IFS CONVERSATIONS
Volume 18

Theme
New Innovations

IFS SECRETARIAT

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MESSAGE FROM THE PRESIDENT’S DESK

Dear Friends,

It is indeed a pleasure to address you all on this issue of IFS Conversations.

We look forward to seeing you all at Fertivision 2022, from 9th to 11th Dec at Hyderabad. In this IFS conversation we have dealt with detailed new innovations. The editorial team and the authors have worked very hard towards it. Hope you all will find it very useful. The conversation also showcase various recent academic activities conducted by our extremely enthusiastic and committed member.

Wishing you all a very pleasant reading of this issue of IFS Conversation!

Dr. K D Nayar
President IFS

MESSAGE FROM THE SECRETARY DESK

Dear Friends,

Greetings from team IFS

IFS conversations is the official newsletter, this particular issue focuses on the innovations in the field of Reproductive medicine and infertility. Hope all members enjoy reading and keeping them professionally updated.

Please go on to the IFS website and answer the surveys we have put in for pan India data collection. We look forward to seeing you participate actively in Fertivision at Hyderabad where you would see IFS at its best – academically, socially and culturally bringing together global and national leaders in the field. Do not miss it!

Dr. Surveen Ghumman
Secretary, IFS

MESSAGE FROM THE EDITOR’S DESK

Dear Friends,

Greetings from team IFS

We are pleased to release this edition of IFS Conversations which is based on theme "New innovation"

It has collection of articles on different aspects like AI, newer concepts in imaging genetics, OTC, Yoga and sexology. It specifically covers interviews of Lifetime awardees, President and Gen. Sec.

We sincerely thank all our authors for their wholehearted contribution towards this issue of IFS conversation.

We would love to hear your comments and suggestions and encourage all our readers to contribute in our forth-coming issues of IFS conversations.

Dr. Sweta Gupta
Editor - IFS

Dr Rupali Bassi Goyal
Jt. Editor - IFS
Sweta Gupta: Thank you for agreeing to give us your valuable time for this interview. Members would like to know about your qualifications, experience and your journey to becoming a successful IVF specialist.


Can you elaborate on your this extraordinary journey to becoming President, IFS

I became President of Indian Fertility Society (IFS) in March 2022, having started as joint treasurer in 2008-2010, became Treasurer 2010-2016, thereafter Secretary General 2016-2018. I was elected as Sr, Vice President from 2018-20. I accepted post of President Elect in March 2020.

I am convenor of Education committee IFS 2018-2024. I have also been actively involved in teaching as course Director of FOGSI accredited course and supervisor for IFS-Amity accredited fellowship program.

How do you balance family and professional life?

I am blessed with a supportive wife Dr. Poonam and three children, two daughters who are now settled in US and a son who has just finished medical graduation.

Members would like to know you as person. What are your hobbies or extracurricular activities?

I still remember this young couple who presented with H/O one failed IVF Cycle done outside, where she developed OHSS. And she was very scared to undergo next cycle. The couple were counselled and underwent another 3 cycles of IVF in our unit, taking care of previous H/O OHSS. The last frozen ET cycle she conceived and they are proud parents of twins babies. They have been visiting us regularly and as a gesture of thanks the couple has supported over the year, the whole IVF cycle of 3 needy couples, who had financial difficulty. In addition, they are still ready to support other couples in future as a gesture of gratitude.

Future vision

Innovations in IVF is important and that is theme of this year’s conference Fertivision.

Any interesting incident u want to share in personal or professional life

Any message to members of IFS

With the introduction of ART law, there is presently a state of teething problems but with passage of time, things will be smooth, safe and well-regulated ART speciality in India.

We should continue ethical, evidence based fertility treatment to needy couples.

I would like to sincerely thank you for sparing your valuable time from your busy schedule. Your journey and thoughts are impressive and inspiring to all our members, on behalf of all, I wish you the very best for your future.
INTERVIEW
Dr Surveen Ghumman

Educational qualification, experience, your journey to becoming a successful IVF specialist: I was always deeply interested in infertility. In the former part of my career I was associated with government hospitals where the facility for Infertility treatment could not go beyond IUI due to lack of IVF labs facilities. Hence, after a few years I became restless as I felt I could not do justice in treating those patients who needed IVF. That is when I decided to leave, get training in IVF and start in the private sector. It was a bold step to give up a secure job and build a practice from scratch. I trained at Manipal University and Cleveland Clinic USA. My training at Manipal was very intensive with excellent teachers. My experience at Cleveland made me realize that India is very much at par with countries like USA as far as IVF treatments are concerned. Over the many years that I have practiced as a fertility specialist I have come across a series of emotions - joy, disappointment, hope, despair, anger, self pity, acceptance. My mantra through the years of practice has been - Do the best for your patient and the best comes back to you.

Journey to becoming Gen Sec, IFS - I joined IFS in the year it was started. With a passion for the subject since then I keenly followed the society and participated in all activities and have always held the Senior members in high esteem. I was asked to join the executive in 2008 and since then have worked for the society with passion. I remember my first assignment as a co web editor was a bulletin where I took out the latest innovations and made it a platform to discuss legal and ethical issues. I used to research deeply for it. Find recent dilemmas which have happened globally in the field and take the opinion of doctors in the field. Later as editor and then treasurer I continued to work with the same passion as I have always felt IFS to be my own society. I feel extremely proud to be associated with the society and be part of its academic ventures. It is growing with leaps and bounds and is doing relevant work in the field of academics and research. Becoming the General secretary gave me the opportunity to put some of my thoughts into action.

How do you balance family and professional life? When I was younger I was a great multitasker. That skill has declined with age. Now whether it is professional or personal I take up one task at a time. But the difference is I have become very fast in completing that task. I think experience and confidence add on with age helping you to take faster decisions. But yes I have never missed a family time or a party because I have a presentation the next day!!

Any hobbies or extracurricular activities? I do oil painting. I have been doing it since the age of 12. My house walls are covered with my paintings. I also swim regularly and do Yoga every morning.

Future vision: Would like to be part of the change occurring to structure IVF practices in India in an ethical manner and make good research a part of each IVF centre in India. As general Secretary I would really like to put together Indian data on practices in this field and initiate Indian guidelines in a proper structured manner. These small steps would make us reach a level of global excellence.

Any interesting incident u want to share in personal or professional life ........ One of my first few cases as an IVF specialist, a humbling incident- I was doing an donor egg IVF. On the day of the pickup only patients husband came to give semen as she was caught up with work. So, I passed on her prescription of progesterone to the husband and told him that she had to take daily till we do the embryo transfer. After 5 days I called her for an embryo transfer. She had perfect embryos. It was a busy day with many cases. As I did the transfer I felt all was good. An hour later as she was leaving I went over her post procedure instructions with her. I explained as usual- “Please continue progesterone” She looked up at me and said - “Which progesterone? I am not taking anything” I was stunned. I had explained to the husband and he apparently did not communicate with her. It was difficult for me over the next few days to not blame myself for omitting talking to patient directly. From that day on to date I never pass on instructions to the husband! Thousands of studies done on progesterone priming of uterus before embryo transfer quoted that the not just the day but even the hour when you start is important. I was now waiting for the day when I would counsel her on why the pregnancy did not happen feeling extremely guilty. She walked into my office 12 days later to share the report. I was stunned! - A positive report! Nine months later she delivered a baby girl. I have never to date quoted what happened to our scientific community because there would be disbelief. However, it remains with me, humbling me each day. A constant reminder that pregnancies don’t occur because of me or because I have treated the patient well. They occur because a far stronger force is in play. The words of Paulo Coelho ring out to me “We have to stop and be humble enough to understand that there is something called mystery”. Each time a patient comes back to thank me I reply, “It wasn’t me, it was you who did it!”

Dr Surveen Ghumman
Secretary - IFS
Historically, Nobel prizes are awarded to an individual(s) in a given subject. However, the Lifetime Achievement award recognises all the contributions made by an individual in enhancing and fostering a Society's standing in the world. One such individual, Professor Arne Sunde, a perfect friend, is honoured with a Lifetime Achievement Award by the Indian Fertility Society (IFS). It is an honour and pleasure to listen to the lifetime journey of Arne and hear of his many contributions and achievements in the field of Reproductive Medicine, especially in Assisted Reproduction.

Jayant: Dear Arne, what was your first reaction when you heard that IFS is honouring you with a Lifetime achievement award?  
Arne: I was extremely humbled and surprised that IFS was honouring a Norwegian with this prestigious award in recognition of my association with the Society. I thank the Executive committee for considering me worthy of this accolade, especially Dr Kuldeep Jain, an excellent friend. I am indebted to the past presidents and secretaries of Society and membership.

Jayant: Although I have known you for more than ten years, I feel there is so much I don’t know about you. Can I take you back to your birth and childhood period?  
Arne: The world was waking up from World War Two’s devastation and aftermath traumas, and Norway was no different. The Norwegian population was coming to terms with the realisation of building a nation without certainty of the next meal. I was born into a relatively low-income family in Trondheim, a small town, on the 16th of August 1950. My father, Asbjørn Sunde, a Civil Engineer, worked very hard to make ends meet. I was nurtured and raised by a very kind, loving mother, Brynhild Sunde, a proud housewife who ensured that we had enough food on the table. My childhood can best be described as reasonably simple growing, with a limited number of toys and other resources enjoyed by our children.

Jayant: So far, I am seeing a child who is content but hungry to know more about life. Can you share with us your educational journey?  
Arne: I was seven when I joined my Primary School in 1957. It was a challenging experience as there were shortages of many items. However, as a keen swimmer, I won my first silver medal in the 1963 swimming National Championships; I continued winning silver medals at consecutive championships between 1963-1969 when I was in secondary school (1964-1966) and Gymnasium College (1966-1969). Before joining the Norwegian University of Science and Technology (1970-1976), I spent one year in Military service, mainly in the Coastal defence section. I obtained my Master's in Chemical engineering.

Jayant: If you obtained a Master’s in Chemical engineering, what motivated you to change directions towards Reproductive medicine?  
Arne: Life has been challenging right from the start. I changed track mid-stream. Initially, I had planned to study computing and had written many programs for mainframe computers, or when possible, worked for the budding Norwegian oil industry. All along, I was intrigued by biochemical processes. Biochemistry teased my interest further when the legend in testis biology Kristen B Eik-Nes was appointed Professor of Biophysics. While working in the US, Eik-Nes’s pioneering work reported understanding the fundamental relationship between the pituitary gland and testicular function. I decided to join him and obtained my masters under his guidance. The title of my thesis was: 'Inhibition of Testicular 5a-reductase by Progestines (1976). I was fortunate to receive a scholarship to do my PhD in Biophysics. Professor Eik.Ness, as my mentor, supported and encouraged me to complete my PhD. Thesis title: "Metabolic activation and inactivation of androgens".

Jayant: On completing your PhD, I am sure many doors would have opened for you. Can you tell our readers about your career?  
Arne: In 1980, after my PhD, I started to work as an engineer and later group leader at the Institute for Cancer research. The research focus for our group was the relationship between androgens and androgen metabolism and prostate cancer. I became more administrative after a while and was heading our molecular biology laboratory (80 employees). In 1991, I went full-time into IVF. Consequently, in 1994, I was appointed Professor in Cell Biology (teaching) at the Norwegian University of Science and Technology. My main task was teaching the Biology of Reproduction to medical students. I stopped teaching in 2020 in recognition of my contributions to the state, King Harald V bestowed me with the Medal of Merits in 2017. A very prestigious royal honour.

Jayant: How did you get involved in ART?  
Arne: A few gynaecologists approached me in 1982 as they wanted to start an IVF service and needed someone to analyse LH and progesterone. I was the only one at the hospital with practical experience with this analysis. As part of my PhD, I had been making radioimmunoassays of hCG from scratch (rabbit in one hand, hCG in the other and a few months later, you had an assay).
I was prepared to make our own RIA for LH and do the analysis (natural cycles), but before getting permission, we decided to go for a stimulated cycle. With six years of experience in the primary culture of testicular, prostate, and cancer cells, I was confident that I could take responsibility for the IVF culture and offered to help. We got our first IVF baby in July 1984 (first in Norway), and in 1987 the first baby was born after the cryopreservation of embryos. The IVF Unit at St Olavs university hospital has been a leading unit in Norway ever since.

I remained the laboratory manager between 1982-2006, was promoted to the Head of the Fertility Clinic in 2006, and in 2015 became the Head of the Department of Obstetrics and Gynaecology. I held this position for one year, retiring from the services in 2016—a very challenging but rewarding journey of my life.

Jayant: We all know about your association with ESHRE and all the contributions that you have made to structure what ESHRE is today. Can you elaborate on how you got associated and all the challenges you faced?

Arne: ESHRE provided a platform for me to fulfill my dreams. The birth of the first test tube baby was fresh, and many questions remained unanswered. I was one of the few Norwegian Biologists then, searching for more information to build on my existing base. It was fortuitous that I wandered into a meeting room (to pass a little time during tea break) at the third World Congress of IVF in Helsinki in 1984. There I found Robert Edwards and a bunch of keen Europeans determined to set up a society to rival the Americans. Edwards gently coerced me into ESHRE's first temporary committee, and I was given the responsibility for ESHRE's training programmes within a few months. I was the first founder executive member (1985-1987), and in 1987, I was appointed as a Special Advisor on training (1987-1994). Eighteen years later - in 2003, I took the helm of ESHRE as its 10th Chairman. This period was challenging as ESHRE was evolving with many educational and training activities. Membership was also increasing, as was their expectation from one of the largest European Reproductive Medicine societies. The Society found itself in a far more political environment than ever before. Under my leadership, the Society formally opposed the restrictive legislation proposed in Italy (enacted in 2004). It formally supported embryo and stem cell research (which appeared under threat from EU funding and a 'rumoured' tissue and cell directive). A need for a permanent address for Society and to accommodate all the increasing activities associated with Society, I was instrumental in purchasing our own Central Office, as we know it now, in the suburbs of Brussels.

At the end of my chairmanship, I continued as the immediate past president for the next two years (2005-2007)

Jayant: IFS has benefited in many ways from your association. How would you describe your journey to India?

Arne: My love affair with India started in 1985, and with Kamal Buckshee. We were on our way to World IVF in Melbourne, and Kamal invited us to spend five days at AIIMS to help them start IVF. We succeeded in getting oocytes and embryos, which were transferred. Although We had no pregnancies, we had a wonderful time. This was my first exposure to India and Indian culture. I was very excited when you approached me at a meeting in Oslo, suggesting the possibility of starting an ESHRE Preparatory course through IFS. I was happy to accept the proposal as it has been my vision to empower all embryologists from different parts of the world to be certified and have an equal understanding of the complex subject. We needed to deliver a safe practice for our patients, especially in countries with no regulations.
Indian clinics are now regulated. Kuldeep and both of us agreed that bringing structured recognition would help the authorities, and an ESHRE Certification was the way forward.

Teaching the entire curriculum in three days was a considerable challenge. However, with everyone's dedication, we have successfully conducted the ESHRE curriculum for the final exams. We all feel proud that 45 embryologists are ESHRE Certified in the tenth year. The Preparatory course has become even more popular after being delivered virtually. It is a proud moment for me to claim a success story on the eve of the tenth year because the combination of us three, You, Kuldeep and me, was/is a very fruitful combo.

We successfully introduced virtual exams, IFS being the guinea pig for ESHRE. And ESHRE, as you know, has adapted the virtual mode of examination.

Jayant: Thank you for your beautiful sentiments. As we conclude this interview, I can't stop asking you to tell us about Ingrid Brattbakk, your partner whom I met a few years ago. How would you describe her?
Arne: As you know, and I am sure you will agree, Ingrid is the most loving, kind and supportive soul. She is my pillar of strength, and nothing is difficult for her. With her by my side, I have the reassurance that I am not alone. We have six children, four from my previous marriage and two from her last marriage. We love our children and have showered upon them all our love and affection.

It has been such a pleasure and an honour interviewing Professor Arne Sunde from Norway, a recipient of the 2022 IFS Lifetime achievement award. You will all agree that he is the most deserving candidate, and he informs me that accepting this honour is not the end but a beginning of a new cycle of more visionary deliverance. Thank you, Arne, for your great friendship and support for the IFS fraternity and for establishing ESHRE as we know it now.
INTERVIEW AND MESSAGE FROM Dr (Prof) Kuldeep Jain

Science demands evidence, more so in the field of Human Reproduction, a fast-evolving arena, especially in a country, which has seen an explosion of Assisted Reproductive Technology with no regulatory controls until recently.

The lifetime achievement award recognises an individual who shines like a torch, setting and establishing pathways and examples for the rest of the fraternity to embrace the safe deliverance of sound treatment options. One individual whom the Indian Fertility Society is proud to honour and bestow a Lifetime achievement award is none other than our own Dr (Prof) Kuldeep Jain.

Sweta Gupta (SG): Sir, many congratulations on being nominated for the Lifetime Achievement award. What was your first reaction to this news?

Dr Kuldeep Jain (KJ): I was humbled that the present IFS leadership and nomination committee appreciated my efforts in developing and nurturing the growth of IFS over last 17 years, and I acknowledge their love and affection in the form of a Lifetime achievement award. Accepting this award does not mean the end of my efforts or contributions to the mission and Vision of IFS. In fact I am having lot of plan for IFS in coming years and working on lots of international collaborations and I seek support of all my colleagues in my future endeavours.

SG: Sir, members would like to know about you as an individual, your likes and dislikes?
KJ: I was born in Jaswant Nagar, a small town in Uttar Pradesh, on the 10th of September 1959. Ours was a business family, and I am the youngest of three brothers. I was my parents’ favourite, who loved spoiling me, and I enjoyed being pampered. My childhood was a happy, fun-loving, carefree period without any worries or concerns, which I cherish very much. School days were filled with mischief like any other child going through the same realisation of life.

SG: Sir as a brilliant scholar, we would like your reflection on your educational journey and your interest in Infertility.
KJ: I received my early education from Etawah UP and Gwalior. I graduated from S S Medical College Rewa with a gold medal in anatomy, Pathology and PSM in 1982 and was awarded an MD in Obstetrics and Gynaecology in 1986. During my MD training, I became interested in infertility and reproductive medicine. My boss Professor S C Saxena motivated and nurtured my desire to understand the field of infertility. In those days, it was all clinical as even ultrasound was not available in my college as it was only available in bigger institutions like AIIMS. The interest further grew with the time spent with Professor B N Chakraborty in 1994, whom we all respectfully called the father of ART, who mentored and inspired me in ART techniques. I recall my debates and discussions with the Professor and how he would prompt me to ask questions about every small aspect of ART. This lead to my fellowship in reproductive medicine at KKIVF, KK Hospital, Singapore where I learned the tricks of ART and sharpened my skills in both clinical and embryology, thx to Balaji Prasath, head of embryology at KK IVF who really mentored my skills in embryology and became a very good friend over the years.

SG: You your self have been an avid teacher and educationist throughout. Can you elaborate on your clinical journey and passion in teaching and education?
KJ: I joined Nanavati Hospital Mumbai in 1987 as a registrar and joined UCMS as a senior resident when I returned to Delhi. I have been passionate about teaching and even as a child I was a very good debater. Because of this passion for teaching, I opted to continue and join the teaching cadre at the University College of Medical Sciences, Delhi University and continued as a Reader till 2000. Later Joined as professor at Mujaffarnagar medical college. During this long period of 14 yrs, I was involved in lot of research activity in infertility, teaching post graduates, nurturing them for the future journey. The whole experience was highly gratifying though a bit challenging because of limited resources available.
S G: When did you treat your first infertile couple? and was there any struggle in establishing yourself as a successful ART consultant.

K J: My first independent infertility patient was as early as during my PG days when I got my 1st pregnancy with clomiphene citrate. It was a real wonderful feeling I can't express in words. When I joined UCMS, Scenerio was very different, you had to arrange everything for your patients if you want to do something different. I had to fight to get a place for setting up my IUI lab, which was the first IUI lab in the government sector in Delhi. In the government sector, infertility treatments were in its embryonic stage, and even I had to prepare my media in haematology lab (though unofficially) as the readymade media was not available. and I had to struggle for the next eight years to realise my dream of establishing an IVF facility in the government sector but unfortunately failed because lack of any support. As a fighter, I was not prepared to accept defeat and decided to start my own IVF practice. It was a very hard decision for me as I was due for my promotion to professor post shortly, and there was hardly any support from outside. Initial two years were full of struggle to establish myself but finally it has been rewarding and highly satisfying and successful journey so far.

S G: Sir, we all are aware that you are an important pillar of Indian Fertility Society (IFS) and your contribution to growth of IFS are well known. Will like to know more for the benefit for our readers, the reasons for establishing IFS?

K J: In 2000, the ART fraternity in India was still struggling as a lack of scientific dialogue, sharing of knowledge and proper guidance within the fraternity. Moreover, there were not any opportunity for training in the field. This lack frustrated me very much; as I am sure, it did others. Soon I realised that there was a need for a platform to facilitate the needs of many infertility specialist in North and other parts of India. I kept on thinking on such a possibility for almost two years until I got an opportunity to realises this dream. I clearly remember that it was a conference in Mumbai when I got an opportunity to discuss this proposal with four colleagues from Delhi, Dr Mangalam Telang, Dr SN Basu Dr Raj Chakravarty and fortunately they were very positive but slight hesitant but finally proposal was instantly accepted and that was the start of process of a new chapter in the history of ART in India. The seed for IFS was shown. On returning back, it took me almost 2 months to convince other colleagues and to organise a meeting which was called at Delhi gymkhana club and 18 members joined that historic meeting. The proposal to launch Indian fertility society was passed by a voice vote. And we established a fertility platform, IFS with 18 founder members, in 2005. As a founder secretary, I had an opportunity to steer the development of the society to embrace the needs of the members, for open communication, newer developments, experiences and difficulties. Initial years were very challenging as a very big task was in hand to bring people with different aspirations under one umbrella for a common goal, Had to write the constitution keeping in mind everyone’s interest, giving the society a pan India character. I remained the founder secretary, steering a successful path till 2008, then as a Vice President and later as the President of the society from 2011 – 2014

S G: Sir, we have all witnessed your passion for teaching and education and collaborations with international bodies, can you share your vision?

K J: As a scholar, I believe in sharing the knowledge with all those who are willing to accept it. I became instrumental in developing and introducing academic programmes in clinical and Embryology arenas. I was successful in establishing an affiliation with Amity University with the help of Dr Sohani Verma, running of IUI workshops across India, and ten years ago introduced the preparatory course in Embryology for ESHRE EXAMS and IFS certification for Embryologist. This has become the most successful programme helping and empowering many budding embryologists in India in achieving a worldwide-recognised Certificate. This was only possible because of unconditional support and help from friends like Dr Jayant Mehta and Professor Arne Sunden.

ESHRE recognised the need for an online exam for its certification course and, in 2019, for the first time, IFS held virtual exams for candidates in India outside Europe. The concept of the online exams has been adopted by ESHRE for candidates worldwide later. I was further responsible for conceiving and introducing the official Journal of IFS ‘Fertility Science and Research. I have developed international ties and collaborations with ESHRE, IFS and ASRM. All these were possible because of widespread support from all subsequent IFS leadership and IFS colleagues across India. My efforts in establishing stronger links with International Societies bore fruits when in 2017, IFS organised the first joint IFS and ESHRE campus workshop on Endometrium in Delhi.

An MOU signed between IFS and ESHRE / ISAR further solidified the association and started a joint IFS/ISAR session during ESHRE annual conference. An extension of this association was the deliverance of a highly successful virtual FUSION 2022 Conference, a collaboration between ESHRE-IFS and ISAR. This is now an established feature till 2026.

As an organising secretary, in 2016, India witnessed the first IFFS world conference, which was a huge success and gave India its due share after 55 years and this was possible because of the collaboration started at 2010 with IFFS when the conference was jointly awarded to IFS and ISAR. An MOU was signed for continued cooperation between IFFS and IFS. Representing IFS, I was invited to be a member standard and practice committee from 2014-2016, one of the board of directors from 2016-2019, and nominated as member scientific committee 2019-2025. IFS has established exchange sessions and panel discussions at IFFS 2019 Shanghai and Athens 2023.

As International committee chairperson IFS, I am continuously working to strengthen ties with ASRM, the British Fertility Society, to name a few and sincerely hope that IFS will be having its write place soon at international scene.
Nationally, I have contributed and given directions to academic activities and growth was of the East Delhi Gynaecologist forum as Vice President and later as President. I have also established long associations with AOGD as an executive member and chairperson of the infertility committee of AOGD. At the FOGSI's level my role as a member of the infertility committee and a member of the international exchange committee was very fruitful. Recently as a chairperson of the endometriosis committee has given me an opportunity to contribute immensely to FOGSI, allowed me to bring out a FOGSI focus and awareness program on adolescent endometriosis across schools in India.

S G: Sir; we have learned a lot about your academic contributions, but members will like to know who the person behind your success is.

K J: As is the tradition in Indian families, as I was evolving and establishing myself in my clinical and academic career; my parents felt it was time to for me to get married. They found an excellent match in Dr Bharti, and we got married in 1987. We are blessed with a daughter and son. Mannsi, has followed my example, supports me in our daily clinical practice, and already had been sharing lot of my responsibilities. On the other hand, Bharti as a specialist ultrasonologist, continues to support me always in my day-to-day clinical and social activities. I am very proud to have a very understanding and loving family and whole credit goes to my family who have allowed me to pursue my dreams inspite of hardships at times.

K J: I am a foodie and cooking is my stress buster and I consider myself a good cook. Apart from that I am a social person and love to be with friends, enjoy travelling and do some singing (though were always hooted in my college days).

SG: You are being followed by a large no of young budding clinicians and embryologist any massage or advice to them.

K J: there is a tendency in lot of youngsters to take shortcuts to achieve their goals. There are no shortcuts and no substitute for hard work. My advice to them is work hard, be focused, practice ethically, observe all new laws in force and keep yourself updated

SG: Last question , what are your hobbies and what do you do in your free time.

K J: I am a foodie and cooking is my stress buster and I consider myself a good cook. Apart from that I am a social person and love to be with friends, enjoy travelling and do some singing (though were always hooted in my college days).

Sweta Gupta: It has been such a pleasure interviewing an eminent clinician and an academician. Someone who has vision to enrich and empower all the fraternity with the advances in science by providing them with evidence. I for sure am convinced that with the blessing of scholars like Dr Kuldeep Jain, we the younger upcoming fraternity will continue to enjoy the fruits of his efforts. Thank you very much sir for such an elaborate and detailed interview. We wait to applaud you on the stage as you receive your Lifetime Achievement Award.
In current times, there has been a constant need for evolution of cryopreservation techniques to assist women and adolescent girls facing urgent prerequisite for treatment of cancer and simultaneously aid in their fertility preservation (FP) for maintaining their active and efficient future reproductive status. Ovarian Tissue Cryopreservation (OTC), also known as ovarian cortex freezing, is considered one of the best suited option that has gained substantial recognition as experimental tag has been removed from it recently in the year 2019. This section of the reproductive age group to women and adolescent girls suffering from various types of cancer may experience impaired fertility or hormone production as a result of their exposure to gonadotoxic chemo-radiotherapy prior to or during the course of combating cancer [1,2,3]. The main objective is the maintenance of the ovarian structure, physiology and endocrinology, benefiting multiple target patients facing different conditions and medical management situations. Moreover, OTC is the only fertility preservation alternative for prepubertal patients, since in these cases, as neither the ovarian stimulation protocol nor oocyte collection can be applied [4], OTC encompasses re-implantation of a few thawed cortical strips into the patient (i.e., auto transplantation) once the patient has completed cancer treatment, is disease free, and desires pregnancy. The number of live births after ovarian tissue cryopreservation exceeded 200 in 2020 [5], while the pregnancy and live birth rates reached 50% and 41%, respectively [6]. Though live births have also been reported by heterotopic transplantation [7, 8], the exact numbers are still unclear.

Concerted multidisciplinary discussions between Hematologists, Assisted Reproductive Technology (ART) teams and Surgeons are required to improve the quality of patient information [9] in terms of procedures and measures for achieving OTC successfully. Radio sensitivity of the human ovary that leads to the loss of 50% of primordial follicles (LD50) is estimated to be 2 Gy [10, 11, 12]. The possibility of ovarian failure is also determined by the regimen and type of chemotherapy where block of DNA replication, double stranded (ds) DNA breaks, and induction of apoptosis is primarily in the stroma and the granulosa cells of growing follicles occur [13, 14].

Studies investigating the most favourable cooling rates and dehydration times have been conducted. It is now well established that for obtaining satisfactory results, adequate penetration of cryoprotectant through the stroma and granulosa cells to the oocytes is required [15]. However, when compared to vitrification, very few reports of successful births were reported in comparison to implementing the slow freezing method for OTC based FP. Although OTC is expected to bridge an important gap in FP in the field of onco-fertility in cases where it is impossible to create embryos for cryopreservation, especially in paediatric oncology most among young girls prior to adolescence [16, 17].

OTC comes with four key components that involve: (i) ovarian surgical procurement, (ii) ovarian tissue processing, (iii) tissue cryopreservation, and (iv) Storage followed by ovarian tissue transplantation (OTT). We as an expert are not only suggesting and recommending OTC as FP method that is being applied to benefit cancer patients, but also the women who want to post-pone their fertility and menopause can opt OTC [18].

It was in 2006 when Meirion et al. reported the first live birth obtained from OTC [19]. However, claims of the first live human birth coming from ovarian tissue which was cryopreserved using the slow freeze technique and then transplanted was described by Donnez et al. [20].

OTC in turner syndrome is under investigation but there is no published report showing any success in such cases [21]. Though, the cryopreservation and re-implantation of whole ovaries are areas where extensive research needs to be performed prior to offering such high-end medical service to the necessitous, in future.

The present stance of OTC is hopeful for young cancer sufferer females and future perspective of OTC/OTT seems to be promising enough, to help the society specially cancer victims. The long term associated and unseen risks of metastasis in young female patients with malignancies who had ovarian cortex re-implanted is still a matter of research and concern and needs to be explored. Nevertheless, optimization of both, cryopreservation strategies and thawing/warming protocols is the need of the hour and necessary to improve the survival of follicles in cryopreserved ovarian cortex.

REFERENCES


Incidence, Prevalence and Epidemiological Aspects of Endometriosis

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Abstract:
Endometriosis is a complex, inflammatory disease which affects more than 190 million women globally and up to 10% of women of reproductive age. It is one of the common causes of chronic pelvic pain in women of reproductive age and associated with infertility. Endometriosis affects significantly the quality of life of women, in all its aspects including sexual life, work, and social relationships. The affected area in endometriosis is the pelvis. The causes of infertility in women with endometriosis may range due to anatomical distortions, adhesions, fibrosis to endocrine abnormalities, and immunological disturbances. It is a complex interplay between the genetic profile, hormonal activity, menstrual cyclicity, inflammation status, and immunological factors that defines the phenotypic presentation of endometriosis. To date, imaging techniques, laparoscopy represent the gold standard in diagnosing endometriosis, of which transvaginal ultrasonography and magnetic resonance imaging bring the most value to the diagnostic step.

Introduction:
Endometriosis is a chronic debilitating disease with features of chronic inflammation. It appears to be one of the most common benign gynaecological proliferations in premenopausal women since it is estimated that 10-15% of reproductive-aged women suffer from endometriosis, and 70% of women will have chronic pelvic pain (2). Worldwide, 247 million women are reported to suffer from endometriosis, and around 47 million in India are reported to have endometriosis. The usual location of endometriosis is in the pelvis. However, endometriosis has been described in extrapelvic sites, including anterior abdominal wall, surgical scars, diaphragm, omentum, small intestine, appendix, lung, urinary tract, musculoskeletal, and neural systems. The biology of endometriosis is unclear. Due to its exact prevalence is unknown, because surgery is required for its diagnosis, this disease remains poorly understood.

Due to the invasive properties of endometrial cells in patients with endometriosis, it behaves as cancer, but it is not cancer. Therefore, it gets implanted in other sites other than pelvic organs including the caesarean scar, subcutaneous tissue, cervical region. Genetic predisposition, superimposed by hyperestrogenic stage in women will be the most important etiological factor in patients with Endometriosis. The etiology of endometriosis remains unclear. Different theories apart from the genetic, familial, environmental pollution, Coelomic metaplasia theory, Sampson theory has been postulated earlier.

Incidence and Prevalence of Endometriosis

The Estimates of the frequency of endometriosis is vary widely, but the prevalence of endometriosis in general estimated to be in around 10-15% of the women of the reproductive age group.

Worldwide it is reported more than 247 million (3) women are reported to suffer from endometriosis, and around 42 million in India (4), 2 million in UK (5) are reported to have endometriosis and the average age is around 18-35 years. In some cases, endometriosis may have a subclinical course; therefore, the real prevalence seems to be underestimated. The incidence in infertile women ranges from 30% to 50% (6). Several research studies conducted in the Indian population have shown the incidence of endometriosis to range from 34% to 48% as diagnosed by laparoscopy (7). The disease is associated with chronic pelvic pain (40-50%), dysmenorrhea (60-80%), dyspareunia (40-50%), and subfertility (30-50%) (9,10). Unfortunately, for many of these women, there is often a delay in diagnosis of endometriosis resulting in unnecessary suffering and reduced quality of life. In the general female population, assessing the rates of endometriosis is immensely challenging to quantitate because the definitive diagnosis requires surgical visualization (11).

Based on the Prevalence it is reported about 10-15% of women have some degrees of this disease respectively and approximately 2% for undiagnosed symptomatic disease (12). 1/3rd of women have chronic pelvic pain with visualized endometriosis. Concerning women with pain or infertility, the prevalence of subtle, typical, cystic ovarian and deep endometriosis was reported in over 80%, 50%, 25%, and 15% of cases. It is reported that around 42 million women are estimated to be suffering from endometriosis in India and the average age is around 18-35 years. Endometriosis is a relatively common disease, with an estimated prevalence among women of reproductive age of women of 10%. More than 20% of women are often asymptomatic and should not undergo abdominal exploration or biopsy procedures. An accurate diagnosis requires the direct visualization of the pelvis during a thorough laparoscopic surgical observation. Based on current knowledge, up to 50% of women referred for fertility problems, 2-5% of postmenopausal cases, and 10-70% of patients with pelvic pain are linked to endometriosis. Endometriosis is usually clinically manifested with chronic pelvic pain, dysmenorrhea, dyspareunia, and subfertility (13,14,15). Due to miss treatments, it takes an average of 7-10 years to get diagnosed in most women, and a general lack of awareness about the illness itself contributes. Few Research studies investigated endometriosis in incidence and prevalence among adolescents of visually confirmed endometriosis among adolescents with pelvic pain ranges from 25% to 100%, with an average of 49% among adolescents with chronic pelvic pain and 75% among adolescents unresponsive to medical treatment (16). In Australian study reported 11.4% (17) in reproductive women.

Classification of Endometriosis:
Currently, the definitive method to diagnose and stage endometriosis and evaluate the recurrence of disease after treatment is visualization at surgery (18). It is associated with pain syndromes that have been established by the American Society for Reproductive Medicine (19), based on the morphology of peritoneal and pelvic implants such as red, white, and black lesions, percentage of involvement of every lesion should be included. The revised scoring system of the American Society for Reproductive Medicine (20) determines the disease stage. Stages of endometriosis consistent with ASRM guidelines are stage I, II, III, and IV determined supported the purpose scores and corresponding to the stage of endometriosis. It is based on the type, location, appearance, and depth of invasion of the lesions and therefore extent of disease and adhesions.

Endometriosis fertility index is a simple robust validated clinical tool that predicts Pregnancy rates for patients after the surgical staging of endometriosis.

Nonsurgical diagnostic approaches like transvaginal ultrasonography and magnetic resonance imaging (MRI) perform within the detection of peritoneal and ovarian implants and adhesions.

All of these classifications divide endometriosis into four stages related to the increasing severity of the ovarian lesions, particularly the number of endometrial implants, their depth, size, and adhesions. Points are tallied on a form and a stage is assigned based on the number of points. Scoring of Stage I (Minimal)-1-5 cm, Stage II (Mild)-6-15, Stage III (Moderate)-16-40, Stage IV (Severe) >40 indicates severe condition with many deep implants, large cysts on one or both ovaries with dense adhesions (20). But the correlation between lesions and pain symptoms or infertility is unclear. It is assumed that 70%-80% of lesions are stable or progress, thus endometriosis is considered a recurrent chronic disease requiring long-term management.

Diagnosis of Endometriosis
Endometriosis can be difficult to diagnose, with some studies showing an average delay in diagnosis by 7-10 years (22) resulting in decreased quality of life and a decrease in the prospect of pregnancy. The routine laparoscopy compared with laparotomy represents the gold standard method for the detection of endometriotic implants under magnification in the pelvis. The women who undergo treatment and have severe endometriosis due to pain symptoms may differ in pathophysiology, symptomatology, and risk factor profiles. The disease severity is assessed by simply describing the findings at the surgery or quantitatively using American society of Reproductive medicine and Histological findings need to be confirmed. Visualization of areas of endometriosis may be followed by excision or destruction by burning. This can be done simply with the diathermy or using the laser (23). History and physical examination are based on cyclic or chronic pelvic pain, dysmenorrhea, dyspareunia, a fixed retroverted uterus, an adnexal mass, uterosacral ligament...
Endometriosis and Biometrics: Dr. Roya Rozati

Reproductive Genetics & Infertility: Dr. Umesh Jindal & Dr. Sangeeta

Gen Sec Interview & Message: Dr. Surveen Gumman

Editorial

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Environmental toxicants like diethylstilbesterol, bleeding during menses, and shorter cycles, bleeding, aberrant estrogen levels, low body mass early menarche, nulliparity, dysfunctional uterine complication rates. Both techniques end in similar symptom regression, often performed by laparotomy or laparoscopy, as surgery for endometriosis and endometrioma is in the general population. Information related to its occurrence and incidences prevention strategies. The accurate assessment of health care expenses, along with the suggested link in women's health because of the associated difficulty to quantify because the definitive diagnosis is not uncommon. The selection of medical treatments is based on side-effect profile, cost, and personal preference. Non-steroidal anti-inflammatory drugs (NSAIDs) and low-dose combined oral contraceptives (COCs) such as ethyl Estradiol and progestins are the first-choice drugs.

Surgical techniques include exclusion or removal of endometrial implants, ablation of uterine vessels by the employment of endocauterization, electrocautery or laser treatment, presacral neurectomy, and hypogastric sympathectomy with bilateral salpingo-oophorectomy. They have a 50–80% success rate in reducing symptoms. Unfortunately, endometriosis recurs in 5% to 15% of cases even after hysterecctomy and bilateral oophorectomy. The first advantage of surgery for infertility related to endometriosis is to enhance the probability of natural conception [33]. Surgery for infertility or pain increases the spontaneous postoperative pregnancy rate [34]. On the other hand, surgery for endometrioma could lead to reduced ovarian function and therefore the possible loss of the ovary. Therefore, the choice of surgery should be made carefully, particularly in women with advanced age, bilateral disease, or long-term infertility, who are incompatible with natural conception due to tubal or malefactors.

Conclusions:

Endometriosis is a gynecologic disease that impacts the quality of life of an adult and adolescent patient. The etiology remains unknown, though there are certain changes in the immune system as well as an association with abnormally moulflow tracts.

Endometriosis is not uncommon & is increasingly being detected because of the greater use of diagnostic modalities like laparoscopy in the evaluation of infertility. Diagnostic delays are common and may lead to a decline in reproductive potential and fertility. Due to this, the need for therapy is increased.

The surgical approach to endometriosis-associated infertility and pain has assumed a prominent role.

Laparoscopy remains the gold standard for diagnosing and staging endometriosis.

The management of endometriosis-associated pain can be multifaceted, with surgical treatment as one of the options. With the exception of selected patients who are young and have relatively mild symptoms that respond to medical therapy, many patients during a diagnostic evaluation have a laparoscopy and subsequent treatment of endometriosis.

The immunologic, genetic, and serum semi/semi-indirective biomarkers proposed to date for endometriosis diagnosis are not sufficiently sensitive and specific to justify their use as a screening test and thus improve outcomes, including a reduced pain and fertility. Medical treatments for endometriosis-associated infertility tend to ameliorate pain symptoms, but they are not effective in infertility treatment. These treatments should be utilized as an adjunct to ART.

Ultrasound examination establishes a presumptive diagnosis of an ovarian endometrioma but cannot reliably peritoneal implants of the image. Other techniques end in similar symptom regression, often performed by laparotomy or laparoscopy, as surgery for endometriosis and endometrioma is in the general population. Information related to its occurrence and incidences prevention strategies. The accurate assessment of health care expenses, along with the suggested link in women's health because of the associated difficulty to quantify because the definitive diagnosis is not uncommon. The selection of medical treatments is based on side-effect profile, cost, and personal preference. Non-steroidal anti-inflammatory drugs (NSAIDs) and low-dose combined oral contraceptives (COCs) such as ethyl Estradiol and progestins are the first-choice drugs.

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Table 1: aRSM Classification of Endometriosis(19).

<table>
<thead>
<tr>
<th>Stage</th>
<th>(Minimal)</th>
<th>(Mild)</th>
<th>(Moderate)</th>
<th>(Severe)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1-3 cm</td>
<td>1-3 cm</td>
<td>1-3 cm</td>
<td>3 cm</td>
</tr>
<tr>
<td>II</td>
<td>1-3 cm</td>
<td>1-3 cm</td>
<td>3 cm</td>
<td>3 cm</td>
</tr>
<tr>
<td>III</td>
<td>1-3 cm</td>
<td>3 cm</td>
<td>3 cm</td>
<td>3 cm</td>
</tr>
<tr>
<td>IV</td>
<td>3 cm</td>
<td>3 cm</td>
<td>3 cm</td>
<td>3 cm</td>
</tr>
</tbody>
</table>

Table 4 depicts: Risk factors for endometriosis (30).

<table>
<thead>
<tr>
<th>Factors associated with increased risk</th>
<th>Factors associated with decreased risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>Family history of males</td>
</tr>
<tr>
<td>Shorter menstrual cycle length</td>
<td>Smoking</td>
</tr>
<tr>
<td>Current obesity</td>
<td>Male smokers</td>
</tr>
<tr>
<td>Early menarche</td>
<td>Use of contraceptive</td>
</tr>
<tr>
<td>Obesity</td>
<td>Use of hormone contraception</td>
</tr>
</tbody>
</table>

Table 3: Algorithm for a clinical diagnosis of endometriosis (21).

The table shows the diagnostic criteria and treatment options for endometriosis. It includes stages of endometriosis, symptoms, and associated fertility issues. The algorithm suggests a step-by-step approach for diagnosis and treatment, emphasizing the importance of early intervention. The table is complemented by references to relevant studies and guidelines, illustrating the evidence-based approach to endometriosis management. The text also highlights the impact of endometriosis on quality of life and the need for further research. The table is a comprehensive resource for healthcare providers and patients alike, aiming to improve the understanding and treatment of this complex condition.
Artificial Intelligence In the Optimization and Personalization of fertility treatments

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What is Artificial intelligence (AI)?

AI is a “partnership between man and machine”. It is a computer program that can learn to execute tasks involving human intelligence. It has the potential to enhance clinical decisions through algorithms, automated communication, and clinical imaging. It involves learning, self-adapting, and predicting machine leading to transformation.

How is it used?

Reproductive experts can determine the best treatment for the individual infertility of patients by incorporating AI, machine learning (ML) and deep learning (DL).

Artificial intelligence (AI) is a science to build intelligent programs and machines that can creatively solve problems, which has always been considered a human prerogative.

Machine learning (ML) is a subset of AI that provide systems the ability to automatically learn and improve from experience without being explicitly programmed. In ML, there are different algorithms (neural networks) that help to solve problems.

Deep learning, or deep neural learning, is a subset of machine learning, which uses the neural networks to analyze different factors with a structure that is like the human neural system.

Where all AI can be used in reproductive medicine?

The role of AI in Reproductive Medicine. Big data include electronic medical records (EMRs) and other data. EMRs can capture data from various ways and the data is analyzed using AI such as machine learning and natural language processing (NLP). AI has been used in the many aspects of reproduction, from research and experiment to clinical practice.

This schematic reviews the seven main applications of AI in reproductive medicine.


Prediction of success rate: By constructing a functional IVF prediction model combined with AI, clinicians can tailor personalized treatment of subfertile couples and improve the pregnancy outcome of ART. Several papers have described models to predict IVF outcomes, where different AI methods have been used with the accuracies from 59 to 84.4%. Although the accuracy of predictions is gradually improving, there remain various problems and the model cannot be applied in clinical practice well. The age, antral follicle count, AMH, number of the developed embryos and endometrial thickness are the usual optimal predictive features.

Semen analysis and selection:

AI has been now used for semen analysis automatic evaluation, popularly called CASA (computerized assisted semen analysis). It has been also used for sperm morphology, DNA integrity as well as for sperm evaluating sperm morphology. AI can be applied for sperm selection. Due to the inherent lack of objectivity and the difficulty in the manual evaluation of the sperm morphology and the high degree of variation between laboratories, the automatic methods based on image analysis should be developed to gain more objective and precise results.

Embryo selection:

It is an objective tool and can be divided into automatic annotation of embryo development (Cell stages and cell cycles), embryo grading and embryo selection for implantation. AI and machine learning are being used to analyze time-lapse imaging data with computer algorithms. AI analyses morphokinetic embryo development data as well as use of computer vision with image processing software to examine raw time-lapse images.
Conclusion:
AI application showed in a study about 32% improvement in the prediction of successful implantation when compared to standard embryo morphological grading by highly skilled embryologists. AI algorithm that has outperformed human analysis, predicting human egg fertilization and blastocyst embryo development with 77% and 62% accuracy respectively.

Preimplantation Genetic Testing (PGT)
AI can be a useful prescreening tool that will allow us to identify and genetically test only those embryos that have a low likelihood of having genetic defects, lowering the overall cost of IVF for patients. AI is used to non-invasively analyze embryos and determine whether they are euploid or aneuploid. In fact, AI can be applied by deep learning through computer vision to embryo selection. AI was applied to PGT-A or interpretation and reporting of next-generation sequencing results (images) to eliminate operator subjectivity, ambiguous results and analyzing the impact of mosaicism.

Endometrial receptivity assessment and optimization
AI can be used for evaluation of defects in endometrium, used for visualization of uterine abnormalities. This evaluation can be used for prediction of implantation results. Machine learning-derived algorithm may assist clinicians in making an efficient and accurate initial judgment. Embryo receptivity assessment helps in transferring embryos at ideal time and thus improving success rates.

Miscarriage: Studies have reported up to 77% accuracy rate of pregnancy loss prediction, raising expectations that similar data may be used to prospectively select euploid embryos for transfer.

Quality control: AI can improve results by keeping quality control of a successful lab through automation, bringing objectivity to diagnostics and enhanced decision making rather than relying on limitations by human because of biases and subjectivity.

Advantages and Challenges:
An AI ART software can have many advantages like decrease interobserver variability, adjustment of drug doses in oocyte stimulation and thus reduce adverse effects such as hyperstimulation, decrease face-to-face medical contacts and thus increase medical and user productivity, better selection of sperm samples and evaluation of oocyte quality and embryo selection. Application of AI can be extended further by including patient characteristics like age, endocrine status, clinical diagnostics. AI can be used for evaluation of defects in endometrium, used for visualization of uterine abnormalities. This evaluation can be used for prediction of implantation results. Application of AI can be extended further by including patient characteristics like age, endocrine status, clinical diagnostics. AI can lower mistakes in performing tasks regardless of the external environment, perform tedious repetitive tasks, organizing medical records and thus leads to digital transformation and automatization for the benefit of subfertile couples.

At the same time, it should be emphasized that computer can not completely replace human decision-making and substitute human compassion. There are however some other dilemmas like initial cost of deployment, the protection of personal data and corresponding legislation and the integration of human experience in clinical decision with ethical dilemmas of relying on machine to replace human decision-making.


Conclusion:
AI application can help clinical decisions to be more accurate, prompt and objective. AI will not be able to replace reproductive medicine Consultants and embryologists but may improve clinical outcome. In future, the capabilities of AI techniques are likely to improve and may shorten time to pregnancy through improved IVF cycle efficiency (reduction of failed retrievals, transfers, miscarriages) and from replacement of a single, euploid embryo resulting in a healthy, live-birth. AI is an instrument to support clinical decision-making. Rapidly evolving state of innovations in artificial intelligence related automation in the patient treatment pathway, gamete/embryo selection, endometrial evaluation and cryopreservation of gametes/embryos has great future in increasing success rates, affordability and accessibility in infertility treatment.
Introduction:
Assessment of the reproductive function of a woman is an important part of the fertility evaluation and pelvis ultrasound (esp. Transvaginal route) is typically used in this regard. The ultrasound evaluation of women for fertility work-up includes assessment of ovarian reserve, Development of follicle(s) in natural or stimulated cycles (Controlled Ovarian Hyperstimulation; COH in IVF), Rupture and formation of adequate corpus luteum and Development of endometrium in various phases of menstrual cycle in synchronous with developing follicle. Assessment of the uterine shape & size and Finding any Pathology in the pelvis which may have an impact on female fertility like Fibroids, Adenomyomas, Endometriomas, Hydrosalpinges and many more. A 2D ultrasound is typically and most commonly used by most of the fertility professionals in this regard and 2D USG has proved itself to be sufficiently accurate and efficacious in the fertility treatment. The recent advancements in the field of sonology with the advent of more advanced equipments having better resolution, incorporation and application of various innovative softwares, more frequent usage of 3D/4D USG in difficult case scenarios and better understanding of Coloured pulsed doppler has made fertility ultrasound more clinically rewarding and efficacious. This chapter would focus on the newer innovations developed in the field of fertility sonology with an evidence-based evaluation of the technique available.

Assessment of the Follicle(s):
Conventionally, follicular monitoring is done using a 2D Transvaginal ultrasound. The transverse and the longitudinal diameter of the follicle is measured and a mean is calculated to obtain mean diameter (1). This method has long been debated as it carries a lot of interobserver variability in measurements and also it lacks any standard protocol of measurement. It also becomes a time-consuming affair in COH-IVF where multiple follicles are to be measured individually. A study (2) proved that a follicle of 15 mm was measured 13-18 mm by the same observer on two different occasions and 12-18 mm by multiple observers. Larger follicles had even a more tendency for measurement variabilities which potentially can impact the results of an IVF Cycle. A similar observation was made in few other studies which quoted 2D TVS measurement of follicle being less accurate. (3 & 4). Recently, application of 3D/4D USG has overcome these limitations of 2D USG. Whereas in 2D USG single focus is calculated to obtain mean diameter (1). This method has long been debated as it carries a lot of interobserver variability in measurements and also it lacks any standard

Pulsed Doppler use in Follicle monitoring:
Conventionally, on 2D USG, Maturity of the Follicle is judged by Its size in synchrony with the Days of menstrual cycle along with the rising Estriadiol values in the blood but relying only on the size of the follicle alone has been argued by many authorities as it may not reveal the maturity of the Oocyte complex. (8) The Physiological blood Flow changes happening in the growing follicle appears to be a better predictor of the maturity of the follicle and hence usage of 3D Power doppler has been advocated by many authorities for a better outcome of the stimulation. (9) Likewise, in Conventional 2D USG, it is difficult to locate and reproduce an Oocyte cumulus complex which can be visualized by newer 3D USG. In a study by Pohel et al, no oocyte complex was retrieved when a 3D USG failed to locate an OOC emphasizing its relevance. (10) (Image 3)
In physiological inactive ovaries as seen before menarche and after menopause, the ovarian stromal blood flow is negligible as ovaries are poorly vascularized. The RI/PI during these times is reported to be very high. As the female enters into reproductive age and menstrual cycle begins, Ovarian stromal blood flow starts increasing as depicted by gradual rise in PSV of stromal blood flow with lowering of RI & PI. The primordial and preantral follicles have virtually limited vascular flow. As the follicle grows, it starts developing its vascularity and can be assessed by calculating vascular flow over its circumference and PSV of Stromal blood flow. A mature follicle ready for the trigger can be defined when it has a vascularity occupying > ¾ th (>75%) of the periphery, PSV > 10-12 cm/s with RI of 0.40-0.48 of perifollicular vessels. An ideal follicular volume at this stage is considered 3-7.5 cc with Follicular vascularity index (VI) being 6-20 and FR > 35. (11,12). Other than deciding the timing of the trigger, Studies have depicted that colour doppler can be helpful in deciding dose of gonadotropins with higher doses needed in ovaries when stromal RI is high (> 0.56) on 2D Doppler and stromal flow index (PI) is less (<11) in 3D Compared to lesser doses when ovarian RI < 0.50 in 2D Doppler and ovarian stromal blood flow is > 15 in 3D Doppler. (11) (Image 4,5)

**Image 4 & 5: Perifollicular Doppler**

Colour Doppler in Endometrium assessment: Endometrial development is a sign of growing follicle with a rising Estradiol values. On 2D USG, an Endometrial thickness of >8mm with classical three-colored pattern morphology is generally considered sufficient for an embryo to implant. However, few studies depicted that vascularity rather than thickness and morphology of the endometrium is more important for an implantation to happen. As the follicle grows, the spiral arteries grow towards endometrium and penetrate into it. Applebaum (13) classified vascularity of the endometrium in four zones and defined a mature endometrium when vascularity reached zone 3-4 covering 5mm2 area with RI of endometrial arteries < 0.59. A low implantation with a higher chance of miscarriages was found in endometrium lacking these doppler parameters irrespective of the three-line morphological appearance and an appropriate thickness of > 8 mm. (Table 1) Similarly, calculating Endometrial volume on the day of HCG trigger and embryo transfer predicted chances of a successful implantation better than a conventional 2D ultrasound. In a study by Magee AM et al, a cut off of endometrial volume of 3.26 and 2.95 ml on the day of trigger and embryo transfer had 70 & 80% sensitivity, specificity 64.5 & 51.6%, a positive predictive value 38.9 & 34.6%, and negative predictive value 87.0 & 88.9%. (14) Since spiral arteries originate from uterine arteries, studies depicted that serial measurement of uterine artery doppler can be incorporated in the protocol to prognosticate and alter the IVF result. Steer et al,1992 Studied impact of uterine artery PI on the implantation of the embryo and categorized patients into three groups: low (1-1.99), medium (2-2.99) and high PI (>3) and found that no pregnancy resulted in high PI group. (15) (Image 6 & 7)

**Image 6 &7: Endometrial Doppler a) Applebaum score: zone 4 vascularity b) Endometrial Volume**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone I</td>
<td>Blood vessels reaching till endo -Myometrial junction</td>
</tr>
<tr>
<td>Zone II</td>
<td>Blood vessels penetrating into endometrium till outer hyperechoic region</td>
</tr>
<tr>
<td>Zone III</td>
<td>Blood vessels penetrating into endometrium till hypoechoic zone</td>
</tr>
<tr>
<td>Zone IV</td>
<td>Blood vessels penetrating into endometrial cavity</td>
</tr>
</tbody>
</table>

Zone III & Zone IV vascularity is considered an “Ideal” and should cover a 5mm² area. The RI of endometrial vessels should be <0.50. The absence of above features could have a detrimental effect on Implantation of the embryo or can increase a chance of miscarriage.

**Table 1: Applebaum Scoring of Endometrial Vascularity**

Ovarian Reserve Testing: Ultrasound evaluation of Ovary to assess the ovarian reserve is an important part of fertility assessment. On Conventional 2D ultrasound, it is done in initial follicular menstrual phase (Day 2-3) by counting antral follicles (2-10 mm). Recent reports from the research exhibited that the size of AFC is more important rather than the count of AFCs and 2D USG has limitations in this regard. This fact was supported by a study from Saumet et al, which proved that AFC measurement using 3D Sonogram correlated equally with AMH and 2D USG proved inferior in this regard. (16,17) Similarly, Measuring Ovarian volume in early follicular phase before development of a dominant follicle with 3D has been advocated by few researchers. It helps in predicting the ovarian response during IVF stimulation with ovaries having volume < 3 ml either had more cancellation of the cycles or yielded poor number of oocytes. (17)
Congenital uterine Anomalies:

CUA are more frequently seen in infertile patients and patients with a history of recurrent miscarriage. The diagnosis of CUA in these cases is of paramount importance as it may prognosticate the outcome of the fertility treatment and obstetrical consequences like preterm birth and miscarriages. (18) A diagnostic laparoscopy with hysteroscopy was considered gold standard in evaluation a case of CUA but is associated with limitations of being an invasive procedure and carries a risk of surgical and aesthetic complications. 2D ultrasound is insufficient to correctly make a diagnosis in this regard as it focuses on a single plane at a time. Hysterosalpingography and recently sonohysteroscopy or HyCoSy are often used as a first tool but HSG can only demarcate the internal lining (contour) of the uterus and is not accurate in subtle anomalies as well as differentiating anomalies like subseptate from bicornuate uterus. A 3D-4D USG can be more yielding in diagnosing and differentiating various uterine anomalies with sensitivity and specificity equal to MRI. When compared to HSG and 2DUS, 3DUS demonstrates high sensitivity and specificity for the identification of a normal uterus (98 and 100 %), arcuate uterus (100 and 95 %), or major uterine anomaly (100 and 100 %). In comparison, 2DUS has lower sensitivity and specificity for the diagnosis of a normal uterus (88 and 94 %) or arcuate uterus (67 and 94 %), but is similarly accurate with major uterine anomalies (100 and 95 %). Hence, 2DUS may be best utilized as a screening test for uterine anomalies, with 3DUS as the definitive diagnostic test. (19) Also, 3DUS assessment of the uterine fundus correlated 91.6 % with laparoscopic findings, and evaluation of the uterine cavity correlated 100 % with hysterosalpingography. (19)

Conclusion:

The current developments in the field of sonology with the advent of more advanced equipments with better resolution and integration with various innovative softwares has made the evaluation and procedures related to the field of fertility more rewarding and successful. In particular 3D/4D USG in difficult case scenarios and better understanding of Coloured pulsed Doppler has made a great contribution in overall success of a fertility treatment.

References


19. Lin Zhang 1, Shi-Shi Li 1, Jing Zhu 2, Jing Shu 3, Hai Xu 1, Xiao-Hua Fu 1, Qiong-Xiao Huang 1, Xiao-Yan Guo 1, Xiaoming Zhang 1, Ying Wang 1, Lin Zhang 1, Shi-Shi Li 1, Jing Shu 3


Sexology is the scientific study of human sexuality, including human sexual interests, behaviours, and functions, it is shaped by our upbringing, attitudes, physical appearance, values, personality and our social outlook.

Covid pandemic has brought to light the changing aspects of sexuality and sexual trends. Many were forced to use gadgets and social media to connect to their loved ones, we even had a hindi movie to depict the struggle to keep alive long distance relationship, probably the couples of today are comfortable to be sexually active, very rarely physically but be more connected non physically on a regular basis using zoom etc zoom sex. It is said there was a boom of sex toys sale in peri covid period, proving that single person also can be sexually satisfied using the wide range of amazon products, eg vibrators to arouse their delicate private parts like clitoral and penile sensations. Another interesting development is the focus on overall health and body, oral hand and sexual hygiene which actually enhances the odour free, enhanced sexual experience of the couple. Participating in regular exercise or sports activity as a couple to boost body building immunity is a new found hobby, thanks to corona virus!! Sexual mindfulness, thinking beyond Orgasm as the only sexual climax but to appreciate the very small activities of physical closeness like kissing, hugging, touching, caressing can equally contribute to holistic sexual health between couples.

Sex is more than procreation, creation, but can also be healing, and transformational. Bliss states longer once the orgasm is over. After the covid crisis, most people reflect to be more attentive about connecting with their partner at a deeper level. Sexual behavior is all about knowing each other better and trying to connect at the mind, body and soul level. Communication and understanding the needs of each other, has improved sexual compatibility. Many partners all around the world finally found a lot of time for each other to care, to cope, to love and to have sex regularly and to be able to enjoy it! While others realized that they are a mismatched couple and this needs to stop and part ways forever as they are not meant to be together! Newer concepts and discoveries of sexuality are contributed by sociologists, psychologists and sexologists.

There has always been an assigned social definition for gender roles as FEMININE AND MASCULINE but today we are bridging up with changing social behaviour and started accepting GENDER EQUALITY. It is upto the individual to take up a chosen identity that suits best, as his or her GENDER IDENTITY! It is important to help our ADOLESCENTS discover their sexuality and build up positive sexual health through scientific and professional SEXUAL HEALTH AWARENESS AT SCHOOLS AND COLLEGES rather than inputs by uncontrollable social media and peers! SEXUAL RIGHTS to make free and responsible reproductive choices must be available to all. The newer concepts must be grasped and improved upon by the different generations and successfully intergrate it into the Traditional core concepts of healthy sexual living!

Let us know the 12 Indian laws relating to sex. Keeping pace with a changing society, soon Same Sex marriage may get legally recognised and Marital Rape can get criminalised!

1. You can have sex with your partner without being married to them, consensual sex is allowed between two homosexual or heterosexual partners in private.
2. However, same sex marriage is not legally accepted.
3. Live in relationship is not illegal between unwed partners.
4. A child born out of a live-in relationship is legitimate. If the couple lived together for a significant time, the law would presume them married.

5. Two consenting adults are allowed to check in a hotel in India with valid ID proofs. However most hotels won’t do so, as we are still a conservative society!
6. Every woman whether married or unmarried is allowed to terminate unwanted pregnancy up to 20 weeks of gestation period. In cases of reserved categories of women who are minors or rape and incest survivors, the termination limit has been extended up to 24 weeks.
7. Hanging out with partners in public places is legally allowed. As per Section 294 of the Indian Penal Code, the act of obscenity causing “annoyance of others” can be punished with a fine and imprisonment of up to 3 months. However, what’s considered obscene still remains highly subjective since the law is not very clear about it. The word often gets brutally exploited because of conservatism in our society.
8. Currently Marital rape is not a crime in India.
9. The Protection of Women from Domestic Violence Act, 2005 acknowledges the right of a woman who was in a live in or marital relationship with a person, to seek protection against domestic violence.
10. India is one of the leading hubs of the commercial sex industry. Apparently, in our country, private prostitution is not illegal per se. However, associated activities such as child prostitution, human trafficking, running a brothel, prostitution in a hotel, and pimping are illegal. Supreme court of India recognises legally rights of a PRIVATE SEXUAL WORKER.
11. Unmarried couples can rent and even buy a house together.
12. The Transgender Persons (Protection of Rights) Act, 2019 recognizes the right to self-perceived gender identity, thus allowing transgender people to register themselves under a third gender (transgender). However, identification as male or female can only be issued once proof of gender confirmation surgery is produced.

Lesbian, gay, bisexual and transgender and queer (LGBTQ) rights in India have been evolving rapidly in recent years. Homophobia is prevalent in India. Public discussion of homosexuality in India has been inhibited by the fact that sexuality in any form is rarely discussed openly. In recent years, however, attitudes towards homosexuality have shifted slightly. In particular, there have been more depictions and discussions of homosexuality in the Indian media and cinema which has helped acceptance. India is among countries with a social element of a third gender but holistic support from family, society and police is the need of the hour. Mental, physical, emotional and economic violence against the LGBT community in India continues to be a problem. RIGHT TO CHANGE GENDER government provides Ayushman bharat health insurance cover for gender reassignment since 2022. The ancient Indian text Kamasutra written by Vatsyayana dedicates a complete chapter on erotic homosexual behaviour. Historical literary evidence indicates that homosexuality has been prevalent across the Indian subcontinent throughout history. Sexual behaviour is progressive and ADAPTIVE if we understand and respect the RIGHTS of others. MALADAPTIVE response leads to DYSFUNCTION in sexual performance and can lead to PERVERSION causing harm, force towards their partners. MODERN SOCIETY can be as revolutionary and welcoming to all types of sexuality as variations of accepted normal! But the danger it can encourage sexual abuse, domestic violence, commercial exploitation of sex in the minds of some ANTI SOCIAL PERSONALITIES! Too much of freedom can be a decision challenge for TODAY’S INDIANS, as sexuality is in a liberalized phase. Until now most of us, have had thoughts and conversations on sex only with oneself in privacy, it has been a taboo to openly express oneself publicly, until recently! Sexuality is sum total of our sexual feeling and the behaviour. Currently, INDIAN sexuality stands more liberalized than before but still it is on a legal and moral policing leash!
Reproductive Genetics and Infertility

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The physiology of reproduction involves several panocrine, autocrine, and endocrine processes regulated by different genetic mechanisms (Rodriguez V, 2020). Infertility is a complex disorder of the reproductive system, defined as the inability to get pregnant after more than 12 months of regular unprotected sexual intercourse and affects more than 75 million couples of reproductive age in the world (Romauido, 2021).

The importance of genetics in reproductive field started with the implementation of chromosome testing in the 1960s, a long time before the advent of ARTs. It is known that genetic disorders are untreatable which leads to reluctance among clinicians to invest on genetic diseases. However, the old concept is changing now. Genetics the fastest developing science is proving its role in many aspects of infertility similarly to every discipline of medicine.

The major contribution of genetics is to predict and prevent a disorder thus decreasing its burden right from the planning of of a pregnancy (Ashutosh H, 2016). It is observed that each of us carries at least 50-100 hetrozygous mutations. About 50% of first trimester abortions are associated with chromosomal defects. Approximately 0.2% babies are born with balanced structural chromosome rearrangement with implication on reproduction later in life. The proportion of chromosomal anomalies detected in stillbirths and neonatal deaths is around 5.6%-11.5%. Three to four percent of all births are associated with a major congenital malformation or genetic disorders and this rate doubles by 8 years of age after inclusion of late appearing or diagnosed genetic disorders. Genetics contributes to infertility in approximately 15% cases as of now but this percentage is going to increase soon as many newer genetic, genomic and epigenetic factors are being recognized. The above-mentioned statistics indicates that no scientific stream has more genetic impact on the practice than reproductive process (Halder A, 2015).

To fulfill the objectives of dealing with the genetic issues related to reproduction, a new branch known as Reproductive Genetics has emerged. This is a branch of science that deals with the genetic contribution of reproductive process, both natural and assisted. This stream is becoming an integral part of today’s reproductive practice due to increase in the burden of reproductive disorders. The ideal time to apply reproductive genetics is from the time of pre-conception or peri-conception period because newer genomic technologies can be incorporated for diagnosis, prevention as well as prediction in this period only (Halder A, 2015). The infertility is the major area covered in reproductive genetics (Garcia-Herrero, 2020). Practically every genetic disorder might directly or indirectly interfere with fertility. Genetic causes must be ruled out before attempting any therapeutic procedure to reverse infertility, because infertility might be a selection mechanism devised by nature to prevent malformations (Coco R, 2018).

Applications of reproductive genetics

Various applications of reproductive genetics in infertility and ART are discussed below:

Male Infertility

Genetic factors are identified in all the aetiologies of male fertility (pre-testicular, testicular and post-testicular). More than 200 genetic conditions related to male infertility are reported, ranging from the most common clinical presentations of infertility to the rarest complex syndromes which are not isolated to reproductive problems (Cariati F, 2019). Currently, approximately 30% of male factor infertility is associated with known genetic causes. These causes include chromosomal abnormalities (Klinefelter syndrome), Yq microdeletion, Copy number variations (CNVs), monogenic, multifactorial, epigenomic, mitochondrial abnormalities etc. Infertile males with oligo/asthenoteratozoospermia (with normal blood Karyotype) increase of chromosomal abnormalities in their sperm, including diplody, disomy and nullisomy. Based on prevalence data, routine karyotyping of infertile men within explained spermatogenetic failure is likely to be critical (Halder A, 2015). The identification of additional genetic causes of male infertility will be helpful for patient counseling regarding diagnosis, potential treatments, outcomes of sperm retrieval, and ART.

Female Infertility

Female infertility has complex multifactorial origin as described by the clinical and genetic heterogeneity of the cohorts under study. Hundreds of genes must interplay in a precise manner during sex determination, gametogenesis, complex hormone actions or interactions and embryo implantation. About 10% of infertility is due to premature ovarian insufficiency (POI). POI is highly clinically heterogenous and is associated either with ovarian dysgenesis, primary ovarian insufficiency with secondary amenorrhea. Most POI cases are idiopathic. Chromosomal aberrations remain a major known cause of premature ovarian insufficiency (POI). Two loci on Xq22-q26 and Xq27-q28 appear to be critical (DIAPH2 gene, proximal Xq22), XPNPEP2 gene in Xq25, DACH2 gene in Xq21.3 and POF1B gene in Xq23.1 for the POI (Ashutosh H, 2016). Among the monogenic causes, the CGG nucleotides expansions in the pre-mutation range in the PMD gene, the cause of isolated POI, more frequent in families with Fragile X syndrome than in sporadic cases of POI. Other monogenic syndromic associations with POI are (1) leber hereditary optic neuropathy, (2) galactosemia (GALT mutations), congenital adrenal hyperplasia (CYP21A2 mutations), (3) progressive external ophthalmoplegia, a mitochondrial disease (POLG mutations), (4) pernicious anemia (POF1B gene), (5) congenital disorders of glycosylation (PM2 and CLP mutations), (6) kuehnemann with vanishing white matter syndrome (EIF2B2 mutations).

Recently, dominant negative disease-associated variants in the TUBB gene, causing defects in spindle assembly and leading to oocyte maturation arrest, have been described in several families.

FSH receptor (FSHR) variation (the p. Asn680Ser polymorphism) has clinical utility due to its significant postnatal functional impairment. FSH receptor gene (LHCGR) have been reported in this disorder (Harper J, 2018).

Although the existence of the genuine empty follicle syndrome is still in controversial phase, disease-associated variants in the LH/GG receptor gene (LHGR) have been reported in this disorder. The pharmacogenomics research focusing on the identification of genetic variation related to the individual response to controlled ovarian hyperstimulation (COH) is going on. Genetic mechanisms behind other aetiologies, such as hypothalamic–pituitary–gonadal deficiencies are also underway. Genotype wide association studies (GWAS) have improved our understanding of the common multifactorial disorders such as polycystic ovary syndrome (PCOS) and endometriosis, each affecting around 10% of women with female infertility. In PCOS, better patient stratification and genetic signification could provide novel research avenues while in endometriosis, abnormal epigenetic mechanisms in Stromal cells are being propped to play pathogenic role.

Preconception carrier screening

ARTs implemented and enforced by personalized genomic medicine have provided the solutions to millions of infertile patients to have babies. Nonetheless, having a baby is not the only challenge to overcome in the reproductive journey, the most important being the lifelong fear of having a baby with any preventable genetic condition which is a global health priority. This becomes especially important in some ethnic communities or populations where the incidence and levels of consanguinity are higher. The impact of genetic disorders during childhood is high, representing 20-30% of all infant deaths and 11.1% of paediatric hospital admissions. With these data, obtaining a precise genetic diagnosis is one of the main aspects of preventive medicine approach in developed countries. The need of screening has led to advent of Genome-wide technologies along the different stages of the reproductive health lifecycle from preconception carrier screening and pre-implantation genetic testing, to prenatal and postnatal screening (Harper J, 2018).

Prenatal screening and diagnosis

Prenatal testing and diagnosis (PND) has been the traditional strategy for reducing the burden of reproductive problems (Cariati F, 2019). Among the monogenic causes, the CGG nucleotides expansions in the premutation range in the PMD gene, the cause of isolated POI, more frequent in families with Fragile X syndrome than in sporadic cases of POI. Other monogenic syndromic associations with POI are (1) leber hereditary optic neuropathy, (2) galactosemia (GALT mutations), congenital adrenal hyperplasia (CYP21A2 mutations), (3) progressive external ophthalmoplegia, a mitochondrial disease (POLG mutations), (4) pernicious anemia (POF1B gene), (5) congenital disorders of glycosylation (PM2 and CLP mutations), (6) kuehnemann with vanishing white matter syndrome (EIF2B2 mutations).

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Carrier screening is used to identify individuals or couples that are at risk to have a child with an autosomal recessive or X-linked genetic disorder. The identification of couples at risk of transmitting a specific inherited disorder offers them the possibility of making informed reproductive choices to future parents (Cariati F, 2019). The American College of Obstetricians and Gynaecologists has issued standard recommendations for ethnic and general population genetic screening along with the preconception period. Testing is available for more than 2000 genetic disorders, including common diseases, such as thalassemia, sickle-cell anaemia, cystic fibrosis, and spinal muscular atrophy. Congenital adrenal hyperplasia or multiple complex conditions, such as mental retardation and congenital heart disease (Gregg, AR, 2021).

Prenatal screening and diagnosis

Prenatal testing and diagnosis (PND) has been the traditional strategy for reducing the burden of genetic disorders and congenital disabilities that cause significant postnatal functional impairment. Universal prenatal screening is advisable for common genetic disorders and congenital anomalies such as Down syndrome, beta-thalassemia, and neural tube defects (Phadke SR, 2017). Invasive PND is usually performed on DNA extracted from fetal cells obtained by chorionic villus sampling (CVS) (between the 11th and 13th weeks of gestation) or from amnion cells (from the 15th to the 20th week). The molecular diagnosis for monogenic diseases can also be carried out depending upon the indications and turnaround time (Allyse M, 2015). An increasing amount of interest has been shown regarding the non-invasive prenatal screening (NIPT) of cell-free fetal DNA (cfDNA) for the screening of chromosomes 21, 18, 13, X and Y and has been clinically adopted as well.
Preimplantation genetic testing (PGT)

PGT has the same diagnostic motivation as the traditional PND, with the advantage of advancing the timing of diagnosis at the embryo stage. These two diagnostic procedures share the same purpose but differ in diagnostic time, type of sampling, and laboratory procedures. PGT has the advantage of reducing the time to pregnancy and avoiding the cost, physical burden of repeated abortions and psychological trauma associated with PND. In addition to the more traditional laboratory investigations, it is now undisputed that molecular biology methods for PGT support the efficacy of ART techniques, contributing significantly to their success (reductions in time, effort, and cost (Cariati, F, 2019).

Only disease-free embryos are transferred to the mother, avoiding recourse to therapeutic abortion. Even for couples who can conceive naturally, PGT requires the application of IVF techniques, including (a) the collection of gametes from both partners; (b) the fertilization of the oocyte by intracytoplasmic sperm injection (ICSI); (c) the embryo biopsy, which allows one or more cells from the blastomere or trophoderm to be taken 3 or 5 days, respectively, postfertilization; (d) molecular analysis and (e) the embryo transfer.

Future applications

Mitochondrial replacement in human oocytes and to cross-generational epigenetic inheritance or germline genome editing (GGE) technologies are gradually creating paradigm shifts in the field of ART (Harper J, 2018).


References:


Polycystic ovary syndrome (PCOS) is the leading cause of infertility. The reported incidence is as high as 26% worldwide. PCOS is not only about the ovaries as its name signifies, it is a "multisystem reproductive metabolic disorder" and is quietly related to body's capability to manage glucose and insulin effectively, with up to 70% of women having insulin resistance in PCOS.

PCOS is an imbalance in a woman's hormone levels and frequently includes symptoms of menstrual irregularity, obesity (80% prevalence in PCOS), hirsutism, infertility, hyperandrogenemia, increased insulin resistance (hyperinsulinemia), and multiple immature antral follicles in the ovaries. The exact cause of PCOS is not well known, but a combination of lifestyle and genetic factors is likely to be involved in the etiology. PCOS puts women at major risk for developing Type 2 diabetes, with more than half of women with PCOS developing Type 2 diabetes by the time they reach 40 years of age.

Research from 2017 suggests that people with PCOS are four times more likely to develop type 2 diabetes than similar peers without the disorder. A study of around 8,000 females found that those with PCOS had a much higher risk of developing gestational or type 2 diabetes. The researchers note that this finding was independent of body mass.

It's important to note that PCOS is a prediabetic condition and these women have high risk of developing gestational diabetes during pregnancy.

Insulin and glucose regulation are directly influenced by diet and lifestyle changes; various research papers have been done to demonstrate their impact on PCOS and the results are very reassuring.

This article describes the opportunities to use new technological innovations like continuous glucose monitoring (CGM) to guide daily food choices and exercise interventions that can optimize health in order to improve PCOS.

PCOS and insulin resistance: bidirectional relationship between androgens and insulin

Insulin is a vital hormone in keeping blood glucose levels under control. When carbohydrates are eaten, insulin is secreted from the pancreas to remove glucose from bloodstream and into the cells. Excess sugar intake, lack of physical activity, poor sleep, environmental toxins, chronic stress, and genetic factors can all lead to conditions of high glucose and insulin which over a period of time make the cells "numb" to the effects of insulin, this process is called as insulin resistance. When this happens, less glucose is able to get into cells, hence more insulin is produced to help remove the excess glucose from the bloodstream. When this process goes on for longer period of time, it can develop into prediabetes and then ultimately into Type 2 diabetes.

This article describes the opportunities to use new technological innovations like continuous glucose monitoring (CGM) to guide daily food choices and exercise interventions that can optimize health in order to improve PCOS. It's important to note that PCOS is a prediabetic condition and these women have high risk of developing gestational diabetes during pregnancy.

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Insulin and glucose regulation are directly influenced by diet and lifestyle changes; various research papers have been done to demonstrate their impact on PCOS and the results are very reassuring.
Role of diet and lifestyle change in tackling PCOS

As PCOS along with fertility issues, also puts women at a risk of developing type 2 DM and gestational diabetes mellitus later in life, hence breaking this vicious cycle of insulin resistance at earlier stage becomes extremely important. Research has shown that lifestyle and dietary factors can play an important role by contributing to weight loss and increasing insulin sensitivity. Although there is no such single diet for PCOS that will treat the condition, but variously suggested use of low glycaemic index meals (LGIs) and ketogenic diets may be fruitful.

The glycaemic index of a food refers to how much it raises blood glucose levels after consumption. Low glycaemic index foods include beans, legumes, non-starchy vegetables, certain fruits, nuts, seeds, tofu, and animal protein. In general, foods with higher fibre also have a lower glycaemic index because fibre slows digestion and makes some carbohydrates less digestible.

Several studies report that an LGI diet may be beneficial for women with PCOS.

- A study9 was done over 24 weeks in 21 women with PCOS. They consumed their usual diet for first 12 weeks after that they were started on LGI diet that was calorically equivalent to the diet they have consumed during the first 12 weeks of the study. After 12 weeks on the LGI diet, researchers found that insulin resistance had decreased significantly.

- A review10 from 2017 that included seven research papers studying the effect of low carb diets on fertility outcomes illustrated improvement in fertility with low carb diets. The authors inferred that “there is convincing evidence that reducing carbohydrate load can reduce circulating insulin levels, improve hormonal imbalance and result in a resumption of ovulation to improve pregnancy rates. Numerous studies have shown that low carbohydrate diets not only elicit fast and significant weight loss but also reduce serum insulin, consequently improving insulin sensitivity.”

Same food may have very different effects on the glucose levels in different individuals. Hence, generalised dietary modifications may not be proved beneficial in all women. The evidences are continuing to emerge from various researches that promotes the benefit of ketogenic, low-carbohydrate, and low glycaemic diets in women with PCOS but these diets can be difficult to implement, maintain and monitor.

Traditional self-monitoring of blood glucose by glucometer and venous blood sugar testing from the laboratories are the conventional methods for monitoring glycaemic profile. The disadvantages of these methods is that they give a snapshot of glucose level at that particular moment and not a trend or continuous profile, they are painful, in convenient, require lot of self-motivation to perform several times over a day. They do not pick up the exact duration of hypoglycaemia or hyperglycaemia events. They also fail to predict how much glucose levels rise after consuming different food items which may help in training and adjusting diet and exercise.

These limitations can now be overcome by measuring continuous glucose profile by use of convenient and handy, flash glucose monitoring system, which is a new landmark technological innovation in this field.

How can flash glucose monitoring (FGM) help in PCOS?

Flash glucose monitoring (FGM) may provide a more precise and individualized approach in formulating a diet that aids in keeping blood glucose levels stable and insulin levels low in women with PCOS. It is a novel method of continuous glucose monitoring. FGM comprises of a sensor which is applied on left upper arm by an adhesive and a separate touchscreen reader device is used which transmits instantaneous glucose level and 24 hours’ trend graph (Picture 12.3). It measures glucose level of interstitial fluid surrounding the subcutaneous tissue cells. Glucose levels are recorded on the device every 15 minutes and changes in glycaemic trends such as hyperglycaemia and hypoglycaemia can be assessed accurately. This method can not only monitor blood glucose continuously, but also can display blood glucose fluctuations. It measures 96 glucose values per day and one device can be used for 14 days. FGM is being manufactured by Abbott Diabetes care by the name of Freestyle Libre Pro. It was approved by FDA for ambulatory glucose profile monitoring on 23 July, 2018.

It allows for the measurement of blood glucose levels in real-time, providing instant and individualized feedback on dietary and lifestyle choices and also helps in monitoring the impact of the choices that patients have made on processes that drive PCOS symptoms. Hence it makes FGM, an extremely beneficial tool in optimizing diet and empowering patients to take charge of the modifiable aspects of PCOS.

FGM provides a more detailed account of daily glucose pattern, hence it may also help in recognising women with PCOS who have insulin resistance earlier than the other testing methods. It has been observed that there is a significant glycaemic variability in women with PCOS (Picture 4) where hypoglycaemic and hyperglycaemic periods are shown to go below 70mg/dl which are marked in red and above 140mg/dl are highlighted in yellow for patient’s understanding. Glycaemic variation or fluctuation is within normal range in non PCOS patient’s graph (Picture 4). The hypo and hyperglycaemia limits can be changed as per physician’s advice. As shown in Picture 4, the graph also gives average glucose values over 24 hours, estimated HbA1c over 14 days, percentage of times the patient had hypo or hyperglycaemia as well as percentage of time she had glucose values within range. Exact blood glucose values every 15 minutes can also be seen on the computer. If the patient maintains a detailed food and exercise diary she can be taught about the trends of glycaemic excursions after different food items during day time and also at night which would be otherwise missed.

FGM is indeed proving to be a very useful training and educational tool when used under guidance. In fact, it is increasingly becoming popular among health conscious normoglycaemic individuals for keeping a check over their dietary patterns.

Tao M et al12 conducted a study in 2011 on forty-five women with PCOS and normal glucose tolerance and 45 healthy, age-matched women (control group). They underwent a 3-day period of blood glucose (BG) monitoring using the CGM system. Various parameters like mean level of 24-hour BG value (MBG), standard deviation of BG (SDBG) and mean amplitude of glycaemic excursion (MAGE), postprandial glycaemic excursions (PPGEs) were measured. Based on CGM, the times to peak glucose of patients with PCOS after 3 meals were higher than the control group (42 ± 18 min vs 32 ± 12 min, 54 ± 25 min vs 39 ± 18 min, and 45 ± 16 min vs 38 ± 16 min, respectively; P < 0.05), and the amplitude of PPGEs after breakfast was higher than the control group (P < 0.05). It was concluded that women with PCOS and normal glucose tolerance have changes in PPGEs. Continuous glucose monitoring can detect alterations in a comprehensive and sensitive way.
PCOS is a prediabetic condition. It involves hormonal imbalances that involve both the reproductive and metabolic systems. The exact causes are likely multifaceted, dietary and lifestyle factors play an important role in disease severity, and new tools may help in alleviating these symptoms.

FGM can guide individualized dietary and lifestyle choices to minimize and prevent glucose fluctuations that promote insulin secretion.

The vicious cycle of elevated androgens and insulin resistance in PCOS can be interrupted by maintaining stable blood glucose and insulin levels to curtail the development of insulin resistance and its associated negative health consequences. FGM helps in accomplishing this by equipping individuals with the necessary tools to track the foods they consume and see which ones have a low glycaemic index for them and also educates them regarding their glucose excursions and future risk of developing diabetes in later life. By having this, personalized and graphical information, smart food choices and lifestyle changes can be made that will have long-lasting, positive effects on both PCOS symptoms and overall health.

References:


Effect of Yoga and Counselling on the success of IUI/IVF/ET Cycles

Dr. Sudha Prasad and Dr. Saumya Prasad
Matriavta Advanced IVF & Training Centre, Delhi

Background:
Assisted reproduction is a promising procedure which is carried out in a controlled body parameter in women diagnosed with infertility due to known and unknown reasons (1). IUI-IVF-ET is a process performed routinely all around the world but still its success marks differently for different women. Other than employing highly specialized medical procedures and sophisticated technology the positive outcome depends upon various parameters (2), which need to be worked in a synchronized manner till successful birth in assisted conception cycles.

The reach to avail the facility of IVF treatment is limited to such infertile couples who belong to lower economical strata. The limitations may be responsible for long standing infertility which itself causes various social, medical, and psychological problems. There is tremendous increase of stress level in these women. The different stress levels may affect the management of clinical outcome in such women (3).

In present RCT, 415 women were enrolled as per inclusion and exclusion criteria. Women were randomly assigned to one of the two groups viz; Yoga & counseling Group and Non-Yoga & non-counseling group after complete worked-up for IVF or IUI as per their treatment of choice. The stress management was based on the different movement and postures (Kriyas and Asana) and counseling, simultaneously.

The Yoga applications comprised; Kriyas or cleaning processes [Ghirit neti, Sutra neti, Jal neti, Jal paan, Dugdha paan], Asanas or postural patterns [Havan tava, Serpasana, Naukasana and Half-sarvangasana], Pranayama or regulated breathing [Anulom-Vilome] and Yogic Relaxation in Shavasana(4).

Supportive counselling by psychological tools based on the concepts of Yoga included; Cornell Medical Inventory (CMI), Amritsar Depression Inventory (ADI)(Singh et al 1974), Hamilton’s Rating Scales for Anxiety (HAM-A) (Hamilton, 1959), Hamilton’s Rating Scale for Depression (HAM-D) (Hamilton, 1979), Presumptive stressfullife event scale (PSLES) (Singh et al 1984), Sinha’s Comprehensive Anxiety Test (SCAT), Fertility and Quality of Life Questionnaire (FERTIQOL)(5,6,7,8,9,10)

Demographic data was compiled and analysed.
Age of women in study group was ranged between 21 to 37 years. The age of these women was 30.32± 4.4 (P > 0.5) and was found non-significant.

The duration of infertility among these women was from <5 years to >14 years.

Being the referral hospital women reaches to our centre quite late. The overall duration of infertility was from 2 to 21 years. The mean duration of infertility was 7.38 ± 4.43 years in Yoga group and 7.77 ± 3.91 years in non-Yoga group (P = 0.019) and was found statistically significant.

The effects of interventions (Yoga and counselling), the uterine artery blood flow parameters were measured 2D Doppler ultrasonography before starting the investigations (firstly in early follicular phase called as base line parameters) and was repeated on the day of trigger which was done to achieve the final maturity of oocytes in IUI or IVF treatment cycles.

The uterine artery Doppler indices indicated better uterine perfusion in Yoga group compared to non-Yoga group. The pulsatility index (PI), measured on day of early follicular phase (1±3±0.1), as well as mean PI that measured on the day of hCG injection (2±1.03), was found to be significantly better in Yoga group, (P = 0.022 and 0.225 respectively) than non-Yoga group (1.76±0.94 and 1.75±1.01). The mean PI (1.92 ± 1.12) value in women who became pregnant in Yoga group was found to be significantly higher than in non-Yoga group (1.55± 0.89) P = 0.015 on contrary to our results, Caicaturo et al (1996) observed that PI and PI were lower in conception (2.45± 0.54 and 0.85 ± 0.4) as compared to non-conception cycles (2.66± 0.39 and 0.87 ± 0.04) (11).

Among 285 women who underwent IVF-ET procedure, a total of 162 women in yoga group, 77 (47.5%) women achieved successful pregnancies, whereas only 31 (25.2%) women were found to have positive pregnancy outcome among 123 women of non-yoga group. This difference was found to be statistically significant (p=0.005).

Similarly, women who underwent IUI cycles, Yoga & non-Yoga group (103/110) achieved successful pregnancy outcome in 04 (14.8%) among Yoga group and 09 (8.7%) women in non-Yoga group. The difference in the success rate was comparable and was found statistically significant difference (p=0.004*).

The clinical outcomes in of Yoga group (N=189) and non-Yoga group (N=226) were statistically significant (P=0.005).

The group of women who underwent, counseling and yoga-based stress management before IVF procedure, experienced highly improved pregnancy outcome. Pregnancy rate in Yoga group was higher (77/162, 47.5% and 4/27; 14.8% in IVF & IUI treatment cycles respectively) than non-Yoga group (31/123, 25.2% and 9/103; 8.7% in IVF & IUI treatment cycles respectively), P<0.005 as shown in table 1.

Table 1. Distribution of women according to Outcome of Pregnancy

<table>
<thead>
<tr>
<th>Type of Cycle</th>
<th>Yoga (N=189)</th>
<th>Non-Yoga (N=226)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclamen</td>
<td>Successful</td>
<td>Failed</td>
<td></td>
</tr>
<tr>
<td>IUI</td>
<td>77 (47.5%)</td>
<td>9 (8.7%)</td>
<td>0.005*</td>
</tr>
<tr>
<td>IVF</td>
<td>73 (43.8%)</td>
<td>9 (8.7%)</td>
<td>0.003*</td>
</tr>
</tbody>
</table>

An attempt was madeto standardize the mandatory number of Yoga sessions (minimum prerequisite as cut-off) required before exposure of the patients to IVF/IUI treatment cycles and the implementation of Yoga and counseling to achieve higher pregnancy rates as routine practice in clinical settings. The Yoga sessions were sub-grouped as 3-15 sessions, 16-30 sessions and >30 sessions shown in table 2.

Table 2. Effect of the number of yoga sessions on pregnancy outcome

<table>
<thead>
<tr>
<th>Number of Yoga sessions attended</th>
<th>Pregnancy Outcome</th>
<th>Total</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;3</td>
<td>Positive</td>
<td>Negative</td>
<td>0.005</td>
</tr>
<tr>
<td>3-15</td>
<td>123 (65.3%)</td>
<td>56 (29.6%)</td>
<td></td>
</tr>
<tr>
<td>16-30</td>
<td>66 (35.1%)</td>
<td>44 (23.6%)</td>
<td></td>
</tr>
<tr>
<td>&gt;30</td>
<td>31 (16.1%)</td>
<td>99 (53.5%)</td>
<td></td>
</tr>
</tbody>
</table>

It has been observed women who attended >30 sessions of Yoga showed highest success rate in terms of clinical pregnancy outcome (P=0.005*).

Comparison of scores at recruitment and after treatment intervention in the study group showed a significant reduction in depression, anxiety, as well as specific stress related to infertility and its treatment as shown in Table 3.

Studies in India as well as abroad have reported that a high percentage of couples discount the treatment due to psychological stress (12), whereas we found the Yoga and non-Yoga group showed reduction in scores and found statistically highly significant.

Women who achieved their successful pregnancies showed a significant reduction in anxiety level as reflected in SCAT only, which was not reflected in HAM-A. Similarly, a slight increase in FERTIQOL indicate an improvement in overall quality of life. Hence, overall, there was a trend towards better emotional health. However, effect was not very strong in non-Yoga group.

Boivin and Schmidt, 2003 (13) reported that fertility problem stress (infertility-induced stress) was associated with a poorer treatment outcome in women and men, with the effect significantly more pronounced for women whereas in our study infertility related psychological complication (depression, anxiety, fatigue and insomnia) and stress was reduced significantly after successfully managed by applying supportive counselling with psychological tools based on the concepts and art of Yoga.

The treatment intervention, both standard treatment as well as the yoga-based stress management was helpful at the psychological level also. However, the magnitude of psychological improvement was more in the study group, with highly significant reduction in anxiety depression and an enhanced overall quality of life. All the cases with positive pregnancy outcome showed significant reduction in anxiety, depression and infertility related stress regardless of whether they were in the study or the control group. Again, the positive emotional change was greater in the study group.

This was seen in the magnitude as well as consistency of change in the anxiety of outcome measures. The data here indicates that the psychological stress reduction is enhanced by the yoga-based stress management. Thus, psychological screening and Yoga should be a definitive part of infertility management.

The counselling and group Yoga sessions were also attended by women even after conception which led to significant reduction in anxiety, depression, infertility related stress, the positive emotional change with improved family relations to achieve their successful pregnancies.

Combined therapy may be advocated for relieving both; infertility related stress and stress related infertility. It should be considered as paramount aspect before approaching the problem of infertility, depression and enrolment and worked up of any infertile women for assisted reproduction.
Acknowledgement: Funded by ICMR while at MAMC.

References:


IFS ACTIVITIES
Chapter Activities

IFS RAJASTHAN & SIG ENVIRONMENT AND INFERTILITY ACTIVITY
IFS ACTIVITIES
Chapter Activities

IFS TELANGANA CHAPTER ACTIVITY

Indian Fertility Society Telangana Chapter
Invites you
To a Webinar on

"Journey of the Gynecologist from Basics to Beyond"

October 16th, 2022 Sunday from 4:00 pm to 6:00 pm

Moderators:
Dr. Pushpa Talwar
Dr. Raya Rozati
Dr. Ambuja Chaturver

Chairperson:
Dr. Srinivas Sanadi
Dr. E. Prabhavati

Panelists:
Dr. Sweta Gupta (IVF Specialist)
Dr. Lakshmi Nair (Gynecologist)
Dr. Lakshmi Chavasamala (IVF Specialist)
Dr. Chandana Chatterjee (Endocrinologist)
Dr. Debina Gokul (IVF Specialist)
Dr. Jitu Reddy (IVF Specialist)
Dr. Sweta Agrawal (IVF Specialist)
Dr. Ashwini Jha (IVF Specialist)
Dr. Vinita Jha (IVF Specialist)
Dr. Anjum Nupur (IVF Specialist)

IFS MADHYA PRADESH CHAPTER ACTIVITY

OCTOBER MISCARRIAGE AWARENESS MONTH -2022

In continuation of many activities IFS MP chapter have one more activity in the month of October as we all know October is miscarriage awareness month. So through campaign at different places by IFS member to raise Awareness of baby loss help grieving mums and dads feel less alone and share the latest research-led information and advice with parents to be so they can have the healthiest pregnancy possible.

IFS MP CHAPTER

EXECUTIVE MEMBERS

DR. R.D. NAYAR
DR. SURVEEN GHUMAN
DR. PRIYA BHAVE CHITTAWR
DR. GUNJAN GOSWAMI
DR. TEENA GUPTA

DR. ANURADHA PANCHOI
DR. SONALI AGARWAL
DR. SUSMITA MUKHERJEE
DR. PRATISHTHA DALMA
DR. SHILPA BHANDARI

I am not able to hold you in my arms but I’ll hold you in my Hearts...
IFS ACTIVITIES

Chapter Activities

IFS SOUTH TAMILNADU CHAPTER SIG ENDOMETRIOSIS ACTIVITY

Date: 19.10.2022
Time: 5.00 pm to 7.00 pm

Dr. K. D. Nayar
President IFS
Dr. Sureeek Ghumman
Secretary IFS
Dr. T. Raman Devi
Patron IFS, South TN
Dr. Salveepiya Srinivasan
Secretary IFS, South TN

Convener
Co-Convener
Dr. Raya Rezaii
Dr. Sweta Gupta
Dr. Salveepiya Srinivasan

Speakers

Dr. T. Raman Devi
Adolescent Endometriosis
- Dr. Shashia Pasha

Dr. Mary Anna

Dr. Annale Devi
Pain management of endometriosis
- Dr. Venugopal

Dr. Vanitha Rukmani

Dr. Kalpana Balasubraman
Endometriosis and Infertility
- Dr. Nataraj

Dr. Uma Veermurugan

Dr. Sweta Gupta
Current management of adenomyosis
- Dr. Raya Rezaii

Dr. Geetha

Click Here to Register

IFS TAMILNADU CHAPTER ACTIVITY

IFS TAMILNADU WITH OGSSI

Time: 1.00 pm to 4.00 pm
Date: 21st Oct 2022 Friday
Venue: Hotel Ramada Chennai Egmore, 2A, Pooniamman Koll Street, Chennai – 08

OGSSI

Dr. R. Premalatha
President

Dr. M.G. Dhanalakshmi
Secretary

Dr. K. D. Nager
President

Dr. Sureeek Ghumman
Secretary

Topic: Heavy Menstrual Bleeding

Speaker:
Dr. Priya Kampan

Chair Person:
Dr. Cynthia Alexander

Panel Discussion

Topic: Donor egg/Surrogacy Act 2022

Panel Moderator:
Dr. Rajprithi Anupapart, Secretary, IFS, TN

Panelists:
Dr. Shila Raj
Dr. Aya Mulab
Dr. Reethi
Dr. Ajayaa Kanag
Dr. Sakeha Haripr
Dr. Priya Kanaka
Dr. Bhuvneshwari
Dr. Akash Bath

Dear Doctor,
You are cordially invited to attend and participate in a CHERish CME organized by Indihome Pvt. Ltd.
IFS ACTIVITIES
Chapter Activities

IFS MADHYA PRADESH CHAPTER ACTIVITY

OCTOBER MISCARRIAGE AWARENESS MONTH - 2022

In continuation of many activities IFS MP chapter have one more activity in the month of October as we all know October is miscarriage awareness month So through campaign at different places by IFS member to raise Awareness of baby loss help grieving mums and dads feel less alone and share the latest research-led information and advice with parents to be so they can have the healthiest pregnancy possible

IFS MP CHAPTER
EXECUTIVE MEMBERS

I am not able to hold you in my arms but I’ll hold you in my Heart's...

[Images of group photos and meeting scenes]
IFS ACTIVITIES
Chapter Activities

IFS MADHYA PRADESH CHAPTER ACTIVITY

MASTERCLASS SERIES
IFS MADHYA PRADESH CHAPTER
ANOVULATION REVISITED THE NEW FIGO CLASSIFICATION
Friday, 28th Oct. 2022 | Time: 07:00 PM - 08:30 PM

Speaker:
Dr. K.D. Nayar
IFS President
IFSGS

Co-convener:
Dr. Priya Bhave Chittawar
Secretary, IFS MP Chapter
Head Reproductive Medicine
Bansal Hospital, Bhopal

Dr. Rana Mondal
IFS MP 2nd Year PM Resident

Dr. Shevy Balani
IFS MP Junior Resident
Shevy Samrat Infertility Centre

Join Zoom Meeting → Meeting ID: 639 742 3579 | Password: NIVIAN

Deep dive in a topic by Master for Sub specialty Fellows & Reproductive Medicine Practitioners

IFS SIG EARLY PREGNANCY ACTIVITY

Spotlight on Early Pregnancy
Under the Aigies of Special Interest Group, Early Pregnancy, Indian Fertility Society & IFSGS
29th October, Saturday | 4:00 pm - 6:30 pm

Programme

4:00 pm - 4:15 pm
Welcome of delegates and introduction of IS Early Pregnancy

4:15 pm - 4:30 pm
Panel Discussion: Prescription writing after HVL 10 - Consequences

4:30 pm - 4:45 pm
Preliminary: Dr. Nandita Nair, Dr. Sameer Ansari, Dr. Mamta Kazi

4:45 pm - 5:00 pm
Chaiyaporn: Dr. Maneer Chen, Dr. Sunita Ansari, Dr. Mahesh Khatri

5:00 pm - 5:15 pm
Complexities in assessing and scanning in early pregnancy after ABT - the norms and guidelines

5:15 pm - 5:30 pm
Panel Discussion: Contraception counseling: recent opportunities and milestones

5:30 pm - 5:45 pm
Panel Discussion: Contraception counseling: recent opportunities and milestones

5:45 pm - 6:00 pm
Panel Discussion: Contraception counseling: recent opportunities and milestones

6:00 pm onwards
Date of Thanks
IFS ACTIVITIES

Chapter Activities

IFS SIG HOLISTIC MEDICINE ACTIVITY

Indian Fertility Society
IFS SIG- Holistic Medicine
MONDAY, 31 OCTOBER, 2022
6:30 PM
Online Symposium: Holistic Approach to PCOS

Programme
6:30 to 6:35 pm
Welcome
Dr. Surveen Chawla
6:40 to 6:55 pm
Clearing Myths about PCOS
Dr. Shalini Chawla
7:00 to 7:30 pm
Role of Diet in PCOS
Ms. Rujuta Diwekar
7:30 to 7:45 pm
De-stressing - Role of Yoga
Dr. Roopi Mehta
7:45 to 8:00 pm
Approaches to PCOS Treatment
Dr. Ritu Jain
8:00 to 8:05 pm
Concluding Remarks
Dr. Papa Dasari

Registration is Free
But Mandatory

www.indianfertilitysociety.org
in.indianfertilitysociety.org@gmail.com

Panel Discussion on Troubleshooting in IUI

Moderators
Dr. Shrihari Sachdeva Gaur
Associate Professor, AIIMS, Delhi
Dr. Swapnil singh
Venkateshwar hospital, Patna

Panelists
Dr. Sangeeta Kumari
Consultant, Amala CRM & GO Hospital, Patna
Dr. Tejaswi Nandan
Consultant, Ganga Hospital, Gaya
Dr. Renu Kashyap
Consultant, Sri Krishna, Ghaziabad
Dr. Poonam Lal
Consultant, Bank Hospital, Patna
Dr. Suruchi
Consultant, Pradeep Hospital, Modinagar

Lunch (1-2PM)
Post Lunch: Work Shop on Semen Preparation and Sperm Freezing

Expert of Work Shop Session
Dr. Dayanidhi
Bir Hospital, India, Patna

(84-90) followers

2 million + followers

Notes for Healthy Kids - Pregnancy Notes: Before, During & After
Indian Super Foods - The PCOD - Thyroid Book - Diet Lose Out, Work Out
Indian Food Nutrition - Women & the Weight Loss Taleicha
Don’t Lose Your Mind, Lose Your Weight

JUGS - Buenos Aires, Argentina (23rd international congress of Nutrition, 2017)
FENS - Berlin, Germany (13th European nutrition conference, 2015)
ASCN - Miami, USA (PCOS integrative physiology of exercise conference, 2005)
NAGS - Las Vegas, USA (National strength and conditioning association, 2009)

IACS - Jodhpur, Rajasthan (International academy of clinical nutrition, 2013)
National council of nutrition (National council of nutrition, 2013)
International academy of nutrition (International academy of nutrition, 2013)

• Future of Foods- University of Passau, Germany 2019
• Sports dietitians course - Australian Institute of Sports, Canberra, Australia 2012
• FS in Sports science and Nutrition - I.N.D.Y College, Mumbai, 2010
• Yoga & Vedanta studies - University jaya vedanta academy, Utkul

IFS BIHAR CHAPTER ACTIVITY

IFS BIHAR CHAPTER
In Association With
Srijan Fertility Clinic Pvt. Ltd.

Date: 26, 02
Time: 8 am to 4pm
Venue: Hotel Lemon Tree, Exhibition Road, Patna

Convenor
Dr. Bhujia
Director Intra IVF, Patna

Lecture
Add on Therapy in Infertility
By Dr. Neha Tiwari
11-13 PM

Chairpersons
Dr. Anjali Agrawal
Dr. Prashant Agrawal

Post Lecture
Post Lecture: Add on Therapy in Infertility
By Dr. Sukhvir Singh
11-13 PM

Panel Discussion on Trouble Shooting in IUI

Experts
Dr. Swasy
Consultant, Bhanu Hospital, Begusarai
Dr. Anuja
Consultant, Bhanu Hospital, Begusarai
Dr. Kavita Singh
Consultant, Bansal Hospital, Patna
Dr. Renu Sinha
Consultant, Bansal Hospital, Patna
Dr. Uday Shanker
Consultant, Bansal Hospital, Patna

Lunch (1-2PM)
Post Lunch: Work Shop on Semen Preparation and Sperm Freezing

Expert of Work Shop Session
Dr. Dayanidhi
Bir Hospital, India, Patna

(In association With Cooper Surgicals)
IFS ACTIVITIES
Chapter Activities

IFS CHHATTISGARH CHAPTER ACTIVITY

IFS Bihar chapter hosted a conference on 06-11-2022 with talk on ‘Role of adjuvants’ by Dr Kalpana Singh, panel discussion on ‘Troubleshooting in IUI’ with Dr Shivani Sachdev Gaur and Dr Swapnil Singh as moderators and Workshop on Semen preparation by Dr Dayanidhi

HIGHLIGHTS

Workshops

• Ultrasound In Infertility.
• Semen Analysis & IUI Plus Art Lab Set Up.
• Vitrification.

Lectures on Various Topics
And More To Come ...

NATIONAL FACULTIES

• Dr. K D Nayar
• Dr. Surveen Ghumman
• Dr. Pankaj Talwar
• Dr. Sonal Panchal
• Dr. Sushma Deshmukh
IFS ACTIVITIES
Chapter Activities

Scientific session was started with welcome address by Dr Prakrati Verma IFS CG chapter secretary session 1 ovarian stimulation optimization. followed by lamp lightening & felicitation of guest speakers. Dr KD Nayar sir was Chief guest, Dr Pankaj Talwar guest of honor & other faculties were special guests. Dr KD Nayar sir was given talk on DNA sperm fragmentation. Second session was panel discussion on male infertility 3rd session was on mixed topics related to infertility. Last session was panel on early pregnancy management. Program was ended with mementos & certificate distribution. Vote of thanks given by Dr Anuradha Chaudhary. Approx 95 registration was done.
IFS MP chapter and Rewa obstetrics and gynaecology society organised a webinar on 09 Nov 2022 from 7 pm to 9 pm. Topic: Role of Hysteroscopy in fertility enhancement. SIG: endoscopy. Welcome address and introduction of SIG endoscopy presented by Dr Puneeta Bhardwaj. In 2 hrs duration all the speakers delivered very informative lectures and covered each and every aspect of Hysteroscopy from theatre setup to management of surgical cases and complications nicely. Speakers were Dr Priya Bhave Chittawar, Dr Kuldeep Jain, Dr Mansi Jain, Dr Narendra Bhardwaj, Dr Puneeta Bhardwaj, Dr Dhaval Baxi. Dr Padma Shukla. Vote of thanks by Dr Gunjan Goswami (master of ceremony). Almost 240 participants attended this webinar. ICOG provide 2 credit points for this webinar.
IFS ACTIVITIES
Chapter Activities

IFS UP EAST CHAPTER ACTIVITY

Masterclass Series On
MEDICAL DISORDER AND ART PREGNANCIES
Organized by
IFS UP Chapter (East)

Episode-2: GDM AND ART PREGNANCIES
Date: 13th November 2022 | Sunday | Time: 4PM

Dr. K. S. Negi
President, IFS

Dr. S. Varma
Secretary, Divisional Manager, IFS

Dr. Pranav Jain
President, IFS

Dr. Chhatwal
Past President, IFS

Crosstalk: Insulin Therapy in GDM

Dr. Neetu Singh
Basmati Hospital, Lucknow

Dr. DP Jaisingh
Dr. V. Ramana
Sree Balaji Medical College, Chennai

Dr. Rani Sinha
Gynecologist, Father Muller Medical College, Mumbai

Gynaeologists

Dr. Supriya Barua
Secretary, IFS, UP (East)

Dr. Shalini Chauhan
Senior Consultant, St. Mary's Hospital, Lucknow

Dr. Aparna Pandey
Assistant Professor, AMU, Lucknow

Experts

Debate 1: Patient of MHDG controlled on metformin, now hesitant to switch to insulin?

Judge

Dr. Neeta Basu
Director, IFS, UP (East)

For

Dr. Faiza Khan
Consultant, tertiary Hospital, Lucknow

Against

Dr. Archana Gupta
Formely Consultant, Fortis Hospital, Delhi

IFS MADHYA PRADESH CHAPTER ACTIVITY

IFS MP CHAPTER
IN ASSOCIATION WITH HOSHANGABAD OBS GYN SOCIETY
Sunday, 13th November 2022 | Time: 05:00 PM to 09:00 PM
Venue: Hotel Express Y1, Raisi

CME: SAFE YET EFFECTIVE USE OF GONADOTROPINS | ROLE OF MYO INOSITOL IN PCOS & INFERTILITY

Dr. K. M. Mehta
President

Dr. S. R. Mehta
Secretary

Dr. V. K. Mehta
Treasurer

Dr. R. K. Mehta
Editor

Dr. Neetu Mehta
Assistant Professor

Dr. N. K. Mehta
Assistant Professor

Dr. V. K. Mehta
Assistant Professor

Dr. R. K. Mehta
Assistant Professor

Dr. Neetu Mehta
Assistant Professor

Dr. V. K. Mehta
Assistant Professor
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