

Indian Academy of Pediatrics Consensus Guidelines on Preconception Care

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ABSTRACT

Justification: The preconception period is the earliest window of opportunity to ensure optimal human development. Pregnancy and childbirth outcomes can be improved by interventions offered to support the health and well-being of women and couples prior to conception. Thus, preconception care is essential in preparing for the first thousand days of life. Adolescence, the stage of life that typically comes before the preconception stage, is characterized by various high-risk behaviors like substance abuse, sexual experimentation, injuries, obesity, and mental health issues which can adversely affect their health in adult life. Thus, a Consensus Guideline for pediatricians on providing preconception care to adolescents and young adults can go a long way in making the generations to come, healthier and more productive.

Objective: The purpose of these recommendations is to formulate an evidence-based Consensus Statement that can serve as a guidance for medical professionals to provide preconception care for young adults and adolescents.

Intended Users: All obstetric, pediatric, and adolescent health care providers.

Target Population: Adolescents and young adults.

Process: A large proportion of adolescents seek care from pediatricians and there is a lack of Consensus Guidelines on preconception care. Therefore, the Indian Academy of Pediatrics called an online National Consultative Meeting on April 03, 2023, under the chairmanship of Dr MKC Nair and the National Convenor Dr Himabindu Singh. A group of pediatricians with wide experience and expertise in adolescent health care were assigned the task of formulating evidence-based guidelines on preconception care. The group conducted a comprehensive review of existing evidence by searching resources including PubMed and Cochrane databases. Subsequently, a physical meeting was held at Amritsar on October 07, 2023 during which the consensus was reached through discussions and voting. The level of evidence (LoE) of each recommendation was graded as per the Oxford Centre for Evidence-Based Medicine (OCEBM) 2011.

Recommendations: Every woman planning a pregnancy needs to attain and maintain a eumetabolic state. Prospective couples need to be counselled on the importance of a healthy lifestyle including a nutritious diet, avoidance of substance abuse, and timely screening for genetic disorders. Screening for and management of sexually transmitted diseases in males and females, appropriate vaccination and addressing mental health concerns are also recommended.

Keywords: Adolescent, Contraception, Eumetabolic, Genetic Screening, Nutrition, Pregnancy, Reproductive Health

INTRODUCTION

For the health and development of the unborn child, the

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period prior to conception is vital. Preconception care is the provision of biomedical, behavioral and social health interventions to women and couples before conception occurs to ensure a good pregnancy outcome [1]. Preconception care encompasses several domains, including health promotion, risk assessment, and management of

pre-existing conditions [2]. Reducing maternal and fetal morbidity and mortality, improving the likelihood of conception when desired, and offering contraceptive counseling to avoid unwanted pregnancies are the main goals of preconception care. It aims to establish a healthy lifestyle and prepare the couple psychologically for pregnancy and parenthood. In recent years, there has been a growing body of evidence demonstrating the significance of preconception care in the prevention of neonatal and birth disorders. According to research, an individual's health and lifestyle choices prior to conception can have a significant impact on the health outcomes of their offspring [3]. Preconception care can reduce the incidence of various neonatal and birth disorders by addressing modifiable risk factors and providing targeted interventions, resulting in healthier pregnancies and better long-term health outcomes for children.

Adverse perinatal events can have long-term consequences for individuals and their families. Neonatal and birth disorders can manifest as physical, cognitive, or developmental abnormalities and can have a significant impact on the well-being and quality of life of affected individuals [4].

According to The United Nations Population Fund (UNFPA), out of 121 million pregnancies worldwide - nearly half are unwanted. Over 60% of these unwanted pregnancies end in abortion with an estimated 45% of abortions being unsafe. Abortions also account for 5-13% of all maternal fatalities. This significantly hinders the global efforts to meet the Sustainable Development Goals [5].

Young girls face pressure to marry and have children in many societies. In many places, teenagers do not have easy access to contraceptives. Even in cases where teenagers are able to access contraceptives, they might not have the means or knowledge to procure them and use them properly. In addition, sexual abuse raises the risk of unintended pregnancy in adolescent and young girls. According to a WHO report published in 2020, 120 million girls under the age of 20 years have had some form of forced sexual contact [6]. India alone accounts for more than one-seventh of all unintended pregnancies worldwide. As per the National Family Health Survey-5 (2019-2021), women aged 15 to 19 years have 43 births per 1,000 women [5]. In 2017-19, India's maternal mortality ratio (MMR) was 103 per 100,000 live births [5]. In India, unsafe abortion continues to be the third leading cause of maternal mortality with approximately 8 women dying due to complications related to unsafe abortion every day. As per the NFHS-5 data, teenage pregnancy in India has decreased by 1% to 7.8% and female sterilization

continues to be the most commonly used method of family planning in 37.9% [5]. These data indicate a need to develop preconception care guidelines suited to Indian context.

Therefore, the Indian Academy of Paediatrics called an online National Consultative Meeting on April 03, 2023, under the chairmanship of Dr MKC Nair and the National Convenor Dr Himabindu Singh. A group of experts with experience in caring for adolescents was formulated. The group planned to develop evidence-based guidelines on preconception care with the aim of improving adolescent health and ensuring a safe and healthy pregnancy with good fetal outcomes. A comprehensive search of all available research articles including randomized controlled trials, observational studies, review articles, recommendations endorsed by various authorities and other forms of studies on preconception care was made in Google Scholar, PubMed, and Cochrane database using search keywords preconception care, diabetes, metabolic syndrome, thyroid dysfunction, iodine deficiency, undernutrition, and obesity. Available guidelines from the American College of Obstetricians and Gynecologists (ACOG) [7], Position Paper on Preconception Care by the American Academy of Family Physicians (AAFP) [8], Royal Australian College of General Practitioners (RACGP) [9], Royal Australian and New Zealand College of Obstetricians and Gynecologists (RANZCOG) [10], International Federation of Gynecology and Obstetrics (FIGO) [11], Federation of Obstetrics and Gynecological Association of India (FOGSI) [12], and Guidelines from the Ministry of Health and Family Welfare (MoHFW), Government of India (GoI) were reviewed. The level of evidence (LoE) of each recommendation was graded as per the Oxford Centre for Evidence-Based Medicine (OCEBM) [13]. Subsequently, a physical meeting was held at Amritsar, Punjab, on October 07, 2023 during which a consensus was reached through discussions and voting and recommendations adapted to the Indian context were developed.

1. IMPORTANCE OF BEING EUMETABOLIC

Metabolic abnormalities in the mother can cause potentially adverse long-term consequences both in the mother and the baby. According to recent studies, the prevalence rates of pre-diabetes, diabetes, and metabolic syndrome among adolescents in India are 5.4%, 16.18%, and 0.56%, respectively [14]. Diabetes during pregnancy may increase the risk of miscarriage, pre-eclampsia, preterm labour, and fetal malformation, macrosomia, birth injury, and perinatal mortality. Optimal glycemic control, both before and during pregnancy, helps to reduce these

risks [15]. At the same time, maternal malnutrition can have a negative impact on obstetric and neonatal outcomes, as well as adverse long-term effects on the child's intellectual, physical, and social development [16]. Thyroid dysfunction has been associated with significant maternal and fetal complications. One important micronutrient needed for the production of thyroid hormones is iodine. Iodine deficiency disorder is estimated to affect eight million newborns and nine million pregnant women in India annually [17]. Obesity, poorly controlled diabetes, and deficiencies of micronutrients such as zinc and selenium can affect the sperm quality and fertility and consequently, the health of progeny [18].

RECOMMENDATIONS 1.0

1.a Diabetes mellitus

- Every woman who plans to become pregnant should have a diabetes screening, according to WHO criteria defined as plasma glucose ≥ 200 mg/dL for 2-hour oral glucose tolerance test (OGTT) or ≥ 126 mg/dL for fasting plasma glucose (FPG), which is measured after avoiding calories for at least 8 to 12 hours [12,19]. (LoE 1)
- Women with pre-existing diabetes mellitus should aim for a HbA1c of less than 6.5% and a fasting glucose level of 80–110 mg/dL. They should also be advised to postpone pregnancy until these objectives are met [12,19]. (LoE 1)

1.b Hypothyroidism

- Women in the preconception stage should consume 150 μ g of iodine per day [12]. (LoE 3)
- Given the high prevalence of thyroid disorders in India, it is desirable to screen all women planning to conceive for thyroid dysfunction based on thyroid stimulating hormone (TSH) [12]. (LoE 3)
- Women should receive education regarding the negative effects of hypothyroidism on pregnant women such as pre-eclampsia and gestational hypertension, postpartum hemorrhage, abortion, and preterm delivery, as well as the effects on fetus and the newborn such as intellectual/neurodevelopmental impairment and learning disabilities [12]. (LoE 4)
- Women with subclinical hypothyroidism (serum TSH 2.5 to 10mIU/L and normal FT4 levels) detected during preconception should be further evaluated in consultation with an endocrinologist. Testing for anti-thyroid peroxidase antibodies is recommended to determine the need for treatment. Women with overt hypothyroidism (TSH > 2.5 -3mIU/l with low FT4

levels; or TSH > 10 mIU/L irrespective of FT4) should be treated [12]. (LoE 4)

1.c Hyperthyroidism

- Prior to conception, euthyroidism should be attained [12]. (LoE 4)
- If pregnancy is planned within two years, surgery is a better option than administration of radioactive iodine [12]. (LoE 3)
- Pregnancy should be delayed for at least six months if radioactive ablation therapy is used in order to restore optimal TSH levels [12,19]. (LoE 3)

2. MAINTAINING IDEAL BODY WEIGHT AND NUTRITIONAL STATUS

Both underweight (BMI of < 18.5) and overweight (BMI 25 to 29.9) and obesity (BMI ≥ 30) are associated with substantial risks for maternal and child health [9]. It is important to have a normal BMI of 18.5 to 24.9. Adequate consumption of cereals, legumes, vegetables, fruits, dairy products, and meat constitutes a balanced diet. 50% to 65% of energy should be contributed by carbohydrates, 10% by proteins, and 25% by fat. The recommended daily calorie intake for Women of Reproductive Age (WRA) is 2,100-2,400 Kcal, depending on the level of activity.

The "Choose My Plate" concept was designed by the US Food and Nutrition Department for the ease of understanding a standardised diet. The idea of "thali" was provided by the National Institute of Nutrition, Hyderabad. The dietary limitations and supplements throughout the preconceptional period are outlined in **Table I**.

Guidelines from the MOFW and GoI

In India, pregnant women are advised to take daily oral iron and folic acid (IFA) tablets (totalling 180 tablets) with each tablet containing 60 mg of elemental iron and 500 μ g of folic acid, second trimester onwards. Additionally, they are recommended to take daily calcium supplements with each tablet containing 500 mg of elemental calcium and 250 IU of vitamin D3; tablets should be taken twice daily, starting from the second trimester (14 weeks) of pregnancy and continuing for at least 180 days during gestation, as well as for the first six months after delivery while exclusively breastfeeding [20]

Healthy Lifestyles: Maintaining an ideal weight can be achieved by combining a balanced diet, frequent exercise, and enough sleep. It is advised to engage in muscle-strengthening activities two or more days a week in addition to 150 minutes of moderate physical activity per week [21]. **Table II** provides guidelines on exercise and physical fitness.

Table I Preconception Nutrition Supplementation [23,24,26]

<i>Nutrient</i>	<i>Target population</i>	<i>Recommended dose</i>	<i>Benefit</i>
Folic acid	All women to be continued on folic acid during pregnancy; High risk (previous NTD, anticonvulsant medication, GDM, malabsorption, BMI >30 kg/m ²)	Oral folic acid 400 µg daily for at least four weeks prior to pregnancy and for the first 12 weeks of gestation for all pregnant women; 4 mg daily for at least four weeks prior to pregnancy and for the first 12 weeks of gestation for high-risk pregnancy	Prevention of NTD such as spina bifida and anencephaly
Iodine	All women	150 µg daily while pregnant and breastfeeding	Production of maternal thyroid hormone, fetal brain and CNS development
Vitamin D	Women with vitamin D deficiency identified by blood tests	1000 IU/day (vitamin D 30-49 nmol/L) 2000 IU/day (vitamin D <30 nmol/L)	Reduces risk of small-for-gestational-age babies and impaired fetal skeletal development
Iron	All pregnant women	Oral supplement with at least 60 mg of elemental iron daily (For 180 days)	Prevention of anemia
Vitamin B12	Vegans and vegetarians	250-500 µg/day oral	Prevention of neurological sequelae infants
Calcium	Women with inadequate dietary intake (<1000 mg daily)	At least 1000 mg daily Calcium carbonate	Prevention of pre-eclampsia

Recommendations: 2.0

- Every woman should get her BMI determined at least once a year.
- Women of reproductive age (WRA) with BMI ≥ 25 kg/m² should receive specific dietary counseling, provided with strategies to enhance the quality and balance of their diets, optimise their calorie intake, and physical activity levels. They should also be encouraged to think about enrolling in structured weight-loss programmes.
- Additionally, counseling sessions should be made available to obese men and women [12]. (LoE 3)
- A realistic goal of 5-10% weight loss over a six-month period should be targeted [12]. (LoE 3)
- WRA with a BMI ≤ 18.5 kg/m² should get counseling regarding the short- and long-term health hazards, as well as the risks associated with future pregnancies, including infertility. They should also be assessed for

Table II Preconception Exercise Guideline

<i>Type</i>	<i>Duration/Frequency</i>	<i>Intensity</i>	<i>Other information</i>
Aerobic	150-300 minutes of moderate intensity physical activity per week OR 75-150 minutes of vigorous activity per week OR A combination of the two	This is dependent on baseline level of fitness OR Assess via target heart rate: Age < 20 years: 140-155 beats per minute Age 20-29 years: 135-150 beats per minute Age 30-39 years: 130-145 beats per minute Age > 40 years: 125-140 beats per minute	Women should aim to be active on most days of the week. Aim for exercise sessions to be no longer than 60 minutes. Ensure adequate nutrition and hydration.
Strength	Aim for two strength sessions per week on non-consecutive days	One to two sets 12-15 repetitions of each muscle group	Can use light weights, resistance bands or body weights

eating disorders and body image distortions evaluated.

6. Women who are underweight (BMI < 18 kg/m²) should be made aware of their increased risk of preterm birth, low birth weight, and birth defects like gastroschisis [12]. (LoE 3)
7. The food selections should be reviewed, and the underweight women should receive proper nutritional guidance. Treatment and screening for eating disorders, such as bulimia and anorexia nervosa, are necessary [12]. (LoE 4)

3. DECREASING SUBSTANCE ABUSE AND AVOIDING CERTAIN MEDICATIONS

In India, adult tobacco usage is prevalent in 14% of females and 42% of males [9]. Women who smoke have a higher risk of developing lung, cervical, pancreatic, bladder, and kidney malignancies in addition to cardiovascular and pulmonary disorders, regardless of whether they are pregnant. Smoking is continued in early pregnancy by nearly half of women smokers [22]. It is concerning to note that second hand smoke exposure affects more than one-third of expectant mothers and can result in low birth weight and intrauterine growth retardation [23]. **Table III** highlights the health issues related to tobacco use in WRA in the offspring [24].

Risk factors for adolescent smoking initiation include parental or familial smoking, lower socio-economic status, peer pressure, easy accessibility, media influence, academic underperformance, physical, emotional, or sexual abuse, underlying psychiatric conditions.

Evidence-based modalities for prevention, screening and treatment of substance abuse in pregnancy [10,25] include:

- Screening girls for tobacco use at all visits using the “5 As” step algorithm (Ask, Advise, Assess, Assist, Arrange)
- Various screening tools/questionnaires like SBIRT and CRAFFT questionnaire are used for assessing substance abuse in individuals.
- Using this method, couples can be advised to stop using drugs
- A family-based approach to life skill training is possible
- A behavioural approach that incorporates cognitive behavioral therapy (CBT) and rational emotive behavior therapy (REBT)
- Pharmacotherapy such as nicotine replacement therapy may be administered if necessary

Certain medicines need to be avoided in pregnancy for they may have teratogenic effects on the fetus and may also adversely affect the health of the baby as depicted in **Table IV** [26].

Recommendations 3.0

- Substance Abuse: Women who exhibit symptoms of alcoholism, tobacco dependence (smoking and smokeless tobacco), or illicit drug use should be made aware of the negative effects of substance abuse on the course of pregnancy [10,20]. (LoE 1)
- Where appropriate, pharmacotherapeutic and psychosocial interventions should be implemented to help pregnant women stop smoking [10]. (LoE 1)
- Smoking, drinking, and using drugs should be discontinued prior to conception as they can have

Table III Tobacco-use Related Health Problems

<i>Risk Factors</i>	<i>Maternal health issues</i>	<i>Neonatal health issue</i>
Smoking in preconception period	Infertility, delayed conception due to effect on all stages of reproductive function including folliculogenesis, steroidogenesis, embryo transfer, endometrial receptivity, endometrial angiogenesis, uterine blood flow and uterine myometrium	Damage to spermatid DNA may lead to cancer in offspring at later age
Smoking in Pregnancy	Spontaneous abortion, ectopic pregnancy, premature rupture of membranes, placenta previa, placental abruption	Preterm birth, low birth weight, birth defects (oral cleft, limb reduction defect, clubfoot)
Nicotine E-cigarettes in pregnancy	Addiction, Infertility, delayed conception, Hypertension, immunosuppression, altered glucose homeostasis, endothelial dysfunction	Stillbirth, preterm birth, low birth weight, small for gestational age babies
Second hand smoke exposure during pregnancy	Placental insufficiency,	Low birth weight, birth defects

Table IV Recommendation on Various Drugs During Preconception Period [20]

<i>Drugs not to be used</i>	<i>Substances not to be used</i>	<i>Drugs to be used with caution</i>	<i>Safe</i>
Angiotensin converting enzyme inhibitors, Atenolol, guanethidine, Oral Hypoglycemics, Valproate, Lithium, Carbamazepine, Monoamine oxidase inhibitors (MAOI) Methiazole, Radioactive iodine, Cabergoline, Indomethacin, Diclofenac, Phenylbutazone	Tobacco, Cannabis, Alcohol (any kind, any amount), Opium, Heroin, Lysergic Acid Diethylamide, Methamphetamines Codeine	Oral anticoagulants, Antibiotics, Certain oral hypoglycemics, Anti-hypertensives, Anti-epileptics Anti-tuberculous drugs, Anti-histaminics, Psychotropic drugs	Antacids, Iron, Folic acid, Calcium supplements, Insulin, Heparin, Levothyroxine

detrimental effects on the fetus and newborn. Preconceptional tobacco use by fathers has been linked to sperm DNA damage and an elevated risk of cancer in their offspring. When appropriate, medication and counseling for one or both parents should be taken into account. It is appropriate to advise pregnant women that there is no known safe level of alcohol consumption [10,27]. (LoE 1)

4. GENE-RELATED ISSUES AND GENETIC SCREENING

Regardless of a family history or any other variables, there is a background risk of approximately 5% for significant genetic abnormalities in every pregnancy. A child with an autosomal recessive or X-linked recessive disorder has a one in four chance of being born to non-consanguineous couples (1-2%), whereas consanguineous couples are at a higher risk [12]. Carrier rate of spinal muscular atrophy (SMA) is 1 in 38 individuals, while the carrier rate for thalassemia is 1 in 33 within the Indian population [28,29]

India is the world's largest country by population density and the sixth largest country in terms of land area. Due to cultural and social customs, consanguinity is common in marriages among many Indian subpopulations, which has resulted in the accumulation of genetic traits within communities [30,31]. One method of identifying couples who are more likely to have a child with a genetic disorder, particularly an autosomal recessive condition, is carrier screening or testing. The preconception phase is the best time to assess genetic risk because genetic tests can occasionally take three to six months. Preconception care should be regarded as an essential component of primary care for WRA because approximately half of pregnancies are unplanned. Carrier screening or testing can be used for identifying couples who are more likely to have a child with a genetic disorder, particularly an autosomal recessive condition. The preconception phase is the best time to assess genetic risk because genetic tests can

occasionally take three to six months.

Recommendations 4.0

- It is advised to have a conversation regarding the importance of carrier screening with all women and their families who are thinking about getting pregnant (preconception) and with all expectant mothers during their initial prenatal visit, irrespective of the gestational age at presentation [10,12,32]. (LoE 3)
- A thorough family history or personal indicators of bleeding disorders, muscular dystrophy, or intellectual disability should be obtained prior to conception. History of X-linked disorders like hemophilia A and B, Duchenne/Becker muscular dystrophy, and fragile X syndrome in the family need to be thoroughly evaluated in consultation with geneticist and fetal medicine expert [10,12,32]. (LoE 3)
- Provide genetic counseling to women and families who have been determined to be at risk of passing on an inherited condition due to a review of their three-generation pedigree, their ethnic background, or their previous medical and obstetrical history. As part of the informed consent procedure, direct gene mutation or expanded next generation gene sequencing testing ought to be addressed [10,12,32]. (LoE 3)
- When both partners are identified as carriers of the same autosomal recessive condition, the couple should be promptly referred for formal genetic counseling, preferably before conception or as early in the pregnancy as possible due to the complexity of the counseling/informed consent process and the 25% transmission risk to their offspring. [10,12,32]. (LoE 2)
- It is crucial to ask for history of recurrent pregnancy loss/ loss of a previous child due to unclear reasons and provide further testing and genetic counseling and

reproductive options to the couples [10,12,32,33] (LoE2)

- It is recommended that expectant couples should undergo carrier screening for the following conditions hemoglobinopathies (first detected by hemoglobin electrophoresis and complete blood count), Fragile X syndrome, cystic fibrosis and spinal muscular atrophy [10,12, 32-36]. (LoE 2)
- WRA should take folic acid 400 microgram tablet everyday before pregnancy and continue to take it till 12 weeks of gestation [36].

5. REPRODUCTIVE HEALTH IN FEMALES

Preconception healthcare is crucial for WRA to address biomedical, behavioral, and social risks to maternal health and pregnancy outcomes. Research shows it enhances birth outcomes, particularly for women with conditions like diabetes and nutritional deficiencies. However, obstacles to preconception care exist, including fragmented healthcare systems, lack of treatment for high-risk behaviors, and limited evidence-based interventions. Additionally, it's important to educate women and their partners about the declining likelihood of conception and increased risk of chromosomal abnormalities with maternal age, despite advances in assisted reproductive technology.

Obstetric history is vital for identifying modifiable risk factors linked to unfavourable outcomes in subsequent pregnancies, such as preterm birth, infant mortality, fetal loss, and neural tube defects. Close collaboration with specialists is crucial for assessing pre-existing medical conditions, with a focus on multidisciplinary care. Access to appropriate contraception is essential for stabilizing chronic conditions like epilepsy before conception.

Screening for sexually transmitted infections (STIs) and other infectious diseases: It is recommended to screen for immunity to hepatitis B, varicella zoster, mumps, rubella, and measles. STI screening is advised for both men and women, including HIV and hepatitis C with proper pre-test counseling. Patients with HIV planning pregnancy should start antiretroviral therapy to suppress viral load to undetectable levels. Pre-exposure prophylaxis for HIV-negative partners before pregnancy can reduce the risk of transmission [37,38].

Fertility issues: For women with polycystic ovarian syndrome (PCOS), oral contraceptives, hormonal patches, or vaginal hormone rings can help regulate menstruation; hirsutism or acne need to be addressed simultaneously. Regular exercise is beneficial for weight loss. Clomiphene citrate may aid in anovulatory infertility, but statins and

insulin sensitizers like inositol or thiazolidinedione are not recommended [39,40].

Menstrual disorders: A sizable proportion of girls suffer from menstrual problems such as heavy, painful, and irregular menstrual bleeding. These include:

- *Primary amenorrhea:* Failure to menstruate within three years of the start of puberty-related physical changes or the absence of secondary sexual characteristics by the age of fourteen.
- *Secondary amenorrhea:* Identified two years after menarche or after missing three periods following the establishment of regular cycles.
- *Dysmenorrhea:* Painful menses not associated with pelvic pathology.
- *Dysfunctional uterine bleeding:* Prolonged, excessive menstrual bleeding that is typically caused by anovulatory cycles and lacks an identifiable organic cause.
- *Polymenorrhea:* Bleeding more frequently than every 18 days.
- *Menorrhagia:* Excessive uterine bleeding at regular intervals.
- *Metrorrhagia:* Intermenstrual bleeding.

Some of the management strategies include:

Dysmenorrhea: When cycles start to become ovulatory, primary dysmenorrhea frequently happens. Reassurance and education form the cornerstones of therapy. Secondary dysmenorrhea usually happens much later, after regular ovulatory cycles have been established. It is caused by illnesses like endometriosis, uterine or vaginal congenital anomalies, pregnancy complications or sexually transmitted diseases (STDs). It is treated by taking care of the underlying cause [41].

Amenorrhea: Primary amenorrhea is uncommon. Every teenager who exhibits symptoms of amenorrhea should get a pregnancy test performed. The next step is to test thyroid-stimulating hormone (TSH), luteinizing hormone (LH), follicle stimulating hormone (FSH), dehydroepiandrosterone sulfate (DHEAS) levels and karyotyping. A five-day challenge using 10 mg of medroxyprogesterone acetate per day is recommended if the hormone levels are normal. During this trial, the teen should experience withdrawal symptoms 5-7 days later. It is recommended to evaluate the patients who do not experience withdrawal bleeding or who have abnormal laboratory results by a gynecologist or endocrinologist who specializes in pediatric and adolescent gynecology.

Dysfunctional uterine bleeding: Anovulation is the most frequent reason for heavy menstrual bleeding. If the bleeding time is abnormal, she should be further assessed for von Willebrand disease. Testing for virilization and a thyroid profile may be necessary, depending on the physical examination and history. The degree of the bleeding determines the treatment:

Mild (normal hemoglobin): Menstrual calendar, reassurance, checking serum level of iron every one to two months.

Moderate (mild anemia; no hemodynamic instability): Oral contraceptives containing 50 µg of estrogenic component, such as norethindrone-mestranol or norgestrel-ethinyl estradiol, used as follows: one pill daily for four days, one pill TID for three days, one pill BID for seven days and one pill QID for fourteen to twenty-one days, after which the pills are stopped to allow for withdrawal symptoms. Thereafter, oral contraceptives are prescribed for three months in a cycle following which the serum level of iron is checked [41].

Severe menstrual bleeding (hemoglobin < 7g/dL, hemodynamically unstable): Hospitalization and administration of intravenous fluids as necessary is recommended along with monitoring for coagulopathy. Need for transfusions is determined by the clinician. Efforts should be directed at stopping the ongoing bleeding. High dose estrogen is given every four hours orally/intravenously with an antiemetic until bleeding stops, then every six hours and finally every eight hours. Iron supplementation followed by a three-month cycle of combined oral contraceptives is administered [41].

RECOMMENDATIONS 5.0

- All WRA should undergo screening for chronic medical conditions and STIs to ensure safe pregnancies and optimal outcomes. (LoE 2)
- Appropriate management of PCOS, menstrual disorders and nutritional deficiencies is important in women of reproductive age groups. (LoE 2)

6. REPRODUCTIVE HEALTH IN MALES

Reproduction in men has an impact on fertility and sexuality. Important part of male reproductive system consists of the prostate gland, penis, testicles, epididymis, and vas deferens. These body parts are involved in ejaculation and the production of semen [42]. Typical issues associated with male reproductive health consist of:

Male contraception: Use of condoms made of latex or polyurethane offers additional benefits of reducing the chance of STIs; STIs are not prevented by lambskin

condoms. Vasectomy is a surgical procedure which may take up to three months to take complete effect; till then a backup method of contraception is recommended. Similar to other sterilization techniques, vasectomy is regarded as a long-term method of contraception [43].

Sexually transmitted infections (STIs): To prevent STIs, it is advisable to ascertain the risk of acquiring an STI by having a discussion with the healthcare provider. The partner's past sexual history and health issues need to be considered and relevant tests should be advised to confirm any suspicion. Vaccinations against hepatitis A, hepatitis B, and human papilloma virus help prevent STIs. Counselling regarding safe sexual behavior such as proper and consistent use of latex condoms are recommended.

Male infertility: Infertility is defined as the inability of a man or woman to conceive after a year of sexual activity without the use of birth control. In general, problems with male partner, female partner, or unknown factors account for one-third of cases of infertility, while problems with both partners account for another third. The inability of the testicles to produce sperm or a complete lack of sperm which affects 10% to 15% of cases, hormone imbalances and obstruction of sperm motility are among the important causes. Varicocele is one of the most frequent causes of this condition [44]. To ascertain the cause of infertility, past medical history including history of any injuries to penis or testicles, any recent high fevers, and any childhood illnesses like the mumps should all be covered. Physical examination to detect infection, hernia, varicocele, or any indicator of underlying hormonal imbalance deficiency such as reduced muscle mass, decreased facial and body hair and increased body fat are mandated [45]. Investigations include:

- Semen analysis with at least two separate semen samples collected least one week apart and with at least 3 days of abstinence preceding the first specimen is recommended.
- Hormonal testing including serum follicle-stimulating hormone (FSH), testosterone, luteinizing hormone (LH), prolactin, thyroid-stimulating hormone (THS, optional), and estradiol (optional) assay is indicated if there is a low sperm count and concentration or clinical findings are suggestive of an endocrine disorder or impaired sexual function.
- Testicular biopsy may be indicated in some cases to exclude spermatogenic failure. Testicular biopsy is typically done in men suspected of ductal obstruction who would present with azoospermia, normal hormonal screening tests and normal-sized testes.
- Karyotype is recommended if there is low testosterone

with high FSH and LH (primary hypergonadotropic hypogonadism). This in turn would affect both sperm production (FSH) and testosterone levels (LH).

- Genetic screening and chromosomal testing may be indicated with azoospermia or severe oligozoospermia as chromosomal defects are more common in infertile men. The common genetic factors which are associated with infertility in males are impaired testicular function due to chromosomal abnormalities (Klinefelter syndrome and XX DSD), isolated spermatogenic impairment due to Y chromosome microdeletions, and congenital absence of the vas deferens due to cystic fibrosis transmembrane conductance regulator (CTFR) gene mutation [46-49].

Treatment

Treatment should be directed at the underlying cause. Evidence-based treatment for improved fertility may be suggested if no problems are found. Surgery is one form of treatment for anatomic abnormalities or damage to the reproductive organs. Medications for treating conditions like erectile dysfunction and hormone imbalances that affect male fertility may be needed. Blockages in the tubes that carry sperm and varicocele can be fixed surgically [50-53].

Recommendations 6.0

- Aromatase inhibitors (AIs), human chorionic gonadotropin (hCG), selective estrogen receptor modulators (SERMs), or a combination thereof is recommended for infertile men with low serum testosterone. (LoE 3)
- Supplements (e.g., antioxidants, vitamins) are of questionable clinical utility in treating male infertility. Existing data are inadequate to provide recommendation for specific agents to use for this purpose. (LoE 3)
- For men with idiopathic infertility, a clinician may consider treatment using an FSH analogue with the aim of improving sperm concentration, pregnancy rate, and live birth rate. (LoE 2)
- Surgical varicocelectomy should be considered in males attempting to conceive, who have palpable varicocele(s), infertility, and abnormal semen parameters, except for azoospermic men [54]. (LoE 2)

7. IMMUNIZATION

Preconception vaccinations lower the risk of in-utero disease transmission, reduce maternal morbidity and mortality and passively transfer antibodies to the fetus and newborn. These include:

1. Influenza vaccine: Women who receive the vaccine have a much lower incidence of low birth weight and premature deliveries [55]. Babies born to mothers who had received influenza vaccine had a lower incidence of influenza infections during infancy [56]. Many nations now advise all pregnant women to get vaccinated against influenza in light of these findings [57].

2. Human Papilloma Virus (HPV) vaccine: Children of vaccinated mothers are protected against laryngeal papillomatosis as well as genital warts, cervical, rectal, anal, vulval, and vaginal cancers. There are currently two vaccines that can be used in individuals between the ages of 9 and 26 years: the quadrivalent and the nonavalent [58].

3. Conjugate Pneumococcal vaccine (13 valent) protects against invasive pneumococcal disease in people with HIV, diabetes, functional or anatomic asplenia, and chronic lung and heart disease. A single dose is given intramuscular. One year after the PCV 13 dose, the polysaccharide pneumococcal vaccine 23 (PPSV 23) is given to provide additional serotype coverage.

4. Japanese Encephalitis vaccine if administered before becoming pregnant, it protects against significant mortality and morbidity in endemic areas. Before visiting an endemic area, it can be obtained as a two-dose schedule given one month apart [59].

Vaccines that prevent fetal disease [60] include:

1. Measles, Mumps, and Rubella (MMR) vaccine: Measles infection during pregnancy has been linked to low birth weight, premature birth, and spontaneous abortions. Mumps causes first trimester abortions. A first-trimester rubella infection causes congenital rubella syndrome, a fatal condition with significant morbidities in the unborn child. Congenital rubella syndrome has become much less common as a result of vaccination campaigns for girls. If a woman has not received the MMR vaccine, she can receive two doses, spaced at least four weeks apart, with the recommendation that she should not to become pregnant for at least 28 days after the vaccination.

2. Hepatitis B vaccine: If a woman is not vaccinated for hepatitis B for any reason, she should be tested for hepatitis B and if the results are negative, the three-dose schedule is administered before she becomes pregnant. If a mother is found to be HBsAg-positive, she should be followed-up closely to ensure that the infant receives hepatitis B Immunoglobulin and the zero dose of hepatitis B vaccine within 12 hours after birth. The infant must be followed up closely to ensure that the infant completes the recommended Hepatitis B vaccine schedule.

3. Tetanus, Diphtheria, acellular Pertussis (Tdap) vaccine: Immunizing a fetus or newborn before or during

pregnancy with a vaccine containing tetanus, pertussis, and diphtheria confers passive immunity. As of now, all expectant mothers should receive a single dose of the Tdap/dT vaccine between weeks 27 and 36 of gestation, earlier being preferable and should do so each time they become pregnant.

4. Varicella vaccine: An infection with varicella during the first or early second trimester causes limb atrophy, skin scarring on the extremities, abnormalities in the central nervous system and issues with the eyes. All WRA who have never had varicella are eligible for a 2-dose regimen, which offers 98% efficacy when administered 4 to 12 weeks apart. Due to the live vaccine's contraindications, pregnancy should be avoided for up to one month following vaccination.

Recommendations 7.0

All pregnant women should receive the following vaccines [57-60]:

During pregnancy:

- a) *Tdap*: One dose Tdap given between 27 to 36 weeks of gestation
- b) *Influenza vaccine*: One dose inactivated influenza vaccine given after 26 weeks of gestation (may be given earlier in the event of a pandemic). Live intranasal influenza vaccine cannot be given to pregnant women.

Before pregnancy:

- a) *Hepatitis B*: 3-dose schedule at 0, 2, 6 months (if not taken earlier)
- b) *Varicella*: Two doses spaced 4 to 12 weeks apart (if no prior varicella infection and no history of the illness)
- c) *MMR*: If not taken earlier, two doses spaced four weeks apart
- d) *HPV*: Two doses (0, 6 months) of the quadrivalent or nonavalent HPV vaccine for children aged 9 to 15 years; three doses (0, 2, 6 months) for adults aged 15 to 26 years. HPV vaccination is licensed for up to 45 years of age.
- e) *Conjugate pneumococcal vaccine (PCV-13)* in special situations
- f) *Japanese encephalitis vaccines*: Two doses given in an endemic zone separated by a month.

8. BODY IMAGE, COSMETIC CONCERNS AND DENTAL HYGIENE

Pregnancy, a profound event lasting approximately 40 weeks, brings about significant biopsychosocial changes.

According to the Developmental Origins of Health and Disease (DOHaD) theory, environmental factors in critical windows of development, shape health and developmental outcomes, possibly via epigenetic mechanisms [61]. Preconception women fall into two groups

1. Those intending pregnancy, open to lifestyle modifications.
2. Unplanned pregnancies, including those from casual sex or out of wedlock, pose a high-risk group less receptive to disfigurement concerns, risk factors, and guidelines.

8.1 Body image

Pre-conception fear of body changes leading to obesity may result in dissatisfaction, eating disorders, and anxiety/depression, affecting post-natal care. Up to 45% of pregnant women experience dissatisfaction. Unhealthy epigenetic-environmental factors can harm the fetus.

Concerns for pre-conception women: [62]

- a) Pregnancy-related body changes and image issues
- b) Dietary deficiencies from restricting food to minimize weight gain
- c) Prospective postnatal body image/breastfeeding
- d) Functionality issues

Recommendations 8.1

1. Provide preconception counseling to avoid metabolic syndrome.
2. Address substance abuse as a stress-coping mechanism.
3. Limit excessive use of social media [62,63]. (LoE 2)

8.2 Cosmetics

Cosmetics pose risks during early pregnancy (5-8 weeks), with 5-20% of pregnancies exposed to retinoids showing fetal retinoid syndrome. Several cosmetics contain harmful chemicals like butylated hydroxyanisole and coal-tar dyes which can induce epigenetic modulation, endocrinal disruption, DNA repair failure, oxidative stress, and ovarian toxicity.

Recommendations 8.2

1. Reduced use of cosmetics during the perinatal period.
2. Use simple, rinsable products with known ingredients and no perfume.
3. The use of essential oils, perfumes, nail polish remover, and hair colors should be avoided by nursing moms.

4. After using volatile cosmetics, particularly sprays and aerosols, let the room air out [64]. (LoE 2)

8.3 Dental Hygiene

During pregnancy, numerous physiological, hormonal, and psychological changes happen in the woman's body; it may lead to fluctuation in oral hygiene practices, eating patterns, and multiple oral health problems in 60-75% of pregnant women. It may be associated with obstetric complications like eclampsia pregnancy, small-for-date babies, and premature birth.

Maternal diet and precautions may be helpful to the fetal oro-dental growth, which starts from 12 weeks of fetal life.

Recommendations 8.3

1. Avoid frequent intake of sugary snacks.
2. Brush regularly (morning and night).
3. Preconception dental check-up is mandated.
4. Undertake routine dental care procedures under local anesthesia
5. The dentist's prescription must be reviewed by obstetricians. Dentists also be provided with medical history.
6. Consider dental X-rays with proper shielding [65]. (LoE 2)

9. MANAGING RELATIONSHIPS - PREMARITAL AND CONJUGAL

Premarital relationship is a period in which two distinct people who do not know each other learn to know and understand each other as well as form bonds that are required to live together before they decide to marry [66]. Conjugal relationship is related to marriage or married persons and their relationships. The changing lifestyle of adolescents, delay in marriage, premarital relationships, premarital sex, live-in relationships, increasing adolescent pregnancy and STIs, increasing prevalence of separation and divorce are proven by various studies [67-69]. Sensitization of adolescents and couples to right knowledge and skills to balance relationships is much needed. Studies indicate rates of premarital sex range from 17% among school children to 22% among young workers in north India [70]. Multinomial analysis clearly shows the reasons underlying delayed marriage being education, ambitions, wealth quintile, and mass media [67]. The 2011 Census of India shows that the average age at which women marry in India has risen to 21 years [71]. Divorce rate in India is on the rise due to various reasons like lack of communication, infidelity, lack of intimacy and interference by family or friends.

Premarital education and counseling on relationship balance and management

Clinical and Educational Frameworks Schumm and Denton identified four major approaches to pre-marriage preparation [71]. Enrichment, or process-oriented couple learning facilitation; instructional counseling, which entails more didactic, problem-focused training on marital matters; generalized education akin to that of marriage courses in high school and college; and therapeutic examination of general or specific relationship issues. Couples' strengths are developed, competency is emphasized, and preventive education is given through active skill development in enrichment programs. Community-based programs like the Couple Communication Program (CCP), Parent Assessment Program (PAP), Relationship Enhancement (RE), and Premarital Relationship Enhancement and Prevention (PREP) aim to build communication, problem-solving, and support skills [71].

Recommendations 9.0

- Raise community awareness on the advantages and disadvantages of (pre)marital relationships (e.g., problem-solving abilities, cohabitation, violent past).
- Instil practical and interpersonal skills in adolescents and young adults.
- Extend distribution methods to include internet resources for couples and providers, self-directed materials, and community seminars.
- Make extra efforts to connect with couples and people who are more vulnerable.
- Include (pre)marital counseling in currently running government initiatives, such as RCH-A (ARSH) for teenagers [67-71]. (LoE 3)

10. MENTAL WELL BEING AND SUPPORT SYSTEM

Mental well-being, a pivotal preconception health indicator, should be integrated into public health interventions. This includes addressing risk factors on three levels: biological (days to weeks prior to the development of the embryo), individual (willing decision to become pregnant), and public health (months or years prior)

The National Institute for Health and Care Excellence recommends discussing pregnancy planning with all WRA with any mental health history. One in four WRA face mental disorders with rising prevalence in young pregnant women [72]. Depression and anxiety dominate preconception mental disorders, often accompanied by substance abuse [73].

Inadequate preconception mental health increases the chance of unfavorable results in offspring as well as pregnancy. Postpartum psychosis is more common among women with a history of anxiety disorders, panic disorder, obsessive-compulsive disorder (OCD), and pre/postpartum depression who have mental illnesses, such as bipolar disorder, either current or former. Antipsychotics and mood stabilizers are frequently prescribed medications, as they are frequently needed. Because the data on fetal and neonatal outcomes are inconsistent, antidepressants are used with caution (1-5% of pregnant depressive women) [74]. The most often used atypical antipsychotic medication during pregnancy is quetiapine. Aripiprazole, olanzapine, and ziprasidone are commonly used with no significant association with congenital malformations.

Pregnancy-related anxiety is common and influenced by factors like a history of mood disorders, body changes, financial concerns, and new responsibilities. Hormonal shifts during pregnancy (e.g. significant changes in estrogen and progesterone hormone levels can affect levels of neurotransmitters), previous miscarriages, sleep issues, concerns about relationships, the baby's health, and the delivery experience contribute to maternal anxiety. While some anxiety is normal and protective, excessive anxiety may impact fetal and neonatal outcomes.

Prenatal depression is more common among women who are carrying a child with health problems or special needs, dealing with stressful life events (divorce, health issues, financial problems, work troubles), expecting twins or triplets, unplanned pregnancy, lack of supportive partner or network of friends and family during pregnancy, and those who face difficulties in conceiving due to infertility

Pregnant women facing domestic violence endure significant psychological distress, emphasizing the urgent need for screening and support in antenatal services. Physical and psychological abuse, rooted in illiteracy, poverty, and community indifference, is prevalent. Victims receive less antenatal care, leading to a 2.59 - 2.37 times higher risk of perinatal and neonatal mortality respectively [75]. Remarkably, 3.8% of battered women require medical attention and 4.5% require hospitalization [75]. In order to address this and lower domestic violence among Indian women, women's education, economic independence, and empowerment must be prioritized.

Recommendations 10.0

1. Lifestyle changes like regular physical activity and nutritious diet during pregnancy will aid reduction in stress, anxiety, and other mental health issues [76]. (LoE 2)

2. 7-8 hours of uninterrupted sleep is recommended. Insomnia should be identified early and treated according to the causative factor [77]. (LoE 1)
3. *Psychoeducation*: Women should be given information on the effects that pregnancy and childbirth can have on mental wellbeing and the signs of perinatal mental health problems to look out for. Conversations should be open, encouraging dialogue and active listening, and confidential [78]. (LoE 3)
4. Mindfulness practices may be beneficial for outcomes in conditions like anxiety, depression [79]. (LoE 1)
5. Medication considerations: For severe cases requiring medications, counselling on various treatments available should be given to choose medications which may cause minimal harm to the fetus [80,81]. (LoE 3)
6. Therapeutic approaches: Consider CBT (Cognitive Behavioural Therapy) for challenging maladaptive thoughts with a focus on anxiety management strategies adapted to pregnancy [82]. (LoE 1)
7. Alternative interventions: Yoga has been proven to be very effective in reducing depression and anxiety during pregnancy. Other interventions are massage therapy, meditation and acupuncture [83]. (LoE 1)

CONCLUSION

Although there have been major advances in the field of medicine and perinatal care, birth outcomes are worse in both the developing and developed countries alike. Many babies are born early or have low birth weight leading to other complications. Hence, the concept of preconception care takes precedence when it comes to health of children, the guidelines listed above for men and women are not just for planning a pregnancy but for taking control of their lives and choosing healthy habits.

To be able to reduce maternal and childhood mortality and morbidity, we need to address any mental health issues related to pregnancy, childbirth, infancy, childhood, adolescence and adulthood. This will include health education and promotion, risk assessment, specific counseling, intervention before pregnancy. These guidelines when properly implemented in the community will bring about a positive change in the health and wellbeing of adolescents, adult men and women and thereby improve subsequent pregnancy and child health outcomes.

These guidelines are provided in ten different domains – being eumetabolic, nutrition and healthy lifestyle, avoiding substance abuse, genetic screening, reproductive health, immunization, body image/cosmetics/dental

Box 1 Preconception Care Checklist

Diet

- Nutritional requirements including folic acid supplementation
- Advice on a healthy diet with special emphasis on micronutrients

Weight

- Appropriate advice for underweight and overweight WRA

Exercise

- Advise 150 minutes of exercise per week or 30 minutes on most days

Genetic screening

- If indicated from personal/family history or ethnic background

Smoking/alcohol/illicit drugs

- Assess intake and provide appropriate advice (See **Tables III** and **IV**)

Psychosocial aspects

- Screen for domestic violence
- Screen for pre-existing mental health conditions and provide appropriate management

Medical conditions

- Review current disease status (Diabetes mellitus and thyroid dysfunction) and treat accordingly in collaboration with specialists, if required

Environment

- Assess work, home and recreational environments

Dental health check

Screening for sexually transmissible infections and other infectious diseases

- Measles, mumps, rubella, varicella zoster, hepatitis B
- Human immunodeficiency virus and hepatitis C with appropriate pre-test counseling
- Screening for cervical cancer
- Appropriate advice on vaccination.

health, handling relationships, mental well-being/support system. It can be used as a ready reckoner in the community for bringing about a positive change. See **Box 1**.

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section and provided critical inputs. PK, SB, DJ, LS and MS provided their inputs in the guidelines, participated in discussions and manuscript editing. EB of IAP 2023 and all authors approved the final version.

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