

**Refined Techniques of FEMcide: foetal sex-determination and sex pre selection/technical aspects**

*RAVINDRA, R. P.*

The contributory of science and technology in shaping various aspects of human life needs no elaboration. At present, amongst activists there are two basic streams of thought regarding such a role of science and technology. According to one, `science is neutral and value-free. Technology (its application) can be used for or against people depending upon the motives and interests of groups controlling it. They feel, by and large, technology has immensely helped humankind by reducing drudgery and ever widening frontiers of knowledge. Only its anti-people use by ruling classes -- (used in abroad sense) needs to be countered. However, some people believe that science is value-loaded. Not only the application, but its development has imbibed the values and prejudices of the ruling elites. Whatever may be our perspective on science and technology vis-à-vis people the issue of sex determination and sex pre-selection presents us an opportunity to fight unitedly against its anti-people effects. May be, we all can judge the relevance (or otherwise) of our concepts as we attempt to tackle this issue. However, it wouldn't be out of place to warn that whatever might be the benefits of ideological battles amongst all activists on this issue, they should not be allowed to hinder united action. We are belatedly fighting a losing battle and the only hope of stalling the victory of anti-people forces in the war lies in our unity.

It is undisputable that technological progress should be in conformity with human development. That such a development should lead to freedom, equality, justice and should put an end to the existing relationships based on exploitation. Any process which may provide more choices, power and control to a few individuals/groups at the cost of loss of such power/control by larger groups cannot be termed as `development'.

Amniocenteses the most popular technique used for sex determination was basically developed for detecting chromosomal abnormalities in foetuses. Subsequently, it became necessary to determine sex of such abnormal foetuses, as in most such cases, females were mere carriers of such deformity, whereas males had 50% chances of getting it. In such cases, male foetuses were aborted if the parents so desired. However, in India, its use for sex determination soon gained prominence. Today, it is almost exclusively being used for sex determination and subsequently for female foeticide. Most people (and even

some doctors) do not know its principal use for detection of hereditary abnormalities. Its ready acceptance by people at large has set the ball in motion. Hence, we have mere refined methods of foetal sex determination and various techniques of sex-preselection on the threshold. Not far behind are the In Vitro Fertilization (IVF) technologies, DNA probes and all the latest developments in New Reproductive technologies (NRTs). It is necessary to understand the basic principles of such techniques before judging their likely repercussions.

### **The Scientific Basis of Sex-Determination and Sex-Pre-Selection**

Each human cell (except a few) contains 23 pairs of chromosomes in its nucleus. Chromosomes are the carriers of hereditary characters. Of these, both the chromosomes in each pair are exactly identical in 22 pairs. It is not so in the 23rd pair which determines the sex of the embryo or foetus. Cells of females have two identical chromosomes (X-X) whereas males have two different chromosomes (X-Y). The gametes (sex cells) - i.e. those leading to formation of sperms and ovum contain exactly half the number of chromosomes, i.e. one from each pair. The cell division leading to formation of such 'haploid' cells is called as meiosis. Meiosis leads to the formation of cells bearing X-chromosomes in females and X or Y - chromosomes in males. During conception, female cell (egg) bearing X-chromosome fuses with male cell (sperm) bearing X- or Y chromosome. Formation of cell bearing XY - chromosomes would result in a male offspring, and that bearing XX-chromosomes to a female offspring.

### **The Sex of the Offspring is Determined at the Moment of Conception and is Unalterable Thereafter.**

Sex of child is determined by the chromosome in the male gamete (X-or Y-). So it's mainly the father who is responsible for the sex of child. (Although conditions prevailing in the mother's reproductive tract may favour one of the two types of gametes, and hence influence the sex of the offspring). The external genitalia of foetus are not clearly distinguishable even upto the fifth month. Hence, most sex determination methods depend upon the removal of foetal cells and their chromosomal analysis (either directly or preferably after culturing and Karyotyping-the latter method is seldom used in India). Presence of a mass of fluorescent 'F-bodies' in UV light/laser beam under a fluorescent microscope indicates presence of male cells. A stainable nuclear material indicates female cells. The accuracy of results claimed by most Indian clinics is 97-99%.

All attempts of sex pre-selection are based on separation of X- and Y- bearing gametes within or outside the body and fertilizing the egg with the desired male gamete. It would mean altering the composition of female reproductive tract to

facilitate passage of Y-bearing sperms (In vivo) or separation of gametes, followed by fertilization processes occurring outside the body (In Vitro Fertilization IVF).

### **Methods of Pre-Natal Sex Determination**

Amniocentesis (Amnion: membrane. Centesis : Pricking) At present, this is the most widely method used for sex determination in India. In the mother's womb, the foetus floats in amniotic fluid filled in the amniotic sac (bag of waters). A few cells of foetus are found in the fluid. The number of such cells increase as the foetus grows. However the amniotic sac gets increasingly filled up due to the growing size of foetus. Amniocentesis consists of inserting a long, aseptic needle into the amniotic sac through the mother's abdomen and withdrawing from it 15-20 cc of amniotic fluid for chromosomal analysis. It is usually performed between 16th to 18th weeks of pregnancy during which it is relatively easier to withdraw fluid containing sufficient number of cells without damaging the placenta or foetus. It should preferably be carried out under the ultrasonic cover by means of which the movement of the foetus and location of placenta can directly be viewed on a screen using in audible sound waves. This helps in the insertion of needle without causing any damage to mother, foetus or placenta.

### **Possible Hazards**

Insertion of needle into amniotic sac can damage the placenta or foetus resulting in puncture marks over body, organ damage or even spontaneous abortion. The result of sex determination is known after the end of fourth month of pregnancy. MTP carried out after that period (i.e. in the second trimester of pregnancy) is more difficult and risky and can adversely affect the mother's health, specially making her more anaemic. A repeated cycle of pregnancy - Sex-determination-abortion-pregnancy-can be very hazardous for her health.

Due to the above mentioned hazards associated with amniocentesis, efforts are being made to evolve a simpler, safer method of sex determination which can be used in the earlier phases of pregnancy. Of these, at present Chorionic Villi Biopsy (CVB) seems to be the most effective and is replacing amniocentesis. It consists of removing the column like cells (Villi) from the chorionic part of uterus through cervix under ultrasonic scanning. The cells can then be studied by chromosomal analysis or with specific DNA probes. It carries 3-5% risk of bleeding, pain and spontaneous abortion in the next two weeks. However, it is considered to be less painful and safer than amniocentesis. It is carried out in 6th-13th week of pregnancy making abortion in first trimester possible.

Ultrasonics is a useful non-invasive technique used for directly viewing the foetus. Fortunately, on its own it cannot be misused for sex-determination as the external genitalia of foetus are not well defined even in 5th month of pregnancy. However, extensive research is going on for a simpler, quicker method of sex determination. Some such attempts include measuring hormonal level in the mother's saliva/blood, testing cells from IVF embryo, testing foetal cells in mother's blood etc. None of these is yet perfected. However, it may not be surprising if within a decade sex determination may become as simple as withdrawing blood from mother's arm, separating foetal cells from it and then determining foetal sex by chromosomal analysis/other methods. With the development of safer-quicker and non-invasive methods of sex-determination, the room for opposing them on grounds of foetal/maternal health is being increasingly depleted. Opposition of the same should now come from a more basic ideological angle.

### **SEX-PRE-SELECTION**

In the modern technology's bid for a greater control over woman's bid, sex preselection technology is the more advanced stage of sex determination technologies, for the former pre-empted the need for the latter. Once the birth of a particular sex of child can be medically manoeuvred, all sex determination technologies and one's opposition to them would automatically become a priority research field for the same reasons as sex-determination. Needless to say, in India sex-pre-selection is used exclusively for begetting sons. Notwithstanding the claims of success of hundreds of such techniques the International Planned Parenthood Federation (IPPF) stated in 1985 that no such method has been scientifically proved to be effective. Apart from the centuries old prescriptions ranging from drinking lion's blood to a coitus in full moonlight, the present claims for sex-preselection methods can be grouped into three categories:

### **AYURVEDIC PRACTICES:**

According to ayurveda, the sex of child, is not fixed till 3 months of pregnancy. It can be altered by suitable medication and rituals termed as 'Punsavana Vidhi'. According to ancient texts, the sex of child depends, apart from other factors, upon the union of souls and dominance of Sanskaras (dominance of aggressiveness, firmness and courage for son and that of submissiveness, meekness and cowardice for daughter). How medication can affect such factors is beyond comprehension. At present, a research project on 'Sex pre-selection' is going on in the government run Poddar ayurvedic Hospital using nasal drop therapy to beget sons. There's even a product 'select' in the Gujarat market which claims 80 percent to 85 percent success by administration of capsules to mother in second month of pregnancy. Dr Sharad Gogte & Ravi foundation (both from

Bombay) claim to use Ayurvedic therapy to increase the sperm count. However, no scientific evidence is yet provided to substantiate the claim.

The second set of methods focus on altering the environment in the female reproductive tract making it more conducive for sperms bearing Y-chromosomes. Various methods like diet control, use of acidic/alkaline vaginal douches before conception, scheduling time of conception are being advocated. Although a large number of people are willing to pay fat sums of money to try these methods (the consultation charges for 2 month diet course proposed by Ravi Foundation is Rs.1200/-), none of them have yet been proved to be effective in India & outside.

The third set of methods is in accordance with the principles of modern biological sciences. It uses the difference in physical properties (e.g. Density, motility, electric charge etc. ) between X-and Y-bearing sperms for separation of both types of sperms. The fraction rich in Y-chromosomes is then used for IVF with egg. Although the approach is scientifically correct, nature always had an upper hand in such experiments and persistent efforts of total separation of X-and Y-bearing sperms have failed. There are too many variables. The variation in properties of the sperms of the same persons or different persons vary so widely as to obscure the difference in properties of X-and Y-bearing sperms. Moreover, the technique of IVF is sophisticated and requires considerable skill. The moral issues surrounding IVF, also contribute to the relatively slow acceptance of this technique in India at present. No one can predict whether or not they would be accepted here in the future.

Various questions emerge from this scenario. The first one is about the modern science's outlook on women's health. If we look at the development of this science, specially in the last two decades, we observe a persistent pattern of efforts made to control women's bodies. Hormonal contraceptives, injectable contraceptives, implants, sexdetn. Sex pre-selection, all have an implicit assumption that women's bodies are objects to be tampered with, experimented upon without bothering about the effects of such efforts on them. The aim is to control the reproductive processes - the number of children she should have, the timings of their conception, their sex - almost everything seems to be controlled by some agency other than women themselves. This raises the basic question of who should have such a control. Women themselves, scientists and technologists, religions establishments or state?

This also raises the oft-repeated question of `who should decide about the relevance (or otherwise) of any scientific research. Should the scientists and technologists have limitless power so that they can go to any extent without bothering about their effects on society? What should be the criteria for taking

such a decision - pursuit of knowledge, welfare of society as whole/of persons concerned, will be scientists and/or rulers? Shouldn't the people affected by research have a voice in this decision?

It is worth noting that technologies reducing drudgery or improving quality of life of women are either not explored: and if explored, hardly react them. In about four decades after independence, clean water, basic sanitation facilities haven't reach most villages. More than half Indian women are anaemic. The sex ratio is most unfavourable for women in India. Infant mortality rate, specially for females is one of the highest. Technology has failed women in improving their lot. But, technology which can be used for anti-women purposes is readily accepted in all strata of society. Unfortunately in India there is a very large number of women scientists and doctors who are working for propagation of such technologies in India.

It is no good blaming the illiterate masses with regressive ideas for propagation of such technologies. The other end of the link- the highly educated, 'enlightened' scientists, technologists doctors (and of course the state) which helps propagate such a situation need to be questioned.

The basic question is should we allow science and technology be harnessed for such blatant anti-women purposes. If we wait for social transformation to take case of it, we may be paying way for more hazardous technologies which would have far more devastating effects on society in general and women in particular.