



Milestones and Pioneers of Contraception

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* Dr. Kshama Vishwakarma

Dr. Shraddha Singh

Dr. Rekha Vishwakarma

Post Graduate Student department of Obstetrics and Gynaecology G.M.H. and S.S.M.C. Rewa ,M.P.

Post Graduate Student, department of Samhita Sidhant, Subhdepp Ayurveda Medical college, Indore M.P.

Senior Medical Officer, Burhar Central Hospital, Burhar, M.P.

* Corresponding Author

ABSTRACT

Practice of contraception existed since the human origin. In ancient times various natural and herbal methods were used which gave birth to modern methods but safe and effective contraception did not exist until the beginning of twentieth century. Modern methods evolved after unbeatable efforts of our great scientists. Methods were invented starting from natural origin to synthetic and human. We are discussing here the contribution of our great ancestors and scientists to invent various methods of contraception and continuous improvement in them.

Introduction

The practice of contraception is as old as human existence but safe and effective contraception did not exist until the beginning of twentieth century. Social and economic factors have been as important as research initiatives; religious and moral believes have intersected with familial and gender relations. Here we are discussing milestones in the discovery of modern methods of contraception.

Ancient Civilised Practices

4000 years ago, Chinese women drank mercury and lead to control fertility, which often resulted in sterility or death. Greeks consumed diluted copper ore, Italians sipped a tea of willow leaves with mule's hoof.¹ 100 BC, the celebrated physician Charak wrote about many contraceptive prescriptions¹. First book on the subject was "Kamasutra" by Vatsyayan in early 4th century AD, which mentioned kadamba fruit for contraception. 1850 BC: Ancient Egyptian writings on Kahun papyrus refer practice of vaginal pessary or diaphragm of crocodile dung mixed with honey and milk.

Classical Period (Greece & Rome) :

Greece: Plato, Aristotle and followers of Hippocrates discussed about birth control.¹ Soranus (98-138 AD), the greatest gynaecologist of antiquity wrote about contraception and distinguished between contraceptives and abortifacients, told about contraindication of abortions, pregnancy preventive techniques like vaginal plugs, astringents and fruit acids etc.¹ Rome: For privileged community Romans developed goat's bladder as barrier.¹

Middle Era

Islam: Rhazes (850-923 AD), a Persian physician, Avicenna (980-1037 AD) Hamadan, detailed ointments, vaginal barriers, coitus interruptus as methods of contraception.¹ Europe: St. Thomas Aquinas (1225-1274) condemned contraception.¹

Natural and Behavioural Methods

Women have used extended breast-feeding (lactational amenorrhea) to space their pregnancies since the beginning of history. Coitus interruptus (withdrawal with ejaculation taking place afterwards) and coitus reservatus (withdrawal without ejaculation) were known to all ancient religions. Historical demography revealed that they were the principal method responsible for the demographic transition in Europe in the 19th century. Abstinence has been practiced by ancient Greeks, Africans, and Hindus; they thought that most fertile period was just before, during and soon after menstruation. This thought was rectified with the studies in 1929 by Knaus

and Ogino separately that ovulation occurs mostly at 12-16 days before next period.¹ In 17th century African and Native American women were the first to realize that assessment of cervical mucus could help predict ovulation.¹

The Condom

12,000 to 15,000 years back, earliest known illustration of a man using condom is painted on the wall of a cave in Combarelles in France. Romans had condoms made of goats' bladders and muscle sheaths of enemies. In 15th century, Japanese had two types of condoms, the "Kawagata" or "Kyotai" made of thin leather and the "Kabutogata" made from tortoise shell or horns.² 1565, earliest published condom by Dr. Fallopio, recommended linen sheath to fit glans, moistened with lotion for protection against venereal disease.³ 1645, Folklore attributes the invention of a device Dr. Colonel Quondam, at the court of King Charles3, to help the king prevent the birth of illegitimate children.³ 18th century, condoms were described for their utilization in the context of sexual encounters outside marriage or with prostitution. Hence, the medical community was reluctant to promote condoms. 17th century, in France linen condoms were used with a ribbon on the open tied end to be tied around the penis, and were described as "An armour against pleasure, and a cobweb against infection".¹ 18th century, condom was made of caecum of sheep and other animal.⁴ 19th century, Casanova referred condom as "Redingote Anglaise" (riding coat/ rain coat); used them for contraception and prevention of infection.⁵ 1843, condom manufacturing was revolutionized by the discovery of rubber vulcanization by Charles Goodyear (founder of the tyre company) and Hancock.³ 1919, latex condoms were introduced, which had advantage of late ageing, thinner and odourless. By 1924, the condom was most commonly prescribed method of birth control. In exigencies of World War II first large-scale systematic promotion of condoms to prevent venereal disease was brought about due to more realistic attitude of military leaders.² Doctors were allowed to "prescribe" condoms to protect men from STDs (which occurred due to pre or extramarital intercourse), but men could not get condoms to protect their wives from unintended pregnancy. In 1957, the very first lubricated condom was launched in the UK by Durex.⁶ In 1960, Silicon was first used in US to produce semi-dry lubricated condom (US).⁴ Later spermicidal condoms (coated with nanoxynol-9 on inner & outer surface) were manufactured and marketed.⁴ In 1992, female condom was introduced, which was a polyurethane vaginal pouch attached to a rim that partly covered the vulva.¹

Other Barrier Methods

Occlusive Caps: In 18th century Giovanni Casanova invented a primitive cervical cap, partly squeezed half lemons. In 1823, German gynecologist Friedrich Wilde created first modern cervical cap; in 1844, vulcanised rubber was used to prepare longer lasting cervical cap.⁷ 1882, Dr. D.M. Mensinga, Germany, developed 1st modern diaphragm with rubber and watch spring, which was publicized by Dutch Neo-malthusians; hence also known as "Dutch-caps". A Viennese physician rediscovered the cervical cap in 1908.⁸ Vaginal diaphragms and cervical caps were most common contraceptive recommended by birth control clinics.⁴ 1988, USFDA approved Prentif cervical cap was in continuous use in 20th century and is no longer available in US.⁴ **Vaginal Sponge:** In 17th century, as mentioned in Talmud, sponge soaked in vinegar/ brandy was used for contraception, which block vagina and absorb sperm. In 20th century, British birth control crusader Marie Stopes prescribed sponges moistened with olive oil.⁹ 1983, "Today" was most popular; it has now been withdrawn from market since 1995, due to its rare but serious S/E TSS.⁴ 1998, (Allendale Pharmaceuticals, US) started producing sponge again, reintroduced in US in September 2005.⁴ **Spermicides:** During 1st century, Indian women used honey ghee and palasha seeds, elephant dung and water. In 6th century, the Greek physician Aetios suggested mixtures of cedar, lead, alum or wine. "De Materia Medica" was a standard resource for contraceptive information until 16th century.⁷ 1885, WJ Rendell evolved soluble coca-butter vaginal suppositories containing quinine sulphate. 1920s, foam tablets were first introduced.⁴ Today vaginal suppositories, nanoxynol impregnated in glycerine were used.⁴

The Intrauterine Device (IUD)

Arabs and Turks introduced pebbles in uteri of camels during long caravan journey through deserts.¹⁰ 1909 Germany, Dr. Richard Richter developed a closed device made up of silkworm gut ring, German literature reported high rates of infection and even death with their use.¹¹ 1926, Ernst Grafenberg, a German Jew, developed a ring of silk worm gut and fine silver wire, known as the G ring. Grafenberg is considered the "father" of the IUD.¹² 1934, Dr. Tensei Ota in Japan, made a device of gold or gold plated silver with a flat ball in the center of the ring. In 1936, Japanese govt. abandoned Ota 7& G-ring due to high risk of pelvic infection. It took more than two decades to revive IUDs.¹² 1959, Oppenheimer of Israel and Isihama of Japan published separately their works on the successful use of rings made of plastic materials.¹³ 1960, Lazer Margulies, New York, developed the Margulies Coil, the first plastic device; a large device with a hard plastic tail, which caused discomfort to the partner.¹ 1962, first International Conference on IUDs was organised in New York; where more than 100 models were described. At conference Jack Lippes, a gynecologist, presented a polypropylene device, Lippes Loop, which had single filament thread as a tail, was barium impregnated, it became the most widely prescribed IUD in the 1970s.¹⁴ It was withdrawn from market later because of more side effects. 1964, at 2nd world conference, CSP evidenced that these available IUDs were effective and appropriate for use in National Family Planning Programme.¹ 1967, Lernes and Davis designed Dalkon shield, shaped like shield with central membrane, had extensions to prevent expulsion. It has been withdrawn from market due to alleged side effects severe infections which sometime prove fatal.¹⁵ 1970, Howard Tatum and Zipper developed 1st medicated IUCD, of "T" shape and produced the Copper T, which had 200 mm³ of copper wire on the vertical shaft also called the Tatum-T.⁴ 1971, the Cu-7 (Gravigard) and Cu-200 (GynaeT) was developed, and quickly became the most well tolerated and popular one in the US.¹ Cu-7 was taken up by GOI in family planning programme. 1970s, Chinese single-coil made of coiled stainless steel wire was widely used in China along with Mahua-ring (Chinese-double coil stainless steel ring). Chinese govt banned production of steel IUDs in 1993 due to high failure rates.⁴ 1974, Multiload Cu250 was developed. It had with 250 sq mm

Cu wire. 1979-1982, Multiload Cu-375 (ML Cu-375), Nova T, CuT380Ag, CuT-380S (slimline), Cu T 220C were developed. These had higher doses of Cu with either silver core or copper sleeves or silver sleeves.⁴ 1974, Progesterone, a hormone releasing IUCD was developed by Dr. Tapani J.V. Luukainen; it contains 38mg progesterone, released @65microgm/day for 1 year; decreased menstrual blood loss; it was discontinued in 2001.⁴ 1976, only hormonal IUD still available in market is LNG-IUS (Mirena), was developed by Luukainen, which is effective for 5 years, causes less pain and bleeding.¹⁶ 1982, Tatum improved Cu-T by addition of silver core in copper wire and created TCu380A (Para Gard), which had twice amount of copper with increased life span to 10yr.^{1,17} It is free of cost supplied by GOI. 1996, Cu-Fix IUD (Flexigard) is a frameless IUD, consisting of 6 Cu sleeves (300sqmm Cu) strung on polypropylene nylon thread, which knotted on upper end, has high expulsion rate and so needs wide trial.⁴

Oral Contraceptive Pills

Russell Marker discovered that generations of Mexican women had been eating a certain wild yam, the Barbasco root, also called "cabeza de Negro" for contraception.¹ 1944, Marker started synthetic production of progesterone from the roots of the plant Dioscorea Mexicana. In 1949, Carl Djerassi discovered that removal of the 19-carbon increased the progestational activity and created first synthetic progesterone, norethindrone in 1951.^{18,19} 1945, Albright identified potential of ovulation inhibiting doses of estrogen as contraceptive.¹⁴ 1956, Pincus, Rock and Garcia first showed fertility control in women by suppression ovulation with norethynodrel (progestational agent) and found that by combining norethynodrel with mestranol (estrogenic agent) efficacy can be improved and breakthrough bleeding reduced. This heralded birth of 1st combined oral contraceptive pill, Enovid, containing 10mg norethynodrel & 0.15mg mestranol.²⁰ Since 1987, low dose steroid pills accounted for 85% of pills in developed countries and 60% in developing countries. Presently low dose COCs contain estrogen less than 0.05mg, which is down from 0.15mg in 1st COC & 0.05-0.1mg in OCs of 1960-70s. Progesterone doses decreased from 10mg to 0.1mg or less.

Components of combined oral contraceptives:

A. Contraceptive Estrogen: mestranol, ethinyl estradiol

B. Contraceptive progestagen:

1. Pregnanes: MPA, megestrol acetate, cyproterone acetate, drospirenone.
2. Estrane: norethindrone (norethisterone), norethynodrel, lynestrenol.
3. Gonanes: norgesterl, desogestrel, norgestimate, gestodene.

Currently available OCPs are as follows⁴: (table 1)

S.No.	Name	Progesterone	Estrogen
A.	Combined pill (monophasic) Low-dose pills • Ovral-L or Mala-D • Novelon • Femilon • Mala-N • Loette • Yasmin High-dose pills • Ovral or Duoluton-L	LNG 0.15 mg	EE 0.03 mg EE 0.03 mg EE 0.02 mg EE 0.03 mg EE 0.02 mg EE 0.03 mg
		Desogestrel 0.15 mg	
		Desogestrel 0.15 mg	
		LNG 0.30 mg	
		NET Acetate 1 mg	
		Drospironone 3mg	
LNG 0.25 mg	EE 0.05 mg		
B.	Triphasic pills: • Triquilar	LNG 0.05 mg	EE 0.03 mg - 6 days
		LNG 0.75 mg	EE 0.04 mg - 5 days
		LNG 0.125 mg	EE 0.03 mg - 10days

C.	Mini pills • Micronor, nor-QD • Ovrette	Norethindrone 0.35mg Norgestrel 0.075 mg	Nil Nil
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Permanent Methods

Vasectomy: 1832, first known vasectomy was done by Astley Cooper on his pet dog.⁴ 1894, first human vasectomy was performed in Britain to relieve a swollen prostate gland.⁴ 1991, China, no-scalpel technique was developed.⁴ Tubal Sterilization: In 1823, James Blundell performed first tubal ligation in London.⁴ In 1895, Duhrrssen described vaginal tubal ligation.⁴ In 1930, Pomeroy method was described, which is still practiced with modification.⁴ In 1960, Tubal ligation gained popularity as a method of contraception.⁴

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