Editorial

Profertility counselling: when, where and how

INTRODUCTION

India with a population of 1.35 billion is outgrowing China and is set to become the most populous country in the world. In such a scenario, to talk about profertility may be considered antinational. We have grown up with so much emphasis on reducing the population growth rate that we have overlooked the other side of the coin.

According to the economic survey 2018–19, the fast aging of population has been highlighted. In the last 40 years, Indian average population growth rate has declined from 2.5% in 1971 to 1.3% in 2011–16. There are many states in which the growth rate has already come below 1.5. These include states of West Bengal, Assam and Odisha in East, Maharashtra and Kerala in South-West and Himachal Pradesh and Punjab in North. According to the estimate by World Health Organisation in last 40 years, the net fertility rate in India has decreased by 50% to a current level of 2.3 in 2015–2020 and likely to nosedive further. In many states facing slowing of growth rate, it has already declined to 1.7%. A net fertility rate of 2.2 is the population stabilisation level below which the population starts having a negative growth rate.[1] More than 50% of Indian population is below the age of 25 years and nearly 65% are below 35 years. In the year 2020, expected mean age of an Indian would be 29 years as compared to 37 years for China and 47 years for Japan. In this huge population, 10% to 15% of couples in reproductive age group are suffering from infertility. Following the world trend, the rise in young India is skewed towards 30 to 44 years. This is the population which is displaying a lower fertility rate as compared to their younger counterparts.

The increased infertility rates in this 'older young' population can be ascribed to a number of factors. These include social and cultural factors like urbanisation, environmental toxicity, stress, fast-paced lifestyle leaving no time for family, late marriages, career aspiration of women, etc. In addition, increased burden of lifestyle-related non-communicable diseases as well as communicable infections in upper and lower economic strata respectively add to infertility. In India, nearly 22 to 33 million couples are estimated to be infertile. Moreover, the demand from older women in mid-life is increasing everyday. To meet this demand, more and more ovum donation cycles are performed because their own oocytes are either depleted or so few in numbers and quality so as to give a hopeless pregnancy rate.[2-4]

The Indian In –Vitro-Fertilization (IVF) industry is estimated at more than 20 billion and growing at the rate of 15%. There are more than 20,000 IVF centres in India and nearly 10% are added every year. In 2002, the planning commission identified the need for infertility management in public sector. Infertility and IVF services were introduced in government institutions too at handful of centres because of resource crunch. The medical insurance sector is growing and so is the huge demand on health insurance agencies to provide insurance cover for infertility treatment. In the absence of insurance cover, infertility and assisted reproduction technology (ART) has become a major financial drain of personal and national health resources.

In this market-driven cacophony, nobody is talking of *preventing infertility*. There is an emphasis on delayed childbearing but nobody is talking about right or optimal age of childbearing. Fortunately, there are few programmes of the government which indirectly prevent infertility. Government programmes are in place with great stress to control infectious diseases such as tuberculosis and sexually transmitted diseases. Increased maternity benefits to women are likely to help women plan their families at the right time without compromising their careers with greater ease. One of the important aspects is to increase awareness in public regarding the possibility of avoidable infertility by optimising natural fertility.[5] This article highlights the counselling of individual couples to help them make right and timely choices regarding planning their families.

WHAT IS PROFERTILITY COUNSELLING?

What do we understand by profertility counselling (PFC)? Are we trying to promote larger families? This

interpretation is farthest from intention. WHO recognizes the basic human right to have a desired family size by all individuals.[6] The intention of PFC is only to help young couples at right time to realise and plan their reproductive goals.

The second question which comes to mind is that are we trying to promote early child bearing? The modern lifestyle clashes with the carrier goals of women. Unfortunately, the best reproductive years are also the best years for getting education and settling in carreers. A well-known fact is decline of fertility with age.[7] In women, best reproductive outcomes are before 30 years of age. After 30 years of age, natural fertility starts declining. We are only trying to inform about the right age for an individual and prevent regrets.[8,9]

Does PFC promote oocyte freezing by scaring the women? Many women will take oocyte freezing as an option if they are unable to plan a pregnancy early. Instead of promoting oocyte freezing, PFC stresses on pitfalls of oocyte freezing.[10-12]

Does this counselling aims at promoting fertility without ART? Yes, the principle aim of the PFC is to promote natural fertility. The aim is non-medicalisation of the reproduction. Babies should be made the way nature meant it to be, that is genetic offspring, at right age and right number without the help of ART.

Objectives

The objectives of PFC can be listed as follows:

(1) Fertility education
(2) Infertility prevention
(3) Protection and preservation of fertility by early intervention
(4) Reproductive planning

All women and men of reproductive years need education about fertility, contraception and also risk of infertility.[7] The couples who are trying to conceive should be given appropriate advice on how to optimize natural fertility. Many couples are unaware of the concept of fertile period. Adverse lifestyle factors also need to be addressed and couples counselled.[5] Those couples who are not trying to conceive should get appropriate counselling regarding contraceptive choices and also when to start planning for pregnancy to achieve natural conception as far as possible. They need to be told about optimal age of reproduction and decline in fertility with age.[13-16]

The couples need advice regarding safe sexual practices so as to prevent sexually transmitted diseases and resultant infertility. Unsafe sexual practices and repeated medical termination of pregnancies is another problem which is entirely preventable by appropriate contraceptive use. Similarly, couples having other co-morbid medical conditions should be counselled regarding impact of disease on fertility and vice versa and pregnancies planned accordingly.

The couples who are at risk of experiencing infertility should be advised on early planning of family and also medical intervention if the need arises. The most appropriate example in such a scenario is treatment of young cancer patients or while operating upon a young girl for endometriosis.[17-22]

The overall aim is to help couples to plan their family size, timing and interval so that they are able to conceive in the most natural way with minimum of medical intervention.

Is there a real need for PFC?

In many developed countries, there is a negative growth rate because of subnormal net fertility rate which is below population replacement level. Many countries like Japan, eastern European countries, Canada and United Kingdom are either facing negative growth rate or are just managing to maintain their population by encouraging immigration or active interventions to promote fertility. China the most populous country has also now shifted to two child norm after facing a serious threat of long-term population decline. The population decline is associated with an aging population, increased dependency rates and a further decrease in population. The most common reason for this decline is increasing women education and participation in workforce.

There is evidence that this trend towards late childbearing is also related to lack of awareness regarding fertility.[13-15] This involuntary delay in childbearing has its repercussions in social lives of couples. In a country like India where marriage and childbearing is almost universal, infertility has great social stigma.

Many women think that assisted reproduction technologies can overcome any type of infertility with age being no bar.[23] In general, women and men get concerned very late. For various reasons, most men and women take fertility as guaranteed. Natural menopause is taken as the end of fertility. The awareness about fertility

decline which starts 10 to 13 years before actual menopause is miserably lacking.

They do not realize that most pregnancies occurring after 40 years are with the use of donor oocytes. There is an ever increased marketing of oocyte freezing as an insurance against aging. Oocyte freezing for non-medical or social reasons is a much hyped and promoted technique which may not have true long-term benefits.[10,11,24]

PFC can reduce this involuntary preventable childlessness and decrease dependency on assisted reproduction technology.

Who needs PFC?

(1) **Very short infertility:** Women who want to conceive and come to the clinic wanting to conceive and desire optimisation of natural fertility. There are women who come to clinic even after 1 or 2 months of attempting to conceive. Such women only need some assurance and guidance regarding promoting natural fertility.
(2) **Men and women doubtful of their fertility:** Individuals may doubt their fertility because of various reasons, for example family history of infertility, presence of polycystic ovaries, other medical diseases or past history of abortion.
(3) **Young patients undergoing cancer therapy:** These patients have a serious risk of decline in their natural fertility related to cancer or various treatments. International guidelines have recommended mandatory fertility counselling for these individuals before undergoing any therapy.[19-22]
(4) **Plans to delay child bearing:** Women who actually plan to delay childbearing because of various social or personal reasons like higher education or migration to another country.
(5) **Infertile couples after successful treatment:** The couples who achieve baby after infertility treatment sometimes get so exhausted mentally, physically and financially that they delay planning second pregnancy even when they had wanted another child. They also develop overconfidence in technology. These couples need proper advice regarding planning of subsequent pregnancy.
(6) **Known gynaecological conditions affecting fertility, for example polycystic ovarian disease, endometriosis, etc.:** Many such women are unaware of the consequences of these diseases on fertility. They keep on postponing the pregnancy without realizing that these diseases are progressive and age will have a more severe adverse effect.
(7) **Forced by parents and peers:** In India, parents and in-laws have a big role to play in reproductive planning of newly married couples. Many young couples are forced to seek fertility because of social pressure. Such couples and also their peers need counselling regarding fertility and optimisation of natural fertility.
(8) **Couples staying separately:** The number of couples staying separate because of job problems is ever increasing. These couples also delay childbearing in a hope to settle down some day. They may not be able to realise their natural fertility potential because of infrequent sexual exposure.
(9) **Couples wanting Medical Termination of pregnancy (MTP):** Many couples when counselled regarding side effects of abortions would opt out of MTP. Even if they go for MTP, they need counselling regarding appropriate contraception and also fertility education.

Who should do PFC?

General gynaecologists: General gynaecologist and obstetricians are so much tuned to see obstetric patients and unwanted pregnancies that they are likely to overestimate fertility. In their attempt to avoid medical intervention, they may go along with the desires of the couples to delay childbearing even in the presence of obvious adverse infertility factors. It would be more prudent to assess fertility and then give advise.

ART specialists: ART specialists are best trained to assess fertility but at the same time underestimate fertility. They may prematurely advise intervention and ART. They have seen so much of infertility and poor outcomes that it is natural for them to intervene early.

IVF clinics: The opinion is not considered unbiased. An advice regarding decreased fertility may be taken as alluring. A sincere effort to counsel patients is taken as marketing gimmick. A special fertility counselling clinic was started outside and independent of IVF centre in Sweden.[25]

Contraception clinics: Contraception and MTP clinics are often managed by paramedical staff with a focus on achieving targets of contraception and population control. However, these clinics are supposed to give advice related to fertility as well. A concept of reproductive life care plan

was introduced to mid-wives in contraception clinics or better called family planning clinics. It is possible to train the medical and paramedical staff in fertility assessment and fertility planning.[26-28]

Web teaching: There have been attempts to spread awareness through websites dedicated to the issue of optimizing natural fertility. Self assessment fertility tool may be a good source. These websites educate and help couples to self assess their fertility. They also give advice regarding prefertility tests and lifestyle changes. They are effective and advise when to seek medical consultation. However, their impact may not be very long lasting.[28,29]

In the current perspective, there is no single clinic or specialist best suited for fertility counselling. All medical specialists managing fertility issues should be trained to guide these couples appropriately. There is a need to impress upon medical community that there is a large segment of preventable infertility which can be reduced.

COMPONENTS OF PFC

The four main components are as follows:
(1) Fertility assessment
(2) Fertility forecasting
(3) Fertility planning
(4) Need for intervention and fertility preservation
(5) Fertility Assessment in men

Fertility assessment

There are only a handful of studies which have attempted to assess fertility and tried to forecast fertility in non-infertile population. The predictors of ovarian reserve are anti-Mullerian hormone (AMH), antral follicle count (AFC) and age of women. If we could reliably estimate age of menopause, then instead of chronological age of women menopause age would be a better predictor. The fertility declines seriously 10 to 13 years before menopause. There are few population-based studies to assess AMH as a predictor of age of menopause. Fertility assessment is a very important part of pre-treatment workup in infertility management. IVF technology and advances in aneuploidy testing of embryos have confirmed the age-related decline of female fertility because of quantitative and qualitative decline of ovarian reserve.[31-35] There have been attempts to classify and predict fertility on the base of adverse factors. A diagnostic tool for self assessment was developed and tested successfully.[29] Another colour-coded assessment tool was tested in special PFC clinic.[25]

We have tried to categorize infertility risk on the basis of adverse infertility factors in the Indian context [Table 1]. The table only gives a risk category.

Fertility forecast

There have been attempts to predict fertility based on various historical facts. Bunting and Boivin[29] tried to correlate adverse factors with chances of natural conception on follow-up. The fertility prediction tool could predict fertility in 85.8% in women judged as low risk and 73.5% infertility judged to be high risk for infertility.

In Copenhagen University Hospital Denmark, a separate fertility clinic was opened with facilities and expertise to assess fertility with an objective to protect fertility. Couples with no known fertility problems were counselled. Infertility risk was assessed and categorized in low moderate and high risk based on individual factors. However, it categorized risk into green, yellow, orange and red but an overall risk scoring was not possible to give.[25]

Fertility planning

Reproductive life planning is a tool developed to aid men and women realize their reproductive desires without medical interventions.[28,29,36,37]

The aim is to avoid both unwanted pregnancies and promote natural fertility. This reproductive life planning-based module has been recommended by Centre of Disease Control Atlanta.[37] This tool was further tested and recommended by many authors. The tool was further used by mid-wives and was an effective tool for reproductive planning.[28,29]

In another very interesting study, the age at which a couple should start planning for one, two or three children family size can be estimated. With a mathematical model, the authors calculated the maximum start age for one child as 32 years, for two children as 31 years and below 28 years for a three child family. Starting at these ages, the probability of achieving a desired family size can be calculated as 90%. The age may be needed to be lowered in Indian context. They can delay the start age if IVF or a lower chance is an accepted option.[30]

Table 1: Risk of infertility in women without obvious infertility risk factors

S. no.	Risk factor	Critical values
		Very high-risk infertility factors
1	Age	More than 40 modifications suggested in Indian context to 38
2	Cycle length	Less than 23 or history of progressive increase in length
3	Ovarian reserve tests	AFC < 5, AMH < 0.3 ng, FSH > 10 mIU/mL
4	Medical history	History of clinical abdominal or pelvic tuberculosis, >2 ectopic pregnancies, operated advanced-stage endometriosis
5	Non-reproductive	Cancer therapy
		Women with high risk of infertility
S. no.	**Risk factor**	
1	Age 35–40	33–38 in Indian context
2	Cycle length	Less than 23 or >35
3	Ovarian reserve tests	AFC 5–10 or >30; AMH >0.3 and <0.8 or higher than 6 ng/mL, FSH > 10 mIU/mL
4	Gynae pathology	Endometriosis, fibroids >3 cm, hydrosalpinx, pelvic fluid, pelvic surgeries, treated cancers
5	Adverse lifestyle factors	Obesity, alcohol, smoking
6	Non-reproductive medical diseases	Any serious medical diseases such as diabetes, hypertension, renal heart, etc.*
		Moderate/Indeterminate risk
1	Age	More than 30
2	Pelvic pathology	Mild/moderate endometriosis, myomas, PID tuberculosis elsewhere
3	Other pathology	Adverse lifestyle and medical factors

*Many of such diseases may not directly affect fertility but have an effect on maternal and foetal outcome. Adapted from Hvidman *et al.*, 2015[25] and Bunting and Boivin, 2010.[29] AFC, antral follicle count; AMH, anti-Mullerian hormone; FSH, follicle stimulating hormone; PID, pelvic inflammatory disease.

Fertility intervention

There are no studies in which interventions like IVF and/or oocyte preservation can be advised based on fertility forecast. In case of a very high risk of infertility, advice can be given regarding appropriate infertility treatment. The advice and guidelines are quite clear in cancer patients. However, fertility preservation for social reasons is still controversial but can be a reasonable option for women who wish to delay childbearing and face a serious risk of decline in fertility because of delay.

Fertility assessment in men

Theoretically, men remain fertile throughout their lifespan. However, even in men adverse effects of aging, lifestyle factors and medical diseases are being increasingly recognized. There are no specific tools which can predict fertility in men. There is some correlation with sperm counts below the reference range and such men can be guided to plan pregnancy early. However, there is a poor correlation with fertility potential.[38]

ADVANTAGES OF PFC

In the study by Hvidman *et al.*,[25] counselling was given based on risk assessment. The following conclusions can be drawn.[25] Nearly three-fourth agreed that there is a need for more public knowledge and awareness about fertility. Other important conclusions which could be drawn from this study were as follows:

- **Fertility education:** Almost all women found counselling useful and said the counselling had improved their knowledge.
- **Infertility prevention:** On counselling, 35% of women and 19% of men decided to advance their plans for pregnancy.
- **Protection and preservation of fertility by early intervention:** The couples were advised to adopt a healthier lifestyle. This included advice on weight management, alcohol, smoking and stress management. Many of the couples counselled decided for improved lifestyle.
- **Reproductive planning:** The majority appreciated the help offered in decision making regarding size and timing of pregnancy. A minority, 6%, postponed their childbearing because they could be reassured regarding their potential fertility.

PITFALLS OF PFC

Fertility assessment and ovarian reserve tests: There have been numerous studies correlating ovarian reserve testing with IVF outcome. AFC and AMH are two important ovarian reserve tests which are used. However, the tests suffer from two major drawbacks to assess natural fertility. The tests can predict the quantity but not the quality thus making these inefficient for

'quantifying fertility'.[39] Low reserve can only predict decreased chances and no pregnancy. The second major drawback is that all the studies are in infertile populations which cannot be extrapolated to women whose fertility has not been tested. Third, there are reports suggesting early decline of fertility in Indian women.[39-42] Practically, no Indian data exists on which to base judgements. In addition, there is laboratory to laboratory variations and subjectivity in assessing AMH and AFC. All these drawbacks leave age as the sole predictor test of ovarian reserve for potentially fertile women.

It is not possible to give a precise prognosis but only risk estimates can be given. There is very thin line between diagnosing 'infertility' and 'predicting fertility'. Infertility is diagnosed when the couple has been unsuccessfully trying to conceive for at least 1 year. In such cases, the emphasis is in finding the cause. However, in women and men who have not been attempting to conceive, it is not possible to give estimate with a reasonable certainty. Even in young couples with no known infertility risk factors, nearly 15% couples may suffer from unexplained infertility. Similarly, many couples would conceive in presence of obvious negative factors like endometrioma, fibroids or oligospermia.

It is more challenging to reach potential candidates out of medical setting. In any clinic which has the facility to assess fertility and counsel appropriately, even a genuine attempt can be taken as marketing strategy for ART or gamete banking. In addition, many of these couples may already know about existence of negative factors or have experienced short infertility. Most likely outcome of such counselling is a higher infertility risk assessment leading to infertility intervention than a simple reassurance or advice on lifestyle factors.

SIDE EFFECTS OF PFC

Counselling on potential fertility is not without side effects. In the absence of an accurate risk assessment tool, fertility forecasting can be extremely difficult. There may be reports which show borderline impairment of fertility. This ambiguity can result in unnecessary anxiety. The couple may opt for further tests and premature interventions which were not required in the very first place. An advice on timed coitus may be taken so seriously so as to reduce the spontaneity of sexual life of couples. In case couple conceives early it may be taken as a wrong judgement on the part of doctor even if only a risk estimate was given.

On the other hand, false reassurance may be given without detailed workup. There may be other fertility factors which cannot be assessed without appropriate investigations. A reassurance may be taken as guarantee and pregnancy planning postponed further with disastrous consequences.[29]

CONCLUSION

All health professionals have a responsibility to increase awareness about fertility. The rising trend in infertility and ART needs to be reversed. However, with limited studies available on healthy individuals, a rational approach to counselling is fraught with many lacunae. More population-based studies are needed to assess the impact of adverse fertility factors. Web-based information has a much wider access to population at large. Best suited for PFC are general gynaecologists and contraceptive clinics. There is a great need to develop self-assessment tools and more accurate prediction models.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

Umesh N. Jindal

Jindal IVF and Sant Memorial Nursing Home, Chandigarh, India

Address for correspondence: Dr. Umesh N. Jindal, MD, Jindal IVF and Sant Memorial Nursing Home, # 3050, Sector 20 D, Chandigarh, India.
E-mail: drunjindal@gmail.com

REFERENCES

1. World Population Prospects: The 2017 Revision. United Nations Department of Economic and Social Affairs, Population Division. Available at ESA.UN.org (custom data acquired via website). [Accessed September 10, 2017].
2. Jindal UN. Mid-life fertility: Challenges & policy planning. Indian J Med Res 2018;148(Suppl):S15-26.
3. Indian Society of Assisted Reproduction: National ART Registry of India (NARI); 2013-2014.
4. Gleicher N, Kushnir VA, Weghofer A, Barad DH. The "graying" of infertility services: an impending revolution nobody is ready for. Reprod Biol Endocrinol 2014;12:63.
5. Practice Committee of the American Society for Reproductive Medicine in collaboration with the Society for Reproductive Endocrinology and Infertility. Optimizing natural fertility: a committee opinion. Fertil Steril 2017;107:52-8.

6. United Nations. Report of the International Conference on Population and Development. New York: United Nations 1995. pp. 40-1.
7. American College of Obstetricians and Gynecologists Committee on Gynecologic Practice and Practice Committee. Female age-related fertility decline. Committee Opinion No. 589. Fertil Steril 2014;101:633-4.
8. Monester J, Fisher J, Kirkman M, Rowe H, Holton S. 'If I had known the fertility health facts sooner . . . ' Knowledge gaps as a barrier to effective fertility management: findings from the understanding fertility management in contemporary Australia survey. Eur J Contracept Reprod Health Care 2019;17:1-6.
9. Lee M. I wish I had known sooner: stratified reproduction as a consequence of disparities in infertility awareness, diagnosis, and management. Women Health 2019;31:1-14.
10. Willson SF, Perelman A, Goldman KN. "Age is Just a Number": how celebrity-driven magazines misrepresent fertility at advanced reproductive ages. J Womens Health (Larchmt) 2019. [Epub ahead of print].
11. Wyndham N, Marin Figueira PG, Patrizio P. A persistent misperception: assisted reproductive technology can reverse the "aged biological clock". Fertil Steril 2012;97:1044-7.
12. Mac Dougall K, Beyene Y, Nachtigall RD. Age shock: misperceptions of the impact of age on fertility before and after IVF in women who conceived after age 40. Hum Reprod 2013;28:350-6.
13. Maheshwari A, Porter M, Shetty A, Bhattacharya S. Women's awareness and perceptions of delay in childbearing. Fertil Steril 2008;90:1036-42.
14. Deatsman S, Vasilopoulos T, Rhoton-Vlasak A. Age and fertility: a study on patient awareness. JBRA Assist Reprod 2016;20: 99-106.
15. Bretherick KL, Fairbrother N, Avila L, Harbord SH, Robinson WP. Fertility and aging: do reproductive-aged Canadian women know what they need to know? Fertil Steril 2010;93:2162-8.
16. Kudesia R, Chernyak E, McAvey B. Low fertility awareness in United States reproductive-aged women and medical trainees: creation and validation of the fertility & infertility treatment knowledge score (FIT-KS). Fertil Steril 2017;108:711-7.
17. Practice Committees of American Society for Reproductive Medicine, Society for Assisted Reproductive Technology. Mature oocyte cryopreservation: a guideline. Fertil Steril 2013;99:37-43.
18. Ethics Committee of American Society for Reproductive Medicine. Fertility preservation and reproduction in patients facing gonadotoxic therapies: a committee opinion. Fertil Steril 2013;100:1224-31.
19. Lee SJ; ASCO Fertility Preservation Guidelines Committee. Preservation of fertility in patients with cancer. N Engl J Med 2009;360:2680.
20. Practice Committee of American Society for Reproductive Medicine. Ovarian tissue cryopreservation: a committee opinion. Fertil Steril 2014;101:1237-43.
21. Donnez J, Dolmans MM, Diaz C, Pellicer A. Ovarian cortex transplantation: time to move on from experimental studies to open clinical application. Fertil Steril 2015;104:1097-8.
22. Martinez F. Update on fertility preservation from the Barcelona International Society for Fertility Preservation-ESHRE-ASRM 2015 expert meeting: indications, results and future perspectives. Hum Reprod 2017;32:1802-11.
23. Ubaldi FM, Cimadomo D, Vaiarelli A, Fabozzi G, Venturella R, Maggiulli R, *et al.* Advanced maternal age in IVF: still a challenge? The present and the future of its treatment. Front Endocrinol (Lausanne) 2019;10:94.
24. Mac Dougall K, Beyene Y, Nachtigall RD. Age shock: misperceptions of the impact of age on fertility before and after IVF in women who conceived after age 40. Hum Reprod 2013;28:350-6.
25. Hvidman HW, Birch Petersen KB, Larsen EC, Macklon KT, Pinborg A, Andersen AN. Individual fertility assessment and pro-fertility counselling; should this be offered to women and men of reproductive age? Hum Reprod 2015;30:9-15.
26. Stern J, Larsson M, Kristiansson P, Tyde? n T. Introducing reproductive life plan-based information in contraceptive counselling: an RCT. Hum Reprod 2013;28:2450-61.
27. Stern J, Bodin M, Grandahl M, Segeblad B, Axén L, Larsson M, Tydén T. Midwives' adoption of the reproductive life plan in contraceptive counselling: a mixed methods study. Hum Reprod 2015;30:1146-55.
28. Habbema JD, Eijkemans MJ, Leridon H, te Velde ER. Realizing a desired family size: when should couples start? Hum Reprod 2015;30:2215-21.
29. Bunting I, Boivin J. Development and preliminary validation of the fertility status awareness tool: FertiSTAT. Hum Reprod 2010;25:1722-33.
30. Daniluk JC, Koert E. Fertility awareness online: the efficacy of a fertility education website in increasing knowledge and changing fertility beliefs. Hum Reprod 2015;30:353-63.
31. Broer SL, Eijkemans MJ, Scheffer GJ, van Rooij IA, de Vet A, Themmen AP, *et al.* Anti-Mullerian hormone predicts menopause: a long-term follow-up study in normoovulatory women. J Clin Endocrinol Metab 2011;96:2532-9.
32. Broer SL, Broekmans FJ, Laven JS, Fauser BC. Anti-Mu?llerian hormone: ovarian reserve testing and its potential clinical implications. Hum Reprod Update 2014;20:688-701.
33. Freeman EW, Sammel MD, Lin H, Gracia CR. Anti-Mullerian hormone as a predictor of time to menopause in late reproductive age women. J Clin Endocrinol Metab 2012;97:1673-80.
34. Tehrani FR, Solaymani-Dodaran M, Tohidi M, Gohari MR, Azizi F. Modeling age at menopause using serum concentration of anti-Mullerian hormone. J Clin Endocrinol Metab 2013; 98:729-35.
35. Dolleman M, Depmann M, Eijkemans MJ, Heimensem J, Broer SL, van der Stroom EM, *et al.* Anti-Mullerian hormone is a more accurate predictor of individual time to menopause than mother's age at menopause. Hum Reprod 2014;29:584-91.
36. Moos MK, Dunlop A, Jack B, Nelson L, Coonrad D, Long R, *et al.* Healthier women, healthier reproductive outcomes: recommendations for the routine care of all women of reproductive age. Am J Obset Gynecol 2008;199:S280-9.
37. Centers for Disease Control and Prevention. Recommendations to improve preconception health and health care − United States: a report of the CDC/ATSDR Preconception Care Work Group and the Select Panel on Preconception Care. MMWR 2006; 55:1-23.
38. Buck Louis GM, Sundaram R, Schisterman EF, Sweeney A, Lynch CD, Kim S, *et al.* Semen quality and time to pregnancy: the longitudinal investigation of fertility and the environment study. Fertil Steril 2014;101:453-62.
39. Practice Committee of the American Society for Reproductive Medicine. Testing and interpreting measures of ovarian reserve: a committee opinion. Fertil Steril 2012;98:1407-15.
40. Fujimoto VY, Luke B, Brown MB, Jain T, Armstrong A, Grainger DA, *et al.* Racial and ethnic disparities in assisted reproductive technology outcomes in the United States. Fertil Steril 2010;93: 382-90.

41. Shapiro AJ, Darmon SK, Barad DH, Albertini DF, Gleicher N, Kushnir VA, *et al*. Effect of race and ethnicity on utilization and outcomes of assisted reproductive technology in the USA. Reprod Biol Endocrinol 2017;15:44.
42. Iglesias C, Banker M, Mahajan N, Herrero L, Meseguer M, Garcia-Velasco JA, *et al*. Ethnicity as a determinant of ovarian reserve: differences in ovarian aging between Spanish and Indian women. Fertil Steril 2014;102:244-9.

Access this article online

Quick Response Code:

Website: www.fertilityscienceresearch.org

DOI: 10.4103/fsr.fsr_31_19

How to cite this article: Jindal UN. Profertility counselling: when, where and how. Fertil Sci Res 2019;6:2-9