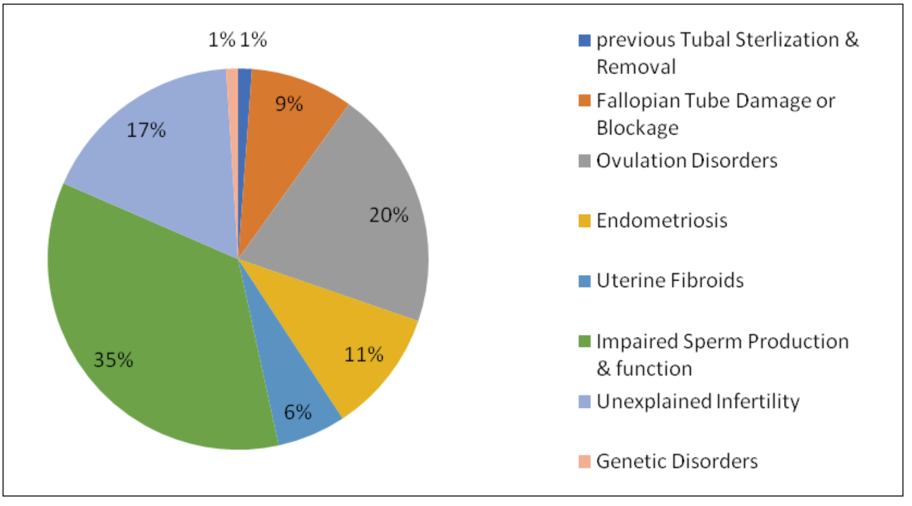
Question No.	*Questions Stem*		*Most Reported Value or Practices*
1	How much does IVF cost with reference to each cycle?		1 lac to 1.4 lac.
2	Which type of medications is given during IVF and their side effects?		Gonadotropin (99%) like recombinant FSH, human menopausal gonadotropin HMG, Literal phase support with micronized progesterone Side Effects: Not necessarily, but if at all may cause ovarian hyperstimulation (OHSS).
3	How long are the fertility hormones injections given?		9-15 days.
4	Are the medications included in the cost of the IVF cycle?		No.
5	How many visits should be done by the patient during the treatment?		3 for work & 5-6 \cycle; If pregnancy occurs, visits increase.
6	Can exercise be done while treatment?		Light exercise.
7	Is traveling safe during IVF treatment?		No (after embryo transfer).
8	Is Intercourse after embryo transfer can be done (ratio of safety)?		Not recommended.
9	Is the egg retrieval process painful?		No.
10	Which technique is followed according to age, and what is its average ratio?		
	a.	Laser-assisted hatching	Done for elderly and/or women with which zona & in women with previous multiple implantation failures.
	b.	Cryopreservation	In most cycles, all embryos are cryo-preserved & transferred in the next cycle. In fresh ET cycles, supernumerary embryos are cryo-preserved.
	c.	Micro-surgical epididymal sperm aspiration (MESA)	Done, when indicated.
	d.	Testicular sperm extraction (TESE)	Done, when indicated.
11	Is embryo biopsy done, which screening technique is followed, and its ratio?		
	a.	Preimplantation genetic diagnosis (PGD)	Done only when indicated e.g., history of genetic disease or sibling suffering from sickling/ thalassemia.
	b.	Comprehensive chromosomal screening (CCS)	Done 50%.
12	What are the normal sperm parameters for the treatment?		IUI 5-10 million\ml IUF 25-50 thousand ISCI 100-500 functional motile sperm.
13	How many hours for fertilization been assisted?		Fertilization is assessed 16-18 hours post insemination.
14	Is IVF done on a guarantee basis?		No.
15	Is IVF related to mental issues and stress?		Partly.
16	How many embryos are transferred during a cycle?		D3 embryos: 2-3 D5 blastocysts: 1-2.

Question No.	Questions Stem		Most Reported Value or Practices
17	What is done with the rest of the embryos?		Cryopreserved 100%.
18	Which medications are given for the following?		
	a.	Ovarian stimulation	R-FSH, HMG, Cabergolines and Gonadotropin.
	b.	Oocyte Maturation	HCG -urinary\recombinant antagonist, combined.
	c.	Prevent Premature ovulation	Antagonist.
	d.	Prepare the lining of the uterus	Estradial valerate Estradial hemihydrate natural cycle, estrogen.
19	What and which complications arise after canceling an IVF cycle?		Not observed, none except stress and a bit anxiety.
20	Which tests are done pre, post, and throughout the cycle?		Pre-F SH, LH, prolactin, TSH, CBC, sickling, VDRL, HIV HCV, HbsAg, Endocrine hormone analysis for male as well as female, Semen analysis for males, HSG, USG, Endoscopy for females.
21	Is it under anesthesia (preferred methods)?		YES.
22	How many times can one transfer the IVF cycle?		8-10 Oocyte pickups depending on age.
23	What is the gap period between two unsuccessful IVF cycles?		1 Month.
24	In your clinic, HCG is usually given when the leading follicle has reached a diameter of?		18-20 mm in diameter of 100%.
25	The routine dose of HCG is usually administered in your unit is?		10,000 IU.
26	If you monitor the patient after HCG administration on a routine basis, what do you look for?		E2, LH, progesterone.
27	What is the normal time interval between HCG administration and collection (time monitored)?		34-36 Hours.
28	What is preferred for cleaning the vagina prior to aspiration?		Sterile normal saline.
29	Do you give any antibiotics?		Yes, after egg pickup, Males also are given antibiotics if the sample contains the infection.
30	Do you perform ultrasound-guided embryo transfer?		YES.
31	Where do you place the embryo in the uterine cavity?		1 cm below the fundus.
32	In the case of difficult embryo transfers, what procedure do you take to solve it?		Perform a mock transfer trial before actual ET.
33	While transferring the embryo, which technique do you follow?		Cusco's spectrum, Sandwich method.
34	Isn't the gender of the embryo can be selected and detected by parents?		No.

over the free professional counseling is a small, but likely effective step towards deciding on an EDO, mental issues, and stress before and after are the reasons for the complications in IVF treatment.

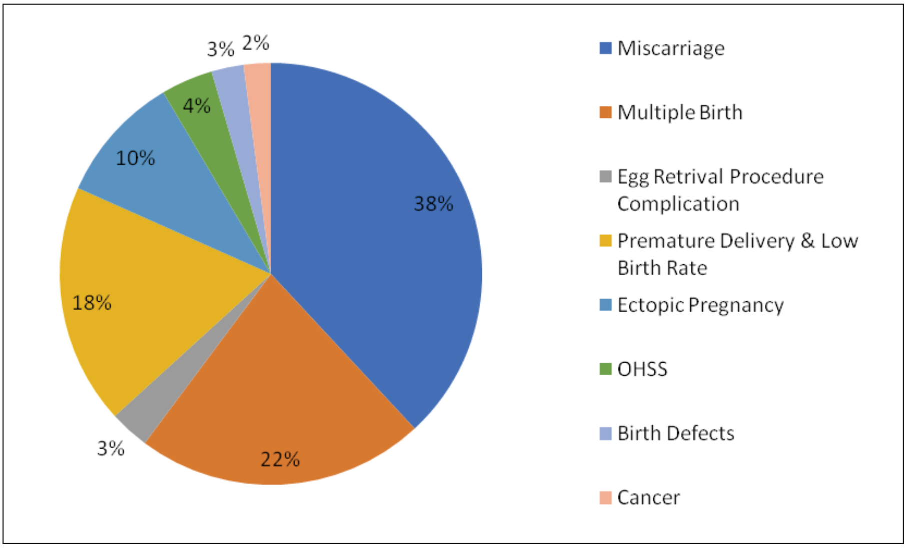


Graph 1: Success rate of treatment cycle

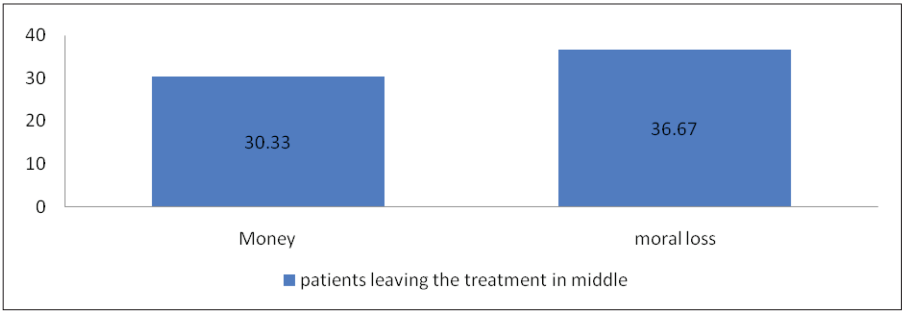


Graph 2: Problems before treatment

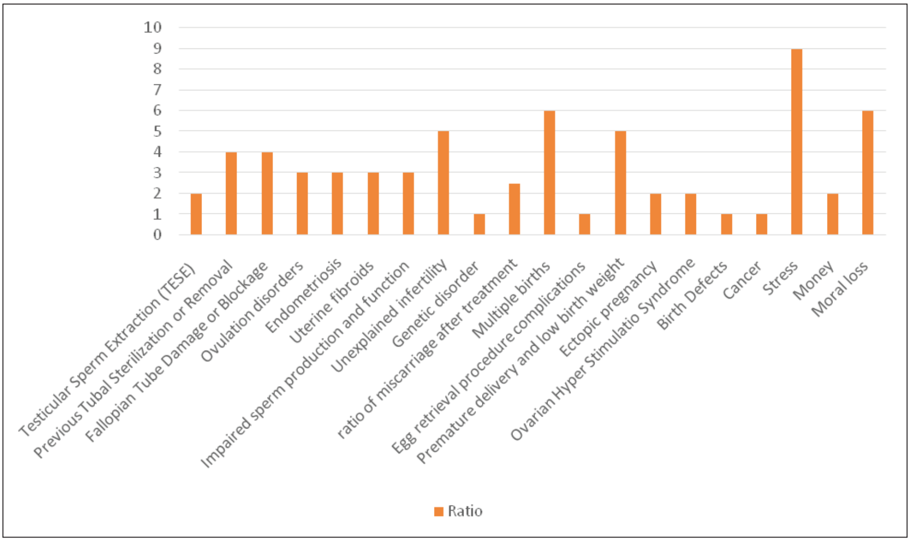
Sterile saline solution for cleaning the vagina prior to aspiration is done in all cases. According to the reports, impaired sperm production is the leading cause of infertility followed by ovulation disorders in the Nagpur division. Genetic disorder, previous tubal sterilization & removal conditions found in patients coming for IVF patients are less than 1%. The reports say that miscarriage is the main issue after IVF treatment to be cared. Premature delivery and low birth rate have a high percentage in the division. Multiple births have also registered, generally mainly twins. And some other complications are there, which are due to careless nature of the patients and errors in the IVF process and the patients. One cannot assume that adopting a specific practice pattern, although reported to be very prevalent, will improve IVF outcomes. Only six clinics in Nagpur are enrolled as assisted reproductive technology (ART) clinics under national registry of art clinics and banks in India by Indian council of medical research. (http://www.isarindia.net/pdf/NARI%202015-17.pdf). Besides, the limitation of this study is that the data is not divided by geographic regions, and thus, if certain IVF practices are unique to geographic areas, it would not be elucidated. Also, there is likely a selection bias influencing the answers to the study as well as the potential for incorrectly reported data. However, as clinicians and people were not ready; therefore, the respondent's name, email, center name, and location are undisclosed. The strength of this study is that it represents a small and diverse population of IVF providers and their specific practice patterns. In addition, this study provides quantitative results regarding the prevalence of many IVF practice patterns that are highly variable. It is thus useful to inquire how providers are integrating various IVF practices in the light scarce scientific evidence. As outlined above, many of the IVF practice patterns we queried are not definitively established with robust data, and thus the data generated in this study which allows a comparison of various practice patterns among IVF providers.



Graph 3: Problems after treatment



Graph 4: Patients leaving treatment in the middle

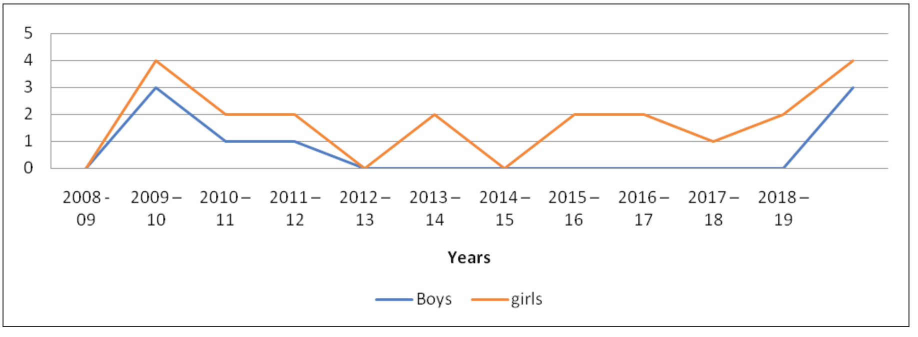


Graph 5: Ratio of patients

The reported practices were analyzed and found that no joint family nor single parent has adopted a child; only small families adopted the child. The age of foster parents is confidential data,hence remained unanswered. All the children adopted were at normal conditions, and the adoptive parents have no relation with the child they adopted. As per the rule by the government child should know that he/she was adopted. Only one unsuccessful case has so far been registered. The law and policy are favorable for the centers,therefore they don't want changes in them, and they visit the foster homes till years 4-6 times approximately. The legal formalities with the waiting period for adoption takes approximately two years and in some expectation more than that. The boy to girl ratio in Nagpur division is 8:13.

Table 2: Adoption Survey Report

Question No.	*Question Stem*	*Reported Practices*
1	What is the ratio of the joint family adopted child (specify girl/boy)?	No.
2	What is the ratio of the single-parent adopted child (specify girl/boy)?	No.
3	Age of foster parent when adopted a child?	NA.
4	The ratio of adoption of a male or female child, what was his/her age?	8:13 (2008 to 2019).
5	Was the adopted child normal (without any disease)?	Yes.
6	Do the foster parents have any relation with the child before adoption?	No.
7	Was the culture of the child after the adoption procedure changed?	No.
8	Does the child know he/she was adopted?	Yes.
9	What was the success rate for adoption?	1 case was unsuccessful.
10	Are the laws and policies being reasonable?	Yes.
11	Do you wish to change any of the laws and policies?	No.
12	Do you visit the foster home to see the child after the adoption?	Till two years 4-6 times.
13	How much time the legal formalities take?	Approx. 2 years.



Graph 6: Ratio of adoption

"If a situation of infertility arises and you have to choose between IVF and adoption what will be your decision", the results show us that the population in Nagpur division first opinion is for IVF *i.e.* 78% and that for adoption is 22%. The second opinion of the population is adoption. While taking the views, we found some cases for adoption an IVF in

Table 3: General People's View Whether to go for IVF or Adoption

Sr.No.	*Cases*	*IVF*	*Adoption*	*Cases found/current status*
1	P1	Yes		
2	P2	Yes		
3	P3	Yes		Girl child, age 13
4	P4	Yes		
5	P5	Yes		
6	P6		Yes	
7	P7	Yes		
8	P8	Yes		
9	P9	Yes		
10	P10		Yes	
11	P11	Yes		
12	P12		Yes	
13	P13	Yes		
14	P14	Yes		Twin girls, age 1 month
15	P15	Yes		
16	P16	Yes		
17	P17		Yes	Girl child, age 17
18	P18		Yes	
19	P19		Yes	
20	P20	Yes		
21	P21	Yes		2 unsuccessful cycles (left treatment)
22	P22	Yes		
23	P23	Yes		
24	P24	Yes		
25	P25	Yes		Twin girls, age 2
26	P26	Yes		
27	P27	Yes		
28	P28		Yes	
29	P29	Yes		
30	P30	Yes		Girl child, age 4

Sr.No.	*Cases*	*IVF*	*Adoption*	*Cases found/current status*
31	P31	Yes		
32	P32	Yes		
33	P33	Yes		
34	P34		Yes	
35	P35		Yes	
36	P36	Yes		
37	P37	Yes		
38	P38	Yes		
39	P39	Yes		
40	P40	Yes		
41	P41	Yes		
42	P42		Yes	
43	P43	Yes		
44	P44	Yes		
45	P45	Yes		
46	P46		Yes	
47	P47	Yes		Girl child, age 4
48	P48	Yes		
49	P49		Yes	Girl child, age 2
50	P50	Yes		
51	P51	Yes		
52	P52	Yes		
53	P53	Yes		
54	P54		Yes	
55	P55	Yes		
56	P56	Yes		1 unsuccessful cycle (left treatment)
57	P57	Yes		
58	P58	Yes		
59	P59	Yes		
60	P60	Yes		

that also, the ratio for IVF cases is more than that of Adoption. Due to small geographic areas and lack of cooperation, results may be biased, but we found the cases of the only girl child. As People were not sharing Details regarding their experience, ages of cases were only known. Unsuccessful cycle cases were also found.

Conclusion

This study is based on survey of IVF practioners of Nagpur District. The investigation does not involve research on human or animal subjects. Therefore, formal institutional review board approval, along with ethical committee approval was not necessary. The survey was conducted as an open survey of the participants who voluntarily answered the study question. Patient data for the survey was kept anonymous since patient data was collected from clinicians. It was found that the ratio of IVF to adoption is 7:2. Although success rate varies from 22% - 55% given by the clinicians, 5:2 is the ratio of successful IVF treatment to that of Unsuccessful cycles. The ratio of normal progeny to that of twins was found to be 5:2.

Adoption continues to remain an undesirable option since links between an adopted child and the social parent become public. Adoption is a cure for childlessness but not for infertility. For some, the move to adoption is an easy and logical for others it is not; still, child adoption due to reproductive problems continues to remain an under-researched aspect of contemporary Indian society. In this survey, due to the limitations, we have only found female progenies, not any male in both IVF and adoption cases.We have reported that the number of foster parents is more to that of orphans in the orphanage. It was also reported that there are orphanages in the division which do not allow the foster parents to adopt and take care of the child. The cases of adoption within families that are not registered are more as compare to that of local and international cases.

Compliance with Ethical Standards

Conflict of interest

The authors declare there is no conflict of interest regarding publication of this paper.

Research involving human participants and/or animals

This survey consists of physician and authorities' self-reports on activity volumes and opinions on medical practices. The survey does not involve research on human or animal subjects. Therefore, formal institutional review board approval was not necessary. Patient data for this research remained anonymous since no patient data was collected. Therefore, no informed consent documentation was required.

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