Health and Population-
Perspectives and Issues 25 (4): 159-176, 2002

RECENT ADVANCES IN HORMONAL MALE CONTRACEPTION

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ABSTRACT

In recent years, increasing emphasis is being given on greater male participation in family life and family planning. From the Second National Family Health Survey (1998-99), it is noted that male participation in family planning is very marginal. This adverse gender inequality needs urgent corrective measures. Two types of actions are needed: (a) To promote the use of currently available male methods, and (b) To make available other effective male methods so as to provide wider choices for contraceptive acceptance and practice.

For development of new male methods, hormonal and non-hormonal approaches have been tried over the past 3½ decades. In earlier efforts, different progestogens and testosterone preparations have been used, either alone or in combination, with the object of suppression of sperm production. Of these, testosterone enanthate (TE) and depo-medroxy progesterone acetate (DMPA) have been used most commonly. In all these studies, adequate spermatogenic suppression was not achieved possibly due to inadequate dosage and duration of hormone administration.

A major breakthrough has appeared through two clinical trials under the WHO Task Force (1990 & 1996). In these trials, TE 200 mg i.m. injections every week produced azoospermia or severe oligospermia in more than 95 per cent of subjects, when they were put on contraceptive efficacy study, pregnancy protection was comparable to the female contraceptive pills. These WHO studies have validated an important concept; but this prototype has several important drawbacks. Therefore, search for newer and better methods has continued. A number of long-acting testosterone derivatives with better pharmacokinetic properties have become available for clinical trials. Similarly, a range of new progestins has been developed. GnRH analogues, agonists and antagonist, have also become available for clinical trials. The results of a good number of studies using androgen

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alone or in combination with progestins or GnRH are published. It has become clear that combinations are more effective and safer than either given alone. An updated state of knowledge is presented.

Key-words: Testosterone enanthate (TE), Spermatogenic suppression, Pharmacokinetic property, GnRH.

Why Development of Male Contraception Needed?

In recent years, particularly after the International Conference on Population and Development (ICPD) in Cairo (1994)[1,1a] and the International Conference of Women in Beijing (1995)[2], the need for taking greater responsibilities by male partners in family life including family planning is being increasingly emphasized at different national and international fora. For achieving this, there is not only an urgent need for appropriate socio-behavioural measures for bringing attitudinal changes, but also greater choices for effective, safe and reversible male contraceptives should also be available. At present only condom is available for use by the male as a temporary method. This underscores the urgency for development of new, dependable and reversible male contraceptives.

Current Contraceptive Prevalence Rate (CPR)

As revealed by the National Family Health Survey (NFHS II, 1998-99)[3], the total CPR was 48 per cent. Out of this 48 per cent, 34 per cent accepted female sterilization and 2 per cent male sterilization; pills and IUD 2 per cent each, condom 3 per cent and other methods 5 per cent. Very poor use of temporary methods shows that proper contraceptive culture with adequate spacing of childbirths has not been developed. Given the near-exclusive emphasis on sterilization in the contraceptive method-mix, women tend to adopt family planning only after they have achieved their desired family size; many of them do not use any contraceptive during the waiting period. Another 8 per cent are not using any contraceptive although they do not want any more children. The overall unmet need for contraception is about 15-20 per cent, and this is highest (27%) among women below 20 years.

It is clearly evident from the above that at present male participation in family planning is very marginal, and there is an urgent need for remedial measures.

Before discussing about the potential male methods, a brief review of the current knowledge of the physiological regulatory mechanisms of male reproductive processes would be helpful.

PHYSIOLOGICAL BASIS OF MALE CONTRACEPTION

Physiological Regulation of Male Reproductive Processes[4]

These are regulated by intricately balanced mechanisms involving the hypothalamus-pituitary-testis axis, and the accessory sex organs. It is generally believed that for initiation as well as maintenance of spermatogenesis in the human both FSH and testosterone are needed. The GnRH secreted by the hypothalamus regulates the synthesis and release of FSH and LH from the pituitary. FSH acts on the Sertoli cells, which are located within the seminiferous tubules in close proximity of developing germinal cells, and stimulates production of various proteins including inhibin, androgen binding protein (ABP), aromatase, anti-mullerian hormone (AMH) and others. No FSH receptor has been located in the germinal epithelium. FSH action on germinal epithelium is probably mediated through the Sertoli cells, the exact mechanism of which is not known.

Inhibin selectively inhibits FSH secretion acting at hypothalamic-pituitary levels. ABP binds the androgen, secreted by the Leydig cells, and maintains high titre of androgen within the seminiferous tubules, efferent ductules and the proximal part of the epididymis. There is evidence to indicate that aromatase may play an important role in the final stage of spermiogenesis. The exact role of AMH in adult life is not known.

The LH acts on the Leydig cells located in the intertubular space and stimulates production of testosterone. Intratesticular testosterone concentration in the human is about 200-300 times greater than that of peripheral circulation. Testosterone has profound influence on germ cell development and differentiation. Major evidences indicate that there is no androgen receptor on the germ cells, and androgen probably acts through the Sertoli cells and/or ABP, which have androgen receptors.

The androgen also gains access to systemic circulation and plays important roles at different levels. It stimulates and maintains secondary sex organs such as epididymis, prostate, seminal vesicles and others. It exerts a negative feedback action primarily on LH secretion, but also on FSH (at higher concentration) acting on hypothalamic-pituitary axis. Acting at higher nervous system, it stimulates and maintains libido. It is also a very potent anabolic agent; it stimulates erythropoesis, maintains muscle and bone mass and influences lipid metabolism.

Spermatogenesis is an orderly development process progressing through spermatogonia → primary and secondary spermatocytes → round and elongated spermatids to spermatozoa. This comprises three phases - mitosis, meiosis and spermiogenesis. The first phase consists of mitotic doubling and multiplication of spermatogonial cells which may be stimulated by FSH. In the second phase, the spermatocytes undergo two stage reduction divisions giving

rise to haploid spermatids; this is androgen dependant. Spermiogenesis involves transformation of spermatids to mature spermatozoa through complex cyto-differentiation. Acrosome and flagellum are formed and the existing, structures are remodeled. There is evidence to indicate that androgen probably acts on preleptotene and pachytene spermatocytes, and on round and elongated spermatids. The final conversion of elongated spermatids to spermatozoa may be facilitated by estrogen produced by aromatase under FSH stimulation. The whole cycle of spermatogenesis takes about 72 ±5 days. The developing germ cells are completely enveloped by the Sertoli cells, which provide nutritional supports for the germ cells. The role of any paracrine factors in spermatogenesis is ill-understood.

After the spermatozoa are released from the seminiferous epithelium into the tubular lumen, these are transported to the epididymis. Here these are exposed to some specific proteins and other substances; they undergo structural and functional changes, and acquire forward progressive motility and the fertilizing capacity. This process of maturation of spermatozoa in the epididymis is androgen dependent.

During ejaculation the spermatozoa pass through the vas deferens, and secretions of the prostate and seminal vesicles. Once deposited in the vagina normal sperms are capable of traversing through the female genital tract - the cervical canal, uterine cavity and utero-tubal junction, to reach the outer third of the fallopian tube, and this is achieved mainly through their innate motility. Usually at this site the sperms are capable of recognizing the ovum, penetrating its investing membranes and fusing with it resulting in fertilization. This latter process is facilitated by the acrosomal enzymes located on the sperm head.

Basis of Contraception[4]

Contraception may be achieved by interrupting the above-mentioned male reproductive processes at one or more sites. The effects may be exerted primarily at the following levels:

- Hypothalamus - Pituitary - Testis axis;
- Directly on the Testis;
- Post-Testicular Processes

    - In Epididymis
    - In Vas Deferens
    - Altering Sperm Function

The physiological basis of various approaches for developing male contraceptives is summarized in Table 1.

TABLE 1
PHYSIOLOGICAL BASIS OF POTENTIAL MALE CONTRACEPTIVES

I. Inhibition of Hypothalamic-Pituitary Function

A. Counteraction of GnRH Activity by:
1. GnRH agonist or antagonist
2. GnRH agonist/antagonist Plus Androgen
3. Anti-GnRH vaccine Plus Androgen

B. Suppression of Pituitary Gondotropins by:
1. Androgens
2. Progestogens
3. Antiandrogenic Progestins - CPA (Cyproterone acetate) and DNG (Dienogest)
4 Progestogens Plus Androgens
5 CPA Plus Androgens
6. DNG Plus Androgens

C. Inhibition of FSH Secretion/Action by:
1. Inhibin
2. Anti-FSH Vaccine

II. Direct Inhibition of Spermatogenic Cells in Testis by:
a. Colchicine
b. Nitrofurans
c. Bis-dichloroacetyl diamines
d. Gossypol
e. Mild testicular heating

III. Post-Testicular Actions
1. Inhibition of Epididymal Sperm Maturation by:

a. Cyproterone acetate
b. $\propto$ - Chlorohydrine
c. 6-Halo-6 deoxy sugars
d. Selective inhibition of 5$\propto$ - reductase activity in epididymis

2. Anti-Sperm-Antigen Vaccine

3. Reversible Intra-vasal Devices:
a. Silastic/silicon plugs
b. Styrene Maleic Anhydride (SMA)
c. Intravasal copper

MALE CONTRACEPTIVE DEVELOPMENT

I. Earlier Efforts

A. Use of Different Non-steroidal Agents and Other Procedures[4]

Many of those listed in Table 1 have been abandoned for various reasons, and with only a few studies are continuing. As for example, the potential non-steroidal agents which were found to suppress spermatogenesis directly, include colchicine, nitrofurans, bis-dichloroacetyl diamines and Gossypol. The first two were found to be toxic at the initial phase itself. The last two were very promising and underwent clinical trials to varying extents. But subsequently, these too had to be abandoned. When the volunteers taking bis-dichloroacetyl diamines consumed alcohol they experienced severe antabuse effects. In 1978, the Chinese scientists announced the discovery of a new, safe and orally effective contraceptive, Gossypol which was derived from cotton seed oil.

During 1970s this was administered to more than 8000 men in China. The sperm count was reported to decrease to around azoospermic levels in 99% of volunteers. However, follow-up studies later showed severe drawbacks such as slow or lack of reversibility, and serious side effects such as hypokalaemia in some of these subjects. Subsequently, numerous derivatives and analogues of Gossypol were synthesized during 1970s and 1980s in China and outside, and clinically tested. But efforts to identify an active compound with reduced adverse effects were not successful. Therefore, it could no longer be considered suitable for male contraception. Similarly, mild testicular heating has not been successful.

For inhibition of sperm maturation in the epididymis, the use of $\propto$ - chlorohydrine and 6-halo-6 deoxy sugars were found to be too toxic, and cyproterone acetate and $5\propto$ - reductase inhibitors were not effective. Vaccination against sperm surface antigens has also not succeeded.

For selective neutralization of FSH action, the use of inhibin or its analogues (particularly the prostatic inhibin derivatives developed at IRR, Mumbai) has not succeeded. Similarly, anti-FSH vaccine has not been useful. In this regard, it may be pertinent to mention that recent studies have indicated that even in total or partial absence of FSH, testosterone alone can maintain spermatogenesis.

For reversible vas-occlusion, several approaches have been tried, but without any success so far.

Obviously, detailed discussion on all aspects is outside the scope of this presentation. Only selected aspects of hormonal male contraception would be highlighted.

B. Use of Steroidal Agents[4,5,6]

For suppression of spermatogenesis, different androgens and progestins have been used either alone or in combination. Different androgens tried were testosterone propionate (TP), testosterone cypionate (TC), testosterone enanthate (TE) and mesterolone injections; and different progestins included medroxyprogesterone acetate (MPA), depot-MPA and danazol. TE and DMPA were used most frequently, either alone or in combination. But these failed to produce consistently azoospermia (only in 50-70%) or very severe oligospermia in all volunteers; this was probably due to inadequate dosage and frequency of hormone administration. In addition, no contraceptive efficacy trial was conducted in these studies. However, two groups of Indian investigators made some pioneering ventures. Firstly, Reddy and Rao[7] administered testosterone propionate 100 mg daily i.m. to normal volunteers and achieved azoospermia in 100% subjects. Although daily injection was not a practical approach it lended support to the concept of hormonal contraception. In the second venture, Roy and co-workers[8-11], studied the effects of cyproterone acetate (CPA) and TE, either given alone or in combination and propounded completely new concepts. These will be discussed in detail later on.

II. Important Breakthrough by WHO Studies[12,13]

A major breakthrough has appeared through two recent studies under the WHO Task Force. In the first multi-centre WHO trial in 10 centres in 7 countries, 271 fertile men were injected with 200 mg testosterone enanthate weekly. After six months, 157 men had become azoospermic and they were put under contraceptive efficacy study for 12 months during which no other contraceptives were used. During a total 1486 person-months of exposure only one pregnancy occurred. Sperm concentration recovered to more than 20 million/ml in about 4 months after the discontinuation of treatment. In the second study in 15 centres in 9 countries, weekly intra-muscular injections of 200 mg testosterone enanthate (TE) were given to 399 normal healthy fertile males. This produced azoospermia or severe oligospermia (sperm density < 3 million/ml) in more than 95% volunteers. In 12 months contraceptive efficacy study with these subjects, only four pregnancies occurred during 49.5 person-years involving men with oligospermia, and none during 230.4 person-years in azoospermic men; pregnancy rates were 8.1 and 0.0 per 100 person-years, respectively, or 1.4 per 100 person-years for oligospermia and azoospermia combined. This contraceptive effect was comparable to female contraceptive pills, and was reversible. These studies have shown for the first time that hormonal contraception for the male is possible.

One interesting observation in these studies was that the proportion of men reaching azoospermia was 91 per cent in Chinese centres compared to 60 per cent in Caucasian centres. It needs to be mentioned here that other studies have reported that Indonesian and Thai men are also extra sensitive to hormonal

suppression of spermatogenesis. It needs to be studied whether all other Asian males, including the Indian men, are similarly extra sensitive to hormonal suppression of spermatogenesis.

These WHO studies have validated an important concept; but this prototype has several important drawbacks:

1. Weekly injections are not practical.

2. TE has poor pharmacokinetic properties.

3. TE produces supra-physiological spikes of testosterone level in blood, which produces side effects such as - weight gain, abnormal lipid profile, acne and potential risk to the prostate.

4. Residual sperms retain fertility.

III. Other Contemporary Studies and Subsequent Developments

A number of long-acting testosterone derivatives with better pharmacokinetic properties have become available for clinical trials[14]. These included testosterone undecanoate (TU), testosterone buciclate (TB), testosterone implants, and 7∝-methyl-19 nortestosterone (MENT)[15]. The near physiological blood levels of testosterone is maintained following one time proper administration of TU for 8 weeks, after TB for 3 to 4 months, after T-implants for 4 to 6 months and after MENT-implants for one year. T.B. has not yet got toxicological clearance.

Similarly, a range of new progestins also have become available. These included levonorgestrel (LNG), norethisterone enanthate (NETEN), desogestrel (DSG) and dienogest (DNG), in addition to already available DMPA and CPA. GnRH analogues, both agonists and antagonists, which effectively suppress secretion of LH and FSH, have become available for clinical trials.

From different studies it also became clear that combinations were more effective than either given alone. GnRH analogues and progestins themselves would markedly suppress LH and FSH. Low levels of testosterone caused by suppression LH would decrease libido and other androgen-dependant parameters. Obviously, this would require testosterone supplementation; however administration of testosterone will have additive effects on gonadotropin suppression, thus augmenting contraceptive efficacy. In combined therapy with progestin plus testosterone, use of suboptimal doses of each may be good enough; that would decrease the side effects due to individual hormones.

Use of Cyproterone Acetate Alone/and with Testosterone[8-11,16,17]

Cyproterone acetate (CPA) is a gestagenic antiandrogen. This is in contrast with the pure antiandrogens such as flutamide and cyproterone, which do not possess any gestagenic/progestogenic property. Before the present study was undertaken, high doses (100 mg and 200 mg daily) of CPA had been used in hypersexuality, hyperandrogenism, sexual precocity, and in benign and malignant prostatic growth. High dose of CPA had also been reported to suppress spermatogenesis and libido in men.

Prasad and co-workers[18] reported that epididymis had relatively high androgen threshold and required higher level of androgen for maintaining its structural and functional integrity. Partial androgen deprivation caused selective inhibition of epididymal function. With the object of producing partial androgen deficiency they administered micro doses of CPA to adult male animals using silastic capsules. They claimed to have produced functional sterility in these animals by selective inhibition of epididymal function, thereby interfering with maturation of spermatozoa. There was no suppression in spermatogenesis and mating behaviour. This novel post-testicular approach for male contraception generated lot of interest.

In early 1970s, the World Health Organization (WHO) initiated two clinical studies with low doses CPA (5 mg, 10 mg and 20 mg daily orally) as a potential male contraceptive (one with Dr. Somnath Roy in India and the other with Dr. Hammerstein in Germany). Lower doses CPA caused a decrease in the count, motility and the cervical mucus penetrating ability of the spermatozoa. Interestingly, prior to the decrease in sperm count, the percentage of immotile, immature and abnormal sperms increased; these were considered to be due to androgen deprivation. Blood levels of LH and testosterone decreased. The results further showed that CPA acted simultaneously at multiple sites - on hypothalamic-pituitary axis, seminiferous tubules, epididymis, seminal vesicles, prostate etc. Because of these actions contraceptive potential of low doses CPA was envisaged; the WHO expanded the study to other centres in different countries.

Incidentally, no selective inhibition of epididymal function by low doses CPA was noted in our clinical study. Furthermore, our controlled animal experiments also failed to support the concept of high androgen threshold for epididymal function as proposed by Prasad and co-workers. Subsequently, a good number of other investigators also lent support to our findings.

From the results of clinical studies with low doses CPA at different centres[10,11,17] the following observations were made: (a) spermatogenic suppression was varied and inadequate; (b) blood testosterone level decreased in all and libido was low in some; and (c) a few pregnancies also occurred

inadvertently. Therefore, earlier enthusiasm waned and the WHO support was discontinued.

However, we continued further studies with financial assistance from the Family Planning Foundation and the National Institute of Health and Family Welfare, New Delhi. The major focus of our study was to find out whether combined administration of CPA plus testosterone enanthate (TE), an androgen with potent gonadotropin-suppressing property, would have additive and mutually complementary actions so as to provide effective and safe male contraception. This study was carried out in human volunteers as well as in rhesus monkeys. In the human study, one group of volunteers was given orally 20 mg CPA alone, the second group was given 250 mg TE intramuscularly at 15 days intervals, and the third group received both the drugs in the above doses over a period of six months. CPA plus TE produced azoospermia in five of six subjects and very severe oligo-asthenospermia (sperm density-0.01 million/ml) in the remaining volunteer. In this group, azoospermia was induced more quickly (within two months) and there were more rapid and severe changes in sperm morphology and motility prior to azoospermia; the acrosomal enzymes such as acrocin and hyaluronidase were also decreased. There was a greater fall in blood level of LH; but blood testosterone and libido were normal. Compared to this, only one volunteer out of four became azoospermic in the groups treated with CPA or TE alone. In CPA treated group blood testosterone was low, and in two out of four subjects libido was decreased. The results of the monkey studies also confirmed the findings of our clinical investigations.

The results of our studies[4,11,19] clearly showed that combined administration of CPA plus TE had several advantages: (a) smaller doses of each drug were needed, thus there were lesser chances of side effects from each; (b) the effects were very prompt due to their actions at multiple sites; and (c) the combination provided additive and mutually complementary effects. The additive effects caused greater suppression of pituitary gonadotropins, particularly the LH and consequently of intratesticular (I.T.) testosterone; the residual I.T. testosterone was probably counteracted by CPA through competitive inhibition. This caused greater androgen deprivation within the testis. Consequently, spermatogenic suppression was prompt and more complete. As a result of complementary actions, normal levels of blood testosterone and libido were maintained, and favourable blood lipid profile was retained. It is noted from other studies that administration of testosterone, either given alone or in combination with other progestogens such as DMPA and LNG, decreases blood HDL cholesterol and increases LDL/HDL ratio[20]. But CPA, because of its specific antiandrogenic action, prevents such adverse effects of testosterone therapy. This is another important attribute of this combination therapy. It is also noteworthy that the biochemical and structural changes in the residual sperms in CPA plus TE group are indicative of loss of fertilizing ability; this would potentiate the contraceptive efficacy of this combined regimen[4,11]. This is in contrast to the

findings of the WHO studies with TE alone where the residual sperms retain their fertilizing ability.

From our studies it was concluded that for male hormonal contraception, a combination of CPA plus testosterone had several advantages compared to testosterone either given alone or in combination with other progestogens. In 1986/87, in a joint meeting of the WHO and the Indian Council of Medical Research (ICMR) held in Bombay, it was decided that extended multicentric clinical trial would be initiated in India under the ICMR. Unfortunately, for various reasons this did not materialize. However, it is very heartening to note that the results of our pioneering studies carried out more than a decade ago have recently been confirmed by Meriggiola and co-workers[21,22]. In these particular studies they had initially used much higher doses of CPA (100 mg and 50 mg daily) in combination with TE 100 mg weekly. But later on, they have tried much lower doses of CPA after being made knowledgeable about our earlier study findings.

The major findings of Meriggiola et al. are summarized in the following Table:

	Treatment Schedule			**Number of Volunteers with Azoospermia**
a)	TE 100 mg/wk + CPA 100 mg daily	…	…	5/5
b)	TE 100 mg/wk + CPA 50 mg daily	…	…	5/5
*c)	TE 100 mg/wk + CPA 25 mg daily	…	…	4/5
d)	TE 100 mg/wk + CPA 12.5 mg daily	…	…	3/5
e)	TE 100 mg/wk + CPA 5 mg daily	…	…	1/5

It may be noted that their findings in the third group using 25 mg CPA daily are very much similar to those of ours using 20 mg CPA daily. This was pointed out by the senior author in the meeting of the Research Group. Based on these findings a study involving ten centres in nine countries using CPA 20 mg daily plus TU 1000 mg/8 weeks was planned. But unfortunately, at the last moment this had to be dropped, because of non-availability of the drugs. Thus, a major potential breakthrough was thwarted.

Other Recent Developments

Using newer testosterone preparations and particularly after using different combinations of testosterone plus various progestin preparations and GnRH analogues encouraging results have been found. Some of the major findings are highlighted below:

Sperm Suppression with TU Alone

Two types of testosterone undecanoate (TU) preparations have been available for the study. The Schering product is dissolved in castor oil (TU 250 mg/ml) and the Chinese preparation is in tea seed oil (TU 125 mg/ml). TU in castor oil has a half-life of 33.9±6 days and TU in tea seed oil has a half-life of 20.9±6 days. Use of Chinese TU 500 mg/month and TU 1000 mg/month has produced azoospermia by 16 weeks in 12/13 and 12/12 Chinese volunteers respectively[23]. Whereas with castor oil preparation TU 1000 mg/6 weeks given for 24 weeks, azoospermia was induced in only 7/14 Caucasian men[24]. The Chinese study is very promising and the Phase III clinical trial is in progress.

Use of GnRH plus Testosterone

A number of agonist and antagonist analogues of GnRH have been studied in cancer prostate patients and also for male contraception. Theoretically, with combined administration of GnRH plus testosterone, production of azoospermia without loss of libido should be possible. In this regard, the antagonists appear to be more promising. In fact, this possibility has been confirmed by using testosterone alongwith a potent GnRH antagonist. In another study administration of TE 100 mg i.m./week plus 10 mg Nal-Glu GnRH antagonist s.c. daily for 12 weeks produced azoospermia in 10 of 15 subjects and severe oligospermia (<3 mill/ml) in 14 of 15 subjects. The 14 who were suppressed on combined treatment maintained on TE alone (100mg/week i.m.) for an additional 20 weeks in the study period[25]. However, several critical issues particularly high production cost and impractical delivery systems must be resolved before considering its use for male contraception.

Use of Progestins plus Testosterone

DMPA plus TU/T Implants

Clinical trials using combined i.m. injections of DMPA plus TU in Indonesia and China have been very effective in spermatogenic suppression. If otherwise found suitable, it may be possible to put both in one single injection formulation. In another important development, combined use of DMPA plus testosterone implants has produced azoospermia in 9/10 and severe oligospermia (<3 mill/ml) in 10/10 Australian subjects[26].

***Levo-norgestrel (LNG) plus TE / T Implants*[27,28]**

In one study, TE 100 mg/week i.m. plus oral LNG 500/250 µg daily was used. This produced azoospermia in 60-70 per cent volunteers and severe oligospermia (<3 mill/ml) in 94 per cent subjects. In another study, TU 1000 mg/6 weeks i.m. plus oral LNG 250 µg daily produced azoospermia in 50 per cent and severe oligospermia (<3 mill/ml) in 100 per cent subjects.

Desogestrel (DSG) plus TE

In other study, oral DSG 300 µg daily plus TE 50 mg/week i.m. induced azoospermia in 100 per cent men; whereas in the group receiving DSG 300 µg daily plus TE 100 mg/week only 75 per cent volunteers became azoospermic[29]. It is noteworthy that in the second group, where gonadotropin suppression was probably more, higher dose of TE prevented sperm suppression. Interestingly, similar observations were made in another study with CPA plus TB in bonnet monkeys[30].

Norethisterone Enanthate (NETEN) plus TU

In a recent study[31], NETEN 200 mg i.m. plus TU 1000 mg i.m. have been administered every 6 weeks for 24 weeks. This regimen achieved azoospermia in 13 of 14 men. The results are very promising and the study needs expansion. This combined regimen has also the possibility of putting both hormones in one single injection formulation.

From different studies some important lessons have been learnt which may be useful for further development. These are listed below:

1. Ideal progestins should have the following properties:

    a. Should have good gonadotropin - suppressing ability;

    b. No inherent androgenicity;

    c. Mild anti-androgenic property would be desirable for getting complimentary benefits.

2. In the light of the above, proper biological characterization of different progestins in regard to the above properties might be useful for predictive value. Such comparative studies are currently in progress under the senior author.

3. While using progestin (P) and testosterone (T) combinations, the ratio of biological/pharmacological actions of P/T should not be in favour of T/androgen. That may prevent complete neutralization of the effects of intra-testicular testosterone.

CONCLUSION

1. Hormonal contraception for men is possible, and we are at the threshold of an important breakthrough.

2. Combined testosterone plus progestin administration is more effective and safer than testosterone alone.

3. Combination of testosterone plus an anti-androgenic progestin has several advantages over other formulations.

4. In combined therapy, single injection formulation may have better compliance.

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Health and Population-
Perspectives and Issues 25 (4) 177-185, 2002

EVALUATION OF PEROXIDATIVE STRESS AND ENZYMATIC ANTIOXIDANT ACTIVITY IN LIVER AND KIDNEY DURING PREGNANCY AND LACTATION IN RATS

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ABSTRACT

Peroxidative stress was assessed through measurement of malanoaldehyde levels (MDA) and activities of enzymatic antioxidants in liver and kidney during early and late pregnancy or lactation. It was found that MDA levels in these tissues were significantly higher (P<0.001) in late pregnancy and in lactation as compared to non-pregnant control levels. The Kidney showed higher superoxide dismutase (SOD) activity than the liver during late pregnancy. SOD activity in liver and kidney, however, demonstrated a downward trend during lactation. Catalase activity in both the tissues increased gradually during pregnancy but demonstrated a decline during lactation. However, glutathione peroxidase (GPX) activity which declined during pregnancy was found significantly (P<0.001) elevated in late lactating periods. It is concluded that the overall peroxidative stress in liver and kidney was high in pregnancy as well as lactation. On the other hand, rise and fall in the activities of antioxidant enzymes in these tissues presented a mixed and variable trend.

Key-words: Lipid peroxidation, Enzymatic antioxidant, Lactation.

Increased metabolic demand during pregnancy requires high oxygen consumption in different body systems[1]. The oxygen free radicals, by-product of this oxidative processes are the main sources of lipid peroxide formation that cause cellular and tissue damage[2]. Studies in rats showed increased lipid peroxidation after 15th day of pregnancy in corpus luteum[3] and in many major organs immediately after delivery[4]. Similarly, antioxidative enzymes like superoxide dismutase (SOD) and glutathione peroxidase activity (Gpx) were found to be decreased in the blood of pregnant women[5]. A measurable decrease in glutathione peroxidase activity was also reported in liver and placenta of pregnant rats[6].

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Lactation is another state of increased metabolism. Evaluation of peroxidative stress and antioxidant enzymes during this period would be crucial in deciding the nutritional supplementation for the breast-feeding mother. The information available in relation to oxidative stress during this period is scanty and also has not been evaluated systematically. Since liver and kidney are metabolically two important organs in the body, an attempt was made to evaluate specific indicators of oxidative stress in these vital organs during early and late periods of pregnancy and lactation.

METHODOLOGY

Animals

Adult cyclic, female rats (Holtzman strain), weighing 150-180 g, were used for the study. The animals were maintained under controlled temperature (25 ± 2^0 C) and constant photoperiodic conditions (12 h light: 12 h dark). Food and water were provided *ad libitum*. The principles of Laboratory Animal Care (NIH publication No. 85-23, revised 1985) were followed throughout the experimental schedule. Following cohabitation, the females were separated from males after spermatozoa were confirmed in the vaginal smear examination. The day in which spermatozoa were first noticed in the vaginal smear was taken as day one of pregnancy. The pregnant females were segregated in cages and kept under observation till delivery. Lactating females along with litters were also maintained till 14 days following parturition.

Tissue Processing

Rats, those were in a group of 10, were sacrificed on the day 7 and 16^{th} of pregnancy and day 3 and 14^{th} post-delivery. Samples of tissue from liver and kidney were collected in ice cold normal saline (0.9% NaCl) in petri dishes, cleaned thoroughly of adhering tissues and blood vessels, dried on filter paper, weighed and stored in -70° C till further analysis. For Lpx, tissues were first homogenized (20%) in 1.15-% KCl and the crude homogenate was taken for lipid peroxidation assay. For assays of SOD, catalase and Gpx activity homogenization (20%) was carried out in 0.25-M sucrose at 4^0 C. The homogenate was centrifuged at 600 g for 10 min. at 4^0 C. The supernatant was further centrifuged at 10, 000 g for 20 min. at 4^0 C to obtain post mitochondrial supernatant (PMS). At this stage, one aliquot was separated for estimation of catalase activity. The remaining sample was allowed to pass through a 5 ml sephadex G-25 column. The eluted sample was taken for assay of SOD and Gpx activities. Protein was estimated as described by Lowry et al[7].

Assay for Lipid Peroxidation

The lipid peroxidation products in crude homogenate were measured through the estimation of malanoaldehyde levels by the thiobarbituric acid method as described by Ohkawa et al[8].

Assay for SOD Activity

SOD activity was measured in the sephadex G 25 eluted PMS as described by Das et al[9]. In this method, superoxide radical generation by photoreduction of riboflavin[10] is combined with nitrite formation from hydroxylamine hydrochloride to detect superoxide radical[11]. Superoxide radicals are allowed to react with hydroxylamine hydrochloride to produce nitrite. The nitrite in turn reacts with sulpahinilic acid to produce a diazonium compound that subsequently reacts with napthylamine to produce a red azo compound. Briefly, 0.1 ml sample (PMS) was added to a cocktail mixture of 7 reagents namely; i) Phosphate buffer (pH 7.4), ii) L- Methionine (20 mM), iii). Hydroxylamine hydrochloride (10 mM), iv). EDTA (50µM), v) Triton X-100 (1%), vi) Riboflavin 100µM and vii). Greiss reagent (consisting of 0.1 per cent Napthethyldiamine and 1 per cent Sulphanilamide) and incubated at 37^0 C for 5 minutes. Riboflavin (80µl) was added to each sample and further incubated in a specially designed fluorescent illuminated light box for 10 minutes. Following the incubation, Greiss reagent was added to each tube to develop color. Absorbance was measured at 543 nM in spectrophotometer. The activity was expressed as U SOD/mg protein.

Assay for Catalase/GPX Activity

Catalase[12] and GPX activity[13] were measured as described. Values were expressed as Pkat/mg protein for catalase and nMol/min/mg protein for glutathione peroxidase activity.

Statistical Analysis

All data were shown as mean ± standard error. Data were analyzed by one-way ANOVA followed by Duncan's multiple range tests. Difference was considered significant when $P < 0.05$.

FINDINGS

Lipid Peroxidation

Fig. 1 shows that the liver MDA levels started increasing during early pregnancy and were significantly higher in late pregnancy as compared to non-pregnant controls ($P<0.001$). In lactation also, liver MDA levels were found significantly higher than controls ($P<0.01$). A distinct and significant rise ($P<0.01$) in MDA concentrations

in kidney was observed all through the various periods of pregnancy and lactation.

SOD Activity

Fig. 2 demonstrates a marginal change in liver SOD activity. However, the activity in kidney was found significantly ($P<0.001$) elevated during late pregnancy. The SOD activity in liver and kidney during lactation was measured and found to be decreased as compared to control levels ($P<0.05$).

Catalase

Fig. 3 reveals a significant increase in catalase activity in liver during early and late pregnancy respectively ($P<0.001$). The activity in kidney was also found more than doubled during the same period ($P<0.001$). The enzyme activity in liver and kidney during lactation also measured higher as compared to control levels.

Glutathione Peroxidase

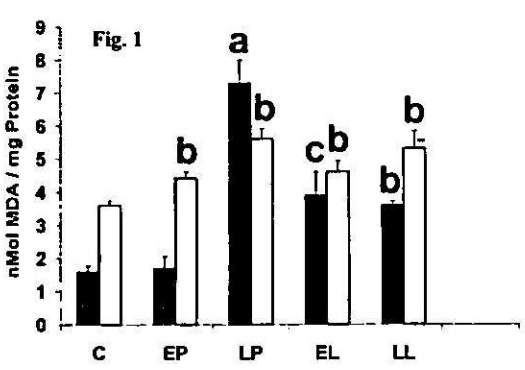
Fig. 4 shows a perceptible decline in the enzyme activity in both the tissues during early and late pregnancy ($P<0.001$). In contrast, liver GPX activity gradually started increasing during lactation. In the kidney tissue too, a significant ($P<0.001$) rise in activity was observed during the periods of late lactation.

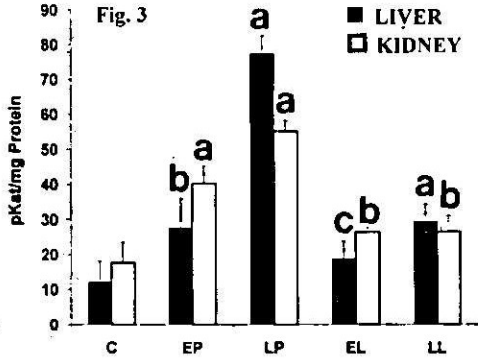
DISCUSSION

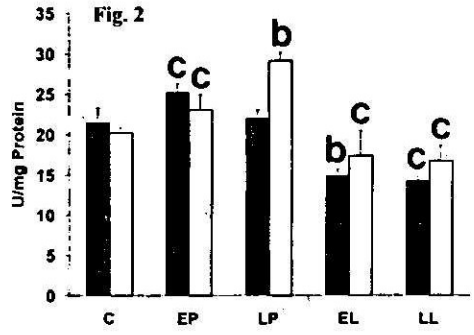
The present study demonstrates that there is a significant rise in MDA levels in liver and kidney during both pregnancy and lactation. A simultaneous increase in catalase activity was also observed. However, the activity of the superoxide dismutase was found either unchanged or decreased.

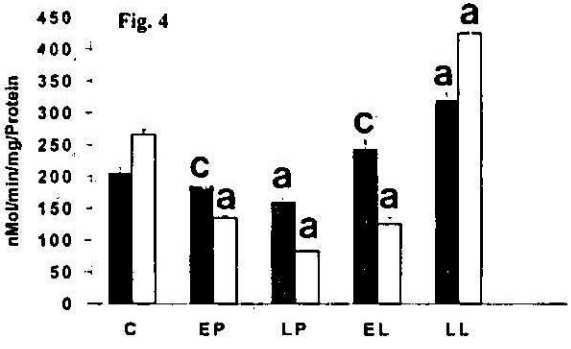
Lipid peroxidation is a chain reaction normally occurring at low levels in all cells and tissues[14]. It is enhanced in many physiologic and pathologic conditions. There are various factors that stimulate lipid peroxidation. Earlier studies have shown that pregnancy is one of the stressful physiological conditions in which higher oxidative stress has been implicated[15]. Our findings in pregnant females supported earlier reports, which demonstrated an increased lipid peroxidation during late pregnancy[3,4]. Liver MDA levels in our studies have risen almost four times during this period as compared to non-pregnant controls (Fig 1).

In humans, energy needed during lactation is approximately 400– 600 Kcal/day which is more than the normal requirement. Expectedly, the oxidative stress would be higher because of increased intake and utilization









Figs. 1-4. Mean (±SEM) concentrations of lipid peroxidation (Fig.1, LPX) products (MDA levels), superoxide dismutase (Fig.2, SOD), catalase (Fig. 3, CAT) and glutathione peroxidase (Fig. 4, GPX) in liver and kidney from non pregnant ©, early pregnant (EP), late pregnant (LP), early lactation (EL) and late lactation (LL) groups of rats (n=10 per group). P<0.001 for (a), 0.01 for (b) and 0.05 for (c) versus control respectively.

of oxygen during lactation. It is stated that, during early lactation, many high milk producing dairy cows cannot consume sufficient amounts of energy in the diet resulting in a negative energy balance during highest periods of milk yield. Body reserves are used to supply as much as 33 per cent of the energy in the milk produced. The energy balance becomes positive at the end of the lactation period only[16] signifying the importance of evaluation of oxidative stress in the same period. In the present finding, MDA levels in liver were elevated by more than two-fold in the early and late lactation period as compared to non-pregnant controls (Fig. 1). The simultaneous diminution in SOD activity ($p<0.05$) in the

same tissue was a clear indication of an imbalance between pro-oxidant and antioxidant forces, resulting in high peroxidative stress. Kidney MDA levels too followed a similar pattern during the same period. However, as compared to late pregnancy, MDA levels in liver and kidney were lower during late lactation (Fig. 1). This distinct drop in MDA levels may be explained by the fact that lactation is most often considered as emotionally satisfactory. The weaning starts during late lactation, which predisposes the return of normal cycle in females. This may be an intermediate stage inducing lower MDA production (compared to late pregnancy) in liver and kidney before the onset of normal reproductive cycle.

Several studies have demonstrated that the enzymatic antioxidant activity in different major organs is altered during pregnancy. Earlier reports show that pregnancy had a significant influence on GPX and CAT activities but minimal influence on SOD activity[5]. Glutathione peroxidase activity was reported to be significantly lower in pre-eclamptic placenta compared to normal placenta. Since aged rodents reportedly lose the ability to detoxify hydrogen peroxide efficiently[17], the efficiency of decomposition of hydrogen peroxide plays a crucial role in determining longevity and life span potential in mammals. Catalase and GPX activity, as indicated, are crucial in this detoxification process[18]. Based on the present findings, a comprehensive analysis of antioxidant enzyme activities along with tissue MDA levels is depicted in Table 1. While GPX and CAT activities in the present study have shown higher levels during pregnancy, a significant increase in SOD activity was also observed in the kidney tissue of late pregnant females. The decline in GPX activity during late pregnancy was seen completely reversed during lactation (Fig. 4). In contrast, catalase activity in liver and kidney was enhanced during pregnancy but started declining in early and late lactation. The significance of this inverse relationship between these two enzymes is not clear. Perhaps, the functional ratio of these two enzymes is essential in managing oxidative stress in different conditions or it may be a part of the overall antioxidant regulatory mechanism.

In conclusion, the high or low profiles of antioxidant enzyme activities may be influenced by various physiological or hormonal factors, dietary constituents and regulated by specific metabolic pathways designed for each organ but modulated differently under different physiologic conditions. Although the natural strategy in each organ is to counteract the high oxidative stress with elevated activity of antioxidant enzymes, such a trend was only partially evident in some specific stages only. The present findings clearly indicate a rising trend of oxidative stress in these high-energy demanding phases of pregnancy and lactation. But the oxidative stress evaluated is more during pregnancy as compared to lactation.

TABLE 1
A COMPREHENSIVE ANALYSIS OF LIPID PEROXIDATION AND ANTIOXIDANT ENZYME ACTIVITY IN RAT LIVER AND KIDNEY DURING PREGNANCY AND LACTATION

S.No.	Groups	LPX (MDA levels)	SOD	CAT	GPX
1	Early pregnancy	↑L	↑L & K	↑L & K	↓L, K
2	Late pregnancy	↑L, K	↑ K	↑L & K	↓L, K
3	Early lactation	↑L & K	↓L, K	↑L & K	↑L ↓K
4	Late lactation	↑L & K	↓L, K	↑L & K	↑L & K

L and K denote liver and kidney respectively (P< 0.05-0.001 versus control)

Legends

Mean (± SEM) concentrations of lipid peroxidation (LPX) products (MDA levels), superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPX) in liver, kidney from non-pregnant (C), early pregnant (EP), late pregnant (LP), early lactation (EL) and late lactation (LL) groups of rats (n =10 per group). P<0.001 for (a), 0.01 for (b) and 0.05 for (c) versus control respectively.

Acknowledgement

The authors would like to thank the Indian Council of Medical Research, New Delhi, India, for financial support (Research associate-ship to KU) for carrying out this study.

सारांश

अल्प आयु तथा उच्चतर आयु में गर्भधारण अथवा स्तनपान काल की अवधि में यकृत तथा वृक्क में मैलएनोएल्डिहोडड (एमडीए) स्तरों तथा इन्झाइम आक्सीडेंट रोधी गतिविधियों के मापन के माध्यम से परआक्सीडेटिव दबाव का आंकलन किया गया था। यह पाया गया था कि उच्चतर आयु में गर्भावस्था तथा स्तनपान काल में गैर-गर्भधारण नियंत्रण स्तरों की तुलना में इन उत्तकों में एमडीए स्तर महत्वपूर्ण रूप से उच्चतर (पी< 0.001) पाए गए थे। उच्चतर आयु में गर्भावस्था के दौरान यकृत की तुलना में वृक्क द्वारा उच्च सुपर-आक्साइड डिस्मुटेज गतिविधि प्रदर्शित की गई थी, किन्तु स्तनपान की अवधि में अद्योमुखी

प्रवृति प्रदर्शित की गई थी। गर्भावस्था की अवधि में दोनों उत्तकों में केटालेज़ गतिविधि में धीरे-धीरे वृद्धि हुई थी, किन्तु स्तनापन की अवधि में इसमें गिरावट प्रदर्शित की गई थी। तथापि, जैसा कि गर्भावस्था की अवधि में ग्लुटेथियोन परआक्सीडेज (जीपीएक्स) गतिविधि में वृद्धि देखी गई थी एवं यह उच्चतर आयु में स्तनपान स्थिति में महत्वपूर्ण रूप से उच्च (पी< 0.001) पाई गई थी)। उपर्युक्त निष्कर्षों से यह देखा गया है कि यकृत तथा वृक्क में समग्र परआक्सीडेटिव दबाव न केवल गर्भावस्था की अवधि में, अपितु स्तनपान के दौरान भी उच्च था। इसके अतिरिक्त, आक्सीडेन्ट रोधी इन्झाइम द्वारा गर्भावस्था तथा स्तनपान की विभिन्न अवधि में दोनों उत्तकों की गतिविधियों में विभेदक प्रवृति प्रदर्शित की गई है।

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Health and Population-
Perspectives and Issues 25 (4): 186-193, 2002

A STUDY OF ACUTE RESPIRATORY TRACT INFECTION CASES ADMITTED TO A TERTIARY LEVEL HEALTH CENTRE

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ABSTRACT

This paper presents the load of ARI cases admitted to a tertiary level hospital along with the existing referral system, the preferred antibiotics by the doctors and cost factors in relation to treatment of ARI.

The study reveals that the hospital admission for ARI cases was only 8.24 per cent. Out of the total 52 cases, only 16 cases (30.77%) were properly referred from their respective first level of contact with the health system before reaching the tertiary hospital. But the other 36 cases (69.23%) had got themselves self-referred to the higher-level health centres. The most preferred antibiotic for the treatment of ARI cases was Penicillin group of antibiotics followed by Macrolides and Cephalosporins. The average total cost borne during hospitalisation at the tertiary level (personal + transport + medicine) was Rs.851.11 ± 327.74, of which exclusively Rs.388.54 ± 167.18 was spent on medicines.

Key-words: Self-referred cases, Health system, Admission policies.

Acute Respiratory Infection (ARI) means an infection of any part of the respiratory tract, of less than 30 days duration, except otitis media, which is of less than 14 days[1]. It is one of the most common causes of morbidity and mortality in developing countries among the children under five years of age. It has been responsible for about 4.1 million deaths (33%) in 1990 among children under five years of age. 95 per cent of these deaths were among the children from developing countries[2]. Hospital based statistics shows that about 13 per cent of in-patient deaths in paediatric wards are due to ARI. The proportion of deaths due to ARI in the community is much higher as many children die at

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home, which are usually unreported[3]. The incidence of pneumonia in developed countries is 3 to 4per cent, whereas the same in developing countries ranges between 20 and 30 per cent[4]. This difference in the incidence of pneumonia is due to the high prevalence of malnutrition, low birth weight and indoor air pollution in developing countries[4,5]. Most cases of death due to pneumonia can be averted through (i) early diagnosis by using simple protocol like looking for fast breathing and chest indrawing in children with cough or difficult breathing and (ii) early treatment using simple antibiotics and better access to health services. But it is unfortunate that India along with other developing countries like Bangladesh, Indonesia and Nepal together accounts for around 40 per cent of the global ARI mortality[6]. Considering the importance of ARI cases, the present study was undertaken to perceive the situation of ARI cases admitted to a tertiary level hospital, Paediatric department of MKCG Medical College and Hospital, Berhampur.

OBJECTIVES

(i) To assess the load of ARI cases admitted to the tertiary level health centre;
(ii) To study the existing referral system for the ARI cases;
(iii) To understand the type of antibiotics used by the doctors for the ARI cases in their very first contact with the health system; and
(iv) To analyse the various cost factors related to the ARI cases admitted to the tertiary level health centre.

MATERIALS AND METHOD

The study was conducted in the Paediatric department of MKCG Medical College and Hospital, Berhampur, Orissa, during 7 July 2001 – 30 November 2001. The population in the age group of 0-5 years, admitted to the hospital for acute respiratory tract infection (ARI) during that period, was taken as the sample. Of the total of 135 ARI cases admitted to the health centre during the study period, 115 cases were between 0 and 5 years of age, of which 52 cases were from rural/tribal areas who were randomly selected for the study.

Data were collected with the help of a well-designed, pre-tested and scientifically scrutinised schedule from the parents of the admitted children. The purpose of the study was explained to the parents and their verbal consent was obtained before starting the actual data collection. Records of past treatment at the periphery and hospital were also used to retrieve information. The SES of the children's families were categorised, taking into consideration the per capita income of the family as per the Prasad's classification, after making necessary correction. Based on the per capita income of the families, they were categorised into lower (less than Rs. 664.00), middle (Rs. 665.00-2281.00) and upper (Rs. 2282.00 and above) strata.

In this study, the referral means just one-way referral, i.e. referral from lower-level to higher-level institutions. The self-referred cases were considered to be those who had moved to the higher levels of health care on their own without collecting the referral

slips from the institution where they were previously treated. The statistical methods used in the study are percentage, mean and standard deviation.

FINDINGS

The hospital admission of ARI cases to the paediatrics department was 8.24 per cent during 7 July- 30 Nov 2001. Chance occurrence of this figure of 8.24 per cent was ruled out by comparing the present caseload of ARI with the caseload of previous two years, during the same time period, which were 8.97 per cent and 8.61 per cent respectively. Among the total 135 cases that got admitted during the study period, 115 cases (85.18%) were below 5 years of age and the rest 20 cases (14.82%) were above 5 years of age (Table-1).

TABLE 1
YEAR-WISE DISTRIBUTION OF ARI CASES ADMITTED TO THE PAEDIATRIC WARD

Year	Period	Indoor Admissions	ARI Admissions	Total <5 Yrs ARI	Total >5 Yrs ARI
2001	7July- 30 Nov.	1639	135 (8.24%)	115 (85.18%)	20 (14.82%)
2000	7July- 30 Nov.	1582	142 (8.97%)	119	23
1999	7July- 30 Nov.	1602	138 (8.61%)	113	25

Of the 52 cases studied, 12 cases (23.08%) were in the age group of 0-2 months, 16 cases (30.77%) were in the age group of 2 months – 1 year and 24 cases (46.15%) were in the age group of 1 – 5 years. 28 cases (53.85%) had suffered during their infancy. The number of ARI cases in boys was more than girls with 30 (57.69%) and 22 (42.31%) respectively. 80.7 per cent (42) of fathers and 48.08 per cent (25) of mothers of admitted children with ARI (52) were found to be literates. Maximum number of cases was found among the 1st order children (0-2 months) with 22 cases (42.31%), followed by 14 cases (26.92%) in the 2nd order (2 months-1 year) and 16 cases (30.76%) in the 3rd order (1-5 years) children. As per the Prasad's classification of socio-economic status, two cases (3.85%) were found in the higher strata, 24 cases (46.15%) in the middle strata and 26 cases (50%) in the lower strata (Table 2).

TABLE 2
AGE AND SEX-WISE DISTRIBUTION OF ARI CASES

Age Group	Sex		Total affected children
	Male	Female	
0-2 Months	4	8	12 (23.08%)
2 Months – 1 Year	6	10	16 (30.77%)
1-5 Years	20	4	24 (46.15%)
Total	30 (57.69%)	22 (42.31%)	52

Distribution of cases as per their first contact with the health system, the findings revealed that only 4 cases (7.69%) had initially attended the sub-centre. Out of these 4 cases, 1 case (25%) was referred to the PHC and the other 3 cases (75%) had got themselves self-referred directly to the higher-levels of health care. Among the 12 cases (23.08%) that had attended the private medical practitioners in their first visit, only 5 cases (41.67%) were referred and the rest 7 cases (58.33%) had got themselves self-referred to the higher levels. Similarly, among the 22 cases (42.31%) that were treated at the PHC initially, only 7 cases (31.81%) were referred and the rest 15 cases (68.19%) had directly moved to the higher-level hospitals without being referred. There were 4 cases (7.69%) that had directly attended the secondary level health care on their own. Among these 4 cases at the secondary level health centre, 3 cases (75%) were referred and 1 case (25%) had directly attended the tertiary level health centre without being referred. 10 cases (19.23%) had visited the tertiary level hospital directly. Out of the total 52 cases, only 16 cases (30.77%) were properly referred from their respective first level of contact with the health system before reaching the tertiary hospital. But the other 36 cases (69.23%) had got themselves self-referred to the higher-level health centres (Table 3).

TABLE 3
DISTRIBUTION OF CASES AS PER THEIR FIRST CONTACT WITH THE HEALTH SYSTEM AND THE DISTRIBUTION OF THE REFERRED AND SELF-REFERRED CASES

Place	**Sub-Centre**	**Private Practitioner**	**PHC**	**CHC or DH**	**Tertiary Hospital**
No.	4	12(23.08%)	22 (42.31%)	4 (7.69 %)	10 (19.23%)
No. of cases referred	1	5	7	3	*Total referred cases that reached tertiary hospital = 16
No. of self-referrals	3	7	15	1	*Total self-referred cases that reached tertiary hospital = 36

Analysis of the causes for the non-attendance of sick children at the level of sub-centre (Table 4) reveals that the lack of confidence in health worker (F) or in the drugs supplied by her was the primary reason in 26 cases (54.17%) which prevented the parents to get their children treated at the sub-centre level. The other reasons for which the parents didn't treat their children at the sub-centre were their preference for doctors (37.5%) and absence of HW (F) (8.33%) (Table 4).

TABLE 4
CAUSES OF NON-ATTENDANCE OF SICK-CHILD AT THE LEVEL OF SUB-CENTRE

Causes of non-attendance	No.	Percent
Lack of confidence in the HW(F)/ drugs supplied	26	54.17
Preference for the doctors	18	37.5
Absence of HW (F)	4	8.33
Total	48 (92.31%)	100

The reason behind not admitting the sick children to the Primary Health Centre level was non-availability of child specialist (paediatrician) in 19 cases (67.86%). The next important reason was the parents' anticipation that their children would get better treatment at the tertiary hospital, 7 cases (25%). In case of parents of other two cases (7.14%), they preferred to go to the higher-level hospital just to avoid the long-waiting time at the Primary Health Centre (Table 5).

TABLE 5
CAUSES FOR NOT PREFERRING PHC FOR ARI

Causes	No.	Percent
Non–availability of child specialist	19	67.86
Avoiding the long-waiting time at PHC	2	7.14
Anticipating better Rx at tertiary hospital	7	25.0
Total	28 (53.85%)	100

The types of antibiotics used by the doctors for the ARI cases in their very first contact with the health system were analysed from the prescriptions. It was found that the most preferred antibiotic for the treatment of ARI cases was Penicillin group of antibiotics in 17 cases (35.42%). Macrolides and Cephalosporins were the other closely preferred drugs in 14 cases (29.17%) and 11 cases (22.92%) respectively. The most notable finding was that Cotrimoxazole was prescribed for only 4 cases (8.33%) (Table 6).

TABLE 6
COMMON ANTIBIOTICS ADMINISTERED BY THE DOCTORS TO THE ARI CASES IN THEIR VERY FIRST CONTACT WITH THE HEALTH SYSTEM

Antibiotics	No.	Percent
Penicillins	17	35.42
Macrolides	14	29.17
Cephalosporins	11	22.92
Cotrimoxazole	4	8.33
Quiuolones	2	4.16
Total: 48 cases		

The average duration of hospitalisation at the tertiary level was 6.5 ± 2.5 days. The average total cost borne during hospitalisation at the tertiary level (personal + transport + medicine) was Rs.851.11 ± 327.74, of which, exclusively Rs.388.54 ± 167.18 was spent on medicines. 3 cases (5.77%) succumbed to the illness during the hospitalisation at the tertiary level (Table 7).

TABLE 7
OBSERVATIONS REGARDING THE ARI CASES ADMITTED TO THE TERTIARY LEVEL HOSPITAL

Sl.No.	Observations	
1.	Average duration of hospitalisation	6.5 ± 2.5 days
2	Average cost of medicines during hospitalisation	Rs.388.54±167.18
3.	Average cost spent on transportation for hospitalisation and the sum spent during hospitalisation	Rs. 45.27± 27.21
4.	Average personal cost (food, lodging etc. of the parents and for the other attendants, if any)	Rs. 403.85±207.31
5.	Average cost borne during hospitalisation (personal+ transport + medicine)	Rs.851.115±327.74
6.	Percentage of cases that succumbed to the illness	5.77% (3 cases)

DISCUSSION

In the present study, the hospital admission rate was 8.24 per cent. This rate is much lower as compared to the finding of 30 per cent[7]. This difference could be due to the difference in the admission policies in different hospitals.

Only 16 cases (30.77%) were referred from their first place of contact with the health system before they reached the tertiary level health centres and the rest 36 cases (69.23%) had got themselves self-referred. Thus, the tertiary level health centres, which are meant for treating mainly the referred cases, are in turn, overburdened with inappropriately referred or self-referred cases. This finding suggests that the health system at the lower level is not in a position to handle the patients.

Out of the 52 cases, 48 cases (92.31%) had bypassed the level of the sub-centre. The main reasons for bypassing the sub-centre were their lack of confidence in HW (F) (54.1%) and the preference for doctors (37.5%). This indicates that Health Worker (F) in the sub-centre may have to put extra efforts to maintain her credibility. Similarly, 28 cases (53.85%) had bypassed the primary health centres. The main causes for bypassing

the primary health centres were the non-availability of paediatric specialists (67.86%) and the parents' anticipation of getting better treatment for their children at the district or tertiary hospitals (25%). But these findings should not be assumed as that the health personnel at these levels lack competency or don't render quality services. This is because it is a known fact that quality is an externally focussed goal not an internal standard. Thus, one may indeed meet several internal standards and yet fail to achieve the goal[8]. More systematic effort to increase the social acceptability of the services by giving more attention on the aspects of responsiveness, courtesy, credibility, security and access to services, particularly at the level of health workers will increase the utilisation at the sub centre level to a great extent.

In the present study, the most encouraging finding is that the primary health centres were the first source of intervention in majority of the Acute Respiratory Infection (ARI) (42.31%) cases. The secondary and the tertiary levels were the first source in 7.69 per cent and 19.23 per cent of the cases respectively. These results are in sharp contrast to the findings of the study in Thailand[9], where the district hospitals were the first source of treatment in 45.2 per cent of the cases and the health centres were the first source for only 10.4 per cent of cases. This difference may be due to the easy access to the district hospitals by the health cardholders which is issued to the members belonging to the economically weaker sections of the society.

The most common antibiotic administered by the doctors to the patient in their very first contact with the health system was Ampicillin or Amoxiocillin in 34.21 per cent of the cases. But a large proportion of cases were also administered with Cephalosporins (28.95%) and Macrolids (26.31%). Only in 5.26 per cent of the ARI cases, the doctors prescribed the antibiotic Co-trimoxazole. Although Co-trimoxazole was not preferred by most of the doctors for the treatment of ARI cases, but this finding has relevance due to its cost factor and rationality.

The average cost of hospitalisation for an ARI case at the tertiary hospitals was calculated to be Rs. 851.11 $\pm$ 327.74. The average expenditure on medicines was Rs. 388.54 $\pm$ 167.18. Other expenditures such as the average cost on transportation and the average personal cost were Rs. 45.27 $\pm$ 27.21 and Rs. 403.85 $\pm$ 207.31 respectively. This cost factor indicates that the expenditure on the treatment of ARI cases can be reduced by more than half that is spent at the tertiary hospitals, if the same treatment could be done near the native places of the cases.

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Health and Population-
Perspectives and Issues 25 (4) 194-210, 2002

A STUDY OF SELECTED DEMOGRAPHIC, HEALTH AND ALLIED INDICATORS IN INDIA: EXTENT OF DATA VARIATIONS BETWEEN SOURCES

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ABSTRACT

Country as well State specific data on selected, demographic and allied indicators obtained from sources like National Family Health Survey-2 (NFHS-2), Sample Registration System (SRS), Rapid Household Survey (RHS), Ministry of Health and family Welfare(MOHFW) etc. were analysed to study the extent of variations in each case. The States are categorised as low, medium and high as per the extent of variations and with respect to different indicators. The State data for various indicators collected from different sources were varied to a great extent and no particular trend in the variations was observed. It is summarized that the variations of data as perceived in the present study might be due to either errors while sampling or lack of adequate supervision and training while collecting data during fieldwork.

Key-word: Indicators, Variations, Data sources.

Demographic, socio-economic and health related surveys/research studies in India are being conducted by various organizations, including Ministry of Health and Family Welfare, Government of India[1]; State Governments, non-government and corporate sectors. The major sources of information for demographic and health related indicators are Census, Civil Registration System (CRS), Sample Registration System (SRS)[2,3], National Family Health Surveys (NFHS)[4], Rapid Household Surveys (RHS)[5] and surveys conducted by the research Institutions like International Institute for Population Sciences (IIPS), Mumbai; Population Research Centers (PRCs); National Institute of Health and Family Welfare (NIHFW), New Delhi; National Council of Applied Economic Research (NCAER), New Delhi; Central Statistical Organization (CSO); Registrar General of India (RGI)[6]; Institute of Economic Growth (IEG); Population Foundation of India (PFI), New Delhi, etc.. Thus, there are multiple sources

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through which basic demographic health and family welfare data are collected for the whole country.

Multiplicity and incongruity of data from various sources add to non-uniformity complicating further the task of programme managers and health planners in different situations. Every source has its own set of data, the reliability of which has to be examined in a proper perspective. To the best of our knowledge, data for selected health, demographic and allied indicators for India and different states have never been analysed to compare and assess the extent of variations existing between sources. The present study was thus undertaken to fulfill the following objectives.

OBJECTIVES

(i) To identify the various demographic and health indicators provided by various sources such as SRS, NFHS, CRS, RHS, RGI, etc.;

(ii) To collate and analyse the extent of variations in various indicators at National and State levels; and

(iii) To compare, contrast and categorize states on the basis of the extent of variations for each indicator.

MATERIALS AND METHOD

Secondary data from major sources like Sample Registration System (SRS), National Family Health Survey (NFHS), Rapid Household Survey (RHS), Census, and Family Welfare Year Book, Ministry of Health and Family Welfare (MOHFW) for the reference period 1998-1999 or the period close to these years have been collected and used for analysis. The purpose of the reference period is as per data availability or non-availability collected from different sources for comparison.

The indicators for the study are broadly divided into four major categories namely: (i) fertility indicators; (ii) nuptiality indicators; (iii) mortality indicators and (iv) programme indicators which are further categorized into two parts; i.e. maternal and child health and family welfare. Fertility indicators include birth rate, total fertility rate and birth order (3+). The female mean age at marriage is taken as a nuptiality indicator. Death rate and infant mortality rate (IMR) are included as mortality indicators. Antenatal checkup (3+), institutional deliveries and children fully vaccinated are taken as maternal and child health (MCH) indicators. Couple protection rate/contraceptive prevalence rate and unmet need for contraception are included under family welfare indicator. All the states are considered depending on the availability of data as indicated and later further categorized into low, moderate and high on the basis of the extent of variation for each indicator.

SOURCES OF DATA COLLECTION

Sample Registration System (SRS)[2,3]

The SRS is a large-scale demographic survey which provides a reliable annual estimate for birth-rate, death-rate and other fertility and mortality rates at the national and State levels. The number of sampling units is periodically increased. The latest updating was based on the 1991 census data completed in 1993-94. The sample unit in rural areas consisted of a village or a segment of it once the population crosses 1500 or more. In urban areas, the sampling unit consisted of a block with population ranging from 750 to 1000. At present, SRS has 6,671 sample units (4,436 rural and 2,235 urban) in all the States and Union territories, covering 1.1 million households and 6.05 million population.

National Family Health Survey (NFHS-2)[4], 1998-99

The International Institute for Population Sciences, Mumbai, has carried out the National Family Health Survey-2 in two phases. Ten States were surveyed in the first phase in November 1998 and the remaining 15 States (except Tripura) were surveyed in the second phase in March 1999. Data were analysed from 91,196 households in 25 States, including the interview of 89,199 eligible women (ever married between 15 and 49 years) from the sampled households. Information was also collected on 32,393 children born in the past three years preceding the survey.

Rapid Household Survey (RHS)[5] 1998-1999

For the assessment of Reproductive and Child Health indicators at the district level, Government of India (GOI) undertakes a district level household survey with the support of non-governmental agencies. About 50 per cent of the districts were covered in 1998 and the remaining 50 percent in 1999. Excluding Kargil, the first phase of the survey covered 252 districts from 25 States and five Union Territories. Over all, 2,62,329 households with 2,32,241 eligible women (currently married in the age group of 15-44 years) and 1,02,638 men in the age group of 20-54 years were covered.

RESULTS AND DISCUSSION

Extent of Variation

The present study has established that considerable variations do exist with respect to data on health, demographic and allied indicators collected from various sources. When data from SRS, NFHS and RHS are compared, a major variation was observed with reference to indicators like IMR, MMR, ANC (3+), institutional deliveries, children fully vaccinated and unmet need for contraception. For some indicators, the difference between sources was not

much. For example, in case of institutional deliveries, NFHS (33.6%), and RHS (34.0%) figures for the study period are comparable if one tends to overlook the figure of SRS (25.4%) which was comparatively lower than other two sources.

Fertility Indicators

Crude Birth Rate (CBR)

CBR is available from two main sources i.e. SRS and NFHS-2. Therefore, data provided by these two sources are compared to assess the extent of variations in between the States. The variations are grouped into 3 categories i.e. less than 0.6 (low), 0.6-3.0 (moderate) and 3.0 points and above for (high) variations. It was seen that maximum number of States (11) fall under the category of 'high' variation. The data from only three States viz. Kerala, West Bengal and Maharastra had negligible variation. The remaining nine States showed moderate variations in CBR. If the medium and high variation States are taken together, 20 States had wide range of fluctuations against this indicator which need to addressed in the right perspective (Table 1).

Total Fertility Rate (TFR)

TFR was analysed against the data from SRS and NFHS-2 for the year 1998-99. Assuming 0.3 points of difference as low, 0.3-0.4 as moderate and above 0.4 as high variation. It was seen that five States namely Andhra Pradesh, West Bengal, Kerala, Maharashtra and Tamil Nadu have very low variations. Four States such as Gujarat, Himachal Pradesh, Karnataka and Rajasthan have moderate variations and the remaining seven States namely Haryana, Orissa, Punjab, Uttar Pradesh, Madhya Pradesh, Bihar and Assam have high variations. A very high variation of 0.9 points was observed for Assam. For other smaller States, data for TFR was not available. A moderate variation (0.3 points) was recorded for India as a whole.

TABLE 1
SOURCES OF DATA AND STATE-WISE VARIATIONS IN CRUDE BIRTH RATE (CBR)

Category of States as per variations in CBR	SRS (1998)	NFHS-2 (1998-99)	Points of Difference (Max.-Min.)
Low variation			
Kerala	18.3	18.8	0.5
Maharashtra	22.5	23.0	0.5
West Bengal	21.3	20.8	0.5
Moderate variation			
Andhra Pradesh	22.4	22.4	0.0
Arunachal Pradesh	22.5	23.6	1.1
Gujarat	25.5	24.3	1.2
Uttar Pradesh	32.4	31.1	1.3
India	**26.5**	**24.8**	**1.7**
Rajasthan	31.6	29.9	1.7
Tamil Nadu	19.2	21.4	2.2
Goa	14.3	16.6	2.3
Karnataka	22.0	20.4	2.4
Himachal Pradesh	22.6	19.9	2.7
High variation			
Bihar	31.1	28.1	3.0
Punjab	22.4	19.1	3.3
Orissa	25.7	22.1	3.6
Sikkim	20.9	24.5	3.6
Madhya Pradesh	30.7	26.7	4.0
Haryana	27.6	23.1	4.5
Assam	27.9	21.8	6.1
Jammu & Kashmir	29.9	23.1	6.8
Meghalaya	29.2	35.7	6.5
Manipur	19.0	25.8	6.8
Mizoram	15.8	25.7	9.9

Low variation: <0.6 points of difference, Moderate variation: 0.6 to 3.0 points of difference, High variation: 3.0 or more points of difference.
Note: Data for CBR was not available in RHS.

TABLE 2
SOURCES OF DATA AND STATE-WISE VARIATIONS IN TOTAL FERTILITY RATE

Category of States as per variations in TFR	SRS (1998)	NFHS-2 (1998-99)	Points of Difference (Max.-Min.)
Low variation			
Andhra Pradesh	2.4	2.3	0.1
West Bengal	2.4	2.3	0.1
Kerala	1.8	2.0	0.2
Maharashtra	2.7	2.5	0.2
Tamil Nadu	2.0	2.2	0.2
Moderate variation			
India	**3.2**	**2.9**	**0.3**
Gujarat	3.0	2.7	0.3
Himachal Pradesh	2.4	2.1	0.3
Karnataka	2.4	2.1	0.3
Rajasthan	4.1	3.8	0.3
High variation			
Haryana	3.3	2.9	0.4
Orissa	2.9	2.5	0.4
Punjab	2.6	2.2	0.4
Madhya Pradesh	3.9	3.3	0.6
Uttar Pradesh	4.6	4.0	0.6
Bihar	4.3	3.5	0.8
Assam	3.2	2.3	0.9

Low variation: <0.3 points of difference, Moderate variation: 0.3-04 points of difference, High Variation: 0.4 or more points of difference.
Note: Data for TFR was not available in RHS.

Birth Order (3+)

One of the main reasons for the high fertility rate in India is that a large number of couples have three or more children. For India, such women account 41.6 per cent in SRS, 42.5 per cent in NFHS-2 and 45.8 per cent in RHS. Regrouping the states as per the extent of variations (low, < 2 points, moderate, 2-5 points and high 5 and above points of difference), it was found that NFHS and RHS data for states falling under low and moderate category are very much comparable. The States of Jammu & Kashmir, and Kerala show the minimum and maximum variation with 0.3 and 13.0 points of difference respectively (Table 3).

TABLE 3
SOURCES OF DATA AND STATE-WISE VARIATIONS IN BIRTH ORDER (3+)

Category of States as per Variations in Birth Order 3+	SRS 1998	NFHS-2 (1998-99)	RHS (1998-99)	Points of Difference (Max.-Min.)
Low variation				
Jammu & Kashmir	NA	50.3	50.6	0.3
Manipur	NA	47.1	46.2	0.9
Tamil Nadu	22.6	23.1	23.6	1.0
Sikkim	NA	42.0	43.3	1.3
Nagaland	NA	59.6	61.1	1.5
Moderate variation				
Meghlaya	NA	60.0	57.1	2.9
Assam	42.6	43.8	45.6	3.0
Goa	NA	24.8	21.4	3.4
India	**41.6**	**42.5**	**45.8**	**4.2**
Haryana	37.5	41.7	40.9	4.2
Orissa	41.0	42.9	45.3	4.3
High variation				
Bihar	51.4	54.7	56.9	5.5
Himachal Pradesh	27.8	33.3	31.4	5.5
Maharashtra	33.6	39.1	34.5	5.5
Uttar Pradesh	54.1	58.0	59.9	5.8
Mizoram	NA	45.9	40.0	5.9
Gujarat	34.9	40.9	37.0	6.0
Rajasthan	46.1	52.8	51.8	6.7
Karnataka	28.5	33.7	35.3	6.8
Punjab	32.6	39.7	35.8	7.1
Madhya Pradesh	45.5	52.7	47.5	7.2
Andhra Pradesh	23.7	31.5	28.7	7.8
West Bengal	31.1	36.5	38.9	7.8
Arunachal Pradesh	NA	46.2	56.7	10.5
Kerala	17.5	30.0	17.0	13.0

Low variation: <2 points of difference, Moderate variation: 2 to 5 points of difference, High variation: 5+ points of difference.
NA: Not available.

Nuptiality Indicator

Female Age at Marriage

Female age at marriage plays a very important role indicating fertility changes. If age at marriage is increased, the fertility is likely to decrease automatically. SRS data for the indicator were not available for smaller States.

When NFHS and RHS data for the indicator were compared it was seen that the overall variation was not that high as in case of other indicators. At the national level as a whole, the variation is only of 0.5 points. While 8 States are categorized as low variation (0.1- 0.2 yrs) states, nine as moderate (1-3 yrs) and the rest seven as high variation (3 yrs and above) states. Goa showed the minimum variation of 0.1 while Nagaland showed the maximum variation of 3.7 years (Table 4).

TABLE 4
SOURCES OF DATA AND STATE-WISE VARIATIONS IN THE FEMALE MEAN AGE AT MARRIAGE

Categorisation of states as per variations in Female age at Marriage	SRS (1998)	NFHS-2 (1998-99)	RHS (1998-99)	Years of Difference (Max.-Min.)
Low variation				
Goa	NA	24.8	24.7	0.1
Tamil Nadu	20.9	20.9	21.0	0.1
Gujarat	20.2	20.2	20.6	0.4
India	**19.5**	**19.7**	**19.2**	**0.5**
Karnataka	19.5	20.1	19.5	0.6
Maharashtra	19.2	19.8	19.3	0.6
Madhya Pradesh	18.8	18.9	18.1	0.8
Manipur	NA	25.4	24.6	0.8
Sikkim	NA	21.9	22.1	0.2
Moderate variation				
Punjab	21.0	22.1	21.5	0.6
Himachal Pradesh	20.8	22.1	21.3	1.3
West Bengal	19.6	19.6	18.3	1.3
Assam	20.3	21.7	20.3	1.4
Bihar	18.8	18.8	17.4	1.4
Haryana	19.1	19.8	20.5	1.4
Orissa	19.8	21.2	19.9	1.4
Rajasthan	19.0	18.3	17.5	1.5
Arunachal Pradesh	NA	21.6	19.8	1.8
High variation				
Andhra Pradesh	16.7	18.3	18.8	2.1
Jammu & Kashmir	NA	22.5	20.4	2.1
Kerala	23.6	21.5	22.7	2.1
Uttar Pradesh	19.8	19.0	17.7	2.1
Meghalaya	NA	23.0	19.9	3.1
Mizoram	NA	24.1	20.4	3.7
Nagaland	NA	23.0	19.3	3.7

Low variation: <1 year of difference, Moderate variation: 1 to 3 years of difference, High variation: 3 or more years of difference.
NA-Not available.

Mortality Indicators

Crude Death Rate (CDR)

The data for this indicator were compared from the two main sources of NFHS and SRS. While the state of Karnataka showed no variation, the difference in the data figures for Arunachal Pradesh was maximum to the extent of 6.3 points (high variation) The other low, moderate and high variation categories among states are shown in (Table 5).

TABLE 5
SOURCES OF DATA AND STATE-WISE VARIATIONS IN CRUDE DEATH RATE (CDR)

Categorisation of States as per Variations in CDR	SRS (1998)	NFHS-2 (1998-99)	Points of Difference (Max.-Min.)
Low variation			
Karnataka	7.9	7.9	0.0
Gujarat	7.9	8.0	0.1
Haryana	8.2	8.1	0.1
Sikkim	6.1	6.3	0.2
Uttar Pradesh	10.5	10.2	0.3
Kerala	6.4	6.0	0.4
Moderate variation			
Assam	10.0	9.4	0.6
Himachal Pradesh	7.7	8.3	0.6
India	**9.0**	**9.7**	**0.7**
Punjab	7.7	8.4	0.7
West Bengal	7.5	8.3	0.8
Maharashtra	9.0	9.9	0.9
High variation			
Madhya Pradesh	11.2	10.2	1.0
Maharashtra	7.7	9.0	1.3
Rajasthan	8.8	10.2	1.4
Mizoram	5.6	7.3	1.7
Bihar	9.4	11.2	1.8
Orissa	11.1	12.9	1.8
Andhra Pradesh	8.8	10.7	1.9
Goa	8.2	10.1	1.9
Tamil Nadu	8.5	10.8	2.3
Jammu & Kashmir	5.4	8.3	2.9
Manipur	5.3	9.0	3.7
Arunachal Pradesh	6.1	12.4	6.3

Low variation: <0.5 points of difference, Moderate variation: 0.5 to 1.0 points of difference, High variation: 1.0 or more points of difference.

Infant Mortality Rate (IMR)

A high IMR is indicative of a relatively high TFR. Comparison of data for the indicator from SRS and NFHS-2 revealed alarming variations to the extent of 37.0 points (high variation) for the state of Meghalaya. Kerala showed the least variation of 0.3 points. For India as a whole, the difference in values from two sources was 4.4 (low variation). States in other categories are shown in (Table 6).

TABLE 6
SOURCES OF DATA AND STATE-WISE VARIATIONS IN IMR

Categorisation of States with Level of Variation in IMR	SRS (1998)	NFHS-2 (1998-99)	Points of Difference (Max.-Min.)
Low Variation			
Kerala	16.0	16.3	0.3
Uttar Pradesh	85.0	86.7	1.7
Andhra Pradesh	66.0	65.8	1.8
Rajasthan	83.0	80.4	2.6
Gujarat	64.0	62.9	1.1
Punjab	54.0	57.1	3.1
India	**72.0**	**67.6**	**4.4**
Moderate variation			
Maharashtra	49.0	43.7	5.3
Bihar	67.0	72.9	5.9
West Bengal	53.0	48.7	4.3
Assam	76.0	69.5	6.5
Tamil Nadu	53.0	48.2	4.8
Karnataka	58.0	51.5	6.5
Sikkim	52.0	43.9	8.1
High variation			
Madhya Pradesh	98.0	86.1	11.9
Manipur	25.0	37.0	12.0
Haryana	70.0	56.8	13.2
Goa	23.0	36.7	13.7
Mizoram	23.0	37.0	14.0
Orissa	98.0	81.0	17.0
Arunachal Pradesh	44.0	63.1	19.1
Jammu & Kashmir	45.0	65.0	20.0
Himachal Pradesh	64.0	34.4	29.6
Meghalaya	52.0	89.0	37.0

Low variation: <5 points of difference, Moderate variation: 5 to 10 points of difference, High variation: 10 or more points of difference.
Note: IMR data are not available in RHS.

Maternal and Child Health (MCH) Indicators

Antenatal Check-ups (3+)

One of the contributing factors to high infant and maternal mortality rate (IMR) and (MMR) in the country is the poor coverage of antenatal care. According to

NFHS-2, only 43.8 per cent of the total pregnant mothers in India had the benefits all the 3 ANC check-ups required for the purpose. This figure is slightly better in RHS (44.2%). At the national level, a difference of 0.4 points was noticed between NFHS and RHS. While no difference in values was recorded for Kerala, large variations to the extent of 14.9 and 25.6 were observed for Arunachal Pradesh and Jammu and Kashmir respectively (Table 7).

TABLE 7
SOURCES OF DATA AND STATE-WISE VARIATIONS IN ANTE-NATAL CHECK-UPS, ANC (3+)

Categorisation of States as per Variations in ANC 3+	NFHS-2 (1998-99)	RHS (1998-99)	Points of Difference (Max. - Min.)
Low variation			
Kerala	98.3	98.3	0.0
Madhya Pradesh	28.1	28.0	0.1
India	**43.8**	**44.2**	**0.4**
Maharashtra	65.4	65.8	0.4
Goa	95.7	95.2	0.5
Punjab	57.0	56.4	0.6
Bihar	17.8	17.1	0.7
Moderate Variation			
Nagaland	23.1	21.7	1.4
Assam	30.8	29.2	1.6
West Bengal	57.0	55.4	1.6
Sikkim	42.6	40.6	2.0
Meghalaya	31.3	33.5	2.2
Tamil Nadu	91.4	94.2	2.8
Orissa	47.3	43.7	3.6
Himachal Pradesh	60.9	57.2	3.7
Haryana	37.4	41.3	3.9
Uttar Pradesh	14.9	19.6	4.7
High variation			
Gujarat	60.2	55.0	5.2
Rajasthan	22.9	28.3	5.4
Manipur	54.4	48.5	5.9
Karnataka	71.4	78.0	6.6
Andhra Pradesh	80.1	87.5	7.4
Mizoram	75.8	66.6	9.2
Arunachal Pradesh	40.5	25.6	14.9
Jammu & Kashmir	66.0	40.4	25.6

Low variation:<1 point of difference, Moderate variation: 1 to 5 points of difference, High variation: 5 or more points of difference.
Note: Data on ANC are not available in SRS and Census.

Institutional Deliveries

This indicator indirectly reflects the status on infant and maternal mortality in India. As per SRS-1998, 25.4 per cent of the total deliveries were institutional. However, as per NFHS and RHS the values were 33.6 and 34 per cent respectively

with an overall variation of 8.6 percent and better performance compared to what reported in SRS. It is debatable whether this variation can be taken as high considering the fact that we are in the process of targeting to achieve a goal of 80 per cent in institutional deliveries by 2010 as per National Population Policy-2000. Meghalaya and Punjab showed wide fluctuations in the data ranging from 16 percent to 27.8 percent respectively (Table 8).

TABLE 8
SOURCES OF DATA AND STATE-WISE VARIATIONS IN INSTITUTIONAL DELIVERIES

Categorisation of States as per Variations in Institutional Deliveries	SRS (1998)	NFHS-2 (1998-99)	RHS (1998-99)	Points of Difference (Max.-Min.)
Low variation				
Manipur	NA	34.5	34.1	0.4
Bihar	15.4	14.6	14.9	0.8
Sikkim	NA	31.5	32.3	0.8
Mizoram	NA	57.7	58.9	1.2
Nagaland	NA	12.1	13.4	1.3
Karnataka	49.2	51.1	50.0	1.9
Moderate variation				
Goa	NA	90.8	93.8	3.8
West Bengal	36.2	40.1	38.9	3.9
Kerala	97.1	93.0	97.0	4.0
Arunachal Pradesh	NA	31.2	26.3	4.9
High variation				
Assam	21.1	17.6	23.8	6.2
Madhya Pradesh	14.7	20.1	21.5	6.8
Himachal Pradesh	24.3	28.9	31.7	7.4
Haryana	24.7	22.4	17.1	7.6
Andhra Pradesh	42.8	49.8	50.6	7.8
Uttar Pradesh	7.8	15.5	16.2	8.4
India	**25.4**	**33.6**	**34.0**	**8.6**
Jammu & Kashmir	NA	35.6	44.4	8.8
Maharashtra	47.8	52.6	57.1	9.3
Orissa	13.9	22.6	23.4	9.5
Gujarat	36.3	46.3	46.1	10.0
Rajasthan	8.0	21.5	22.5	14.5
Tamil Nadu	64.8	79.3	78.8	14.5
Meghalaya	NA	17.3	33.4	16.1
Punjab	12.7	37.5	40.5	27.8

Low variation: <2 points of difference, Moderate variation 2 to 5 points of difference, High variation: 5 or more points of difference.
Note: Data on institutional delivery are not available in Census.
NA: Not available.

Children Fully Vaccinated

'Children fully vaccinated' represents those children who received one dose each of BCG and Measles and all the three doses of DPT and oral polio vaccine excluding the one polio dose given at the time of birth. This indicator is directly

linked to IMR since non-immunized children are at a greater risk of survival. As much as 12.2 points of difference in the indicator value was noted for India compared to the NFHS and RHS data. While Assam recorded the maximum difference of 29.7 points, Uttar Pradesh and Madhya Pradesh followed with 25.7 and 22.5 points respectively (high variation). The range of the variation increased from a minimum of 0.5 in Punjab to a maximum of 29.7 in Assam. The other states as categorized are shown in Table 9.

TABLE 9
SOURCES OF DATA AND STATE-WISE VARIATIONS IN CHILDREN FULLY VACCINATED

Categorisation of States as per Variations in Children Fully Vaccinated	NFHS-2 (1998-99)*	RHS (1998-99)[1]	Points of Difference (Max. - Min.)
Low variation			
Punjab	72.1	72.6	0.5
Maharashtra	28.4	79.5	51.1
Tamil Nadu	88.8	91.5	2.7
Himachal Pradesh	83.4	80.5	2.9
Haryana	62.7	60.0	2.7
Jammu & Kashmir	56.7	52.8	3.9
Kerala	79.7	83.8	4.1
Moderate variation			
Gujarat	53.0	58.2	5.2
Goa	82.6	88.3	5.7
Mizoram	59.6	66.7	7.1
West Bengal	43.8	51.3	7.5
Manipur	42.3	50.6	8.3
Rajasthan	17.3	36.9	19.6
Arunachal Pradesh	20.5	30.4	9.9
High variation			
Bihar	11.0	22.5	11.5
Karnataka	60.0	71.6	11.6
Nagaland	14.1	26.2	12.1
India	**42.0**	**54.2**	**12.2**
Orissa	43.7	57.4	13.7
Andhra Pradesh	58.7	74.7	16.0
Sikkim	47.4	65.4	18.0
Meghalaya	14.3	32.7	18.4
Uttar Pradesh	21.2	43.7	22.5
Madhya Pradesh	22.4	48.1	25.7
Assam	17.0	46.7	29.7

Low variation: <5 points of difference, Moderate variation: 5 to 10 points of difference, High variation: 10 or more points of difference.
[1]Children age 12 months and above.
Note: Data on children fully vaccinated are not available in SRS and Census.

Family Welfare Indicators

Contraceptive Prevalence Rate (CPR)

A high CPR is indicative of the awareness of the community to population control. Data for the indicator from MOHFW have been shown as Couple Protection Rate (CPR) and collated through service statistics. It is collected by NFHS and RHS through direct interview of the respondents. Data for the indicator compared to the three sources (NFHS, RHS and MOHFW) showed considerable variations in value among States. While Tamil Nadu was the State with least variations, Mizoram, on the other hand, emerged as the state with large variations in the data value between sources. By clubbing the two categories namely, moderate and high variations, 20 States show a major difference in data values for CPR collected through the three different sources. Other States clubbed in different categories are shown in (Table 10).

Unmet Need for Contraception

This is an important indicator and contributes to assessment of programme efforts in achieving the replacement level of fertility. It is assumed that by fulfilling the unmet needs for contraception (15.8 for India as per NFHS-2), it is possible to achieve the replacement level of fertility (TFR, 2.1). However, this unmet is variably quoted in different sources. For India, the difference in value for the indicator from NHFS to RHS was as high as 9.5 percent. RHS projects a much higher value in the "unmet needs for contraception" as compared to NFHS-2. West Bengal, Kerala and Karnataka are the only three States with a low variations of less than 5 points of difference. Considerable variations (high) are observed between the data for 14 States. The variation ranges from a minimum of 0.3 in West Bengal to a maximum of 22.0 points in Arunachal Pradesh (Table 11).

TABLE 10
SOURCES OF DATA AND STATE-WISE VARIATIONS IN CONTRACEPTIVE PREVALENCE RATE (CPR)

Categorisation of States as per Variations in CPR	NFHS-2 (1998-99)	RHS (1998-99)	MOHFW (As on 31.3.99)	Points of Difference
Low variation				
India	**48.2**	**48.6**	**48.6**	**0.4**
Tamil Nadu	52.1	51.6	52.1	0.5
Rajasthan	40.3	40.5	41.8	1.5
Karnataka	58.3	59.3	57.4	1.9
Gujarat	59.0	58.3	60.4	2.1
Bihar	24.5	24.5	20.1	4.6
Moderate variation				
Haryana	62.4	58.3	55.8	6.6
Andhra Pradesh	59.6	58.8	52.4	7.2
Orissa	46.8	49.4	41.9	7.5
Punjab	66.7	65.1	73.1	8.0
Madhya Pradesh	44.3	45.5	52.4	8.1
Maharashtra	60.9	60.5	52.5	8.4
High variation				
Uttar Pradesh	28.1	29.5	42.4	14.3
Meghalaya	20.2	16.8	4.8	15.4
Himachal Pradesh	67.7	64.1	51.5	16.2
Manipur	38.7	28.6	21.2	17.5
Arunachal Pradesh	35.4	24.8	14.6	20.8
Goa	47.5	50.4	29.3	21.1
Mizoram	57.7	47.7	35.3	22.4
Nagaland	30.3	28.7	7.9	22.4
Kerala	63.7	68.2	42.4	25.8
Assam	43.3	40.3	17.3	26.0
Sikkim	53.8	40.2	22.6	31.2
Jammu & Kashmir	49.1	47.8	15.4	33.7
West Bengal	66.6	69.2	34.4	34.8
Tripura	NA	70.8	27.2	43.6

Low variation: <5 points of difference, Moderate variation: 5 to 10 points of difference, High Variation: 10 or more points of difference.

Note: Data on CPR are not available in SRS and Census.

TABLE 11
SOURCES OF DATA AND STATE-WISE VARIATIONS IN UNMET NEEDS FOR CONTRACEPTION

Categorisation of States as per Variations in Unmet Need of Contraception	NFHS-2 (1998-99)	RHS (1998-99)	Points of Difference (Max.-Min.)
Low variation			
West Bengal	11.8	12.1	0.3
Karnataka	11.5	15.2	3.7
Kerala	11.7	15.0	4.7
Moderate variation			
Orissa	15.5	22.0	6.5
Maharashtra	13.0	19.6	6.6
Jammu & Kashmir	20.0	26.9	6.9
Punjab	7.3	14.4	7.1
Tamil Nadu	13.0	21.3	8.3
India	**15.8**	**25.3**	**9.5**
Nagaland	30.2	40.1	9.9
Haryana	7.6	17.5	9.9
Goa	17.1	27.0	9.9
High variation			
Himachal Pradesh	8.6	19.2	10.6
Rajasthan	17.6	28.2	10.6
Mizoram	15.5	26.4	10.9
Madhya Pradesh	16.2	27.2	11.0
Gujarat	8.5	19.7	11.2
Manipur	23.6	36.5	12.9
Uttar Pradesh	25.1	38.4	13.3
Meghalaya	35.5	52.6	17.1
Bihar	24.5	42.0	17.5
Assam	17.0	37.6	20.6
Sikkim	23.1	44.8	21.7
Arunachal Pradesh	26.5	48.5	22.0

Low variation: <5 points of difference, Moderate variation: 5 to 10 points of difference,
High variation: 10 or more points of difference.
Note: Data on unmet need for contraception are not available in SRS and Census.

CONCLUSION

Data analysis on various demographic, health and allied indicators has revealed that there exists a wide range of variations in data for indicators collected from different sources and there is no uniformity on the pattern of these variations. A state with a low variation for one indicator does not always fall in the same category for some other indicator. For example, Kerala falls in the low variation category for indicators like Birth Rate, Total Fertility Rate, Death Rate, Infant Mortality Rate, ANC etc. but it has high variations for indicators like Birth

Order (3+), Female Mean Age at Marriage and CPR. As per the objectives of the study, we have analysed the extent of variations for each indicator. It is alarming that in certain cases, the difference in data value for the same indicator is far wide and this raises the question of reliability in data collection and the techniques used during the survey. We are sure that the data managers are aware of the situation. It is possible that with appropriate measures, like taking proper care for sampling errors and providing adequate training and supervision to field staff prior to initiation of surveys, such wide range of differences in data value for indicators can be further minimized.

Acknowledgement

The valuable guidance provided by Dr. P.P. Talwar, former Prof. and Head, Department of Statistics and Demography, NIHFW; and presently Honorary Visiting Professor, NIHFW; is greatly acknowledged.

सारांश

राष्ट्रीय परिवार स्वास्थ्य सर्वेक्षण-2 सैम्पल रजिस्ट्रेशन सिस्टम, रैपिड हाउसहोल्ड सर्वे और स्वास्थ्य एवं परिवार कल्याण मंत्रालय आदि स्रोतों से उपलब्ध विशिष्ट आंकड़ों, जनांकीकिय तथा संबंधित संकेतकों संबंधी आंकडों का देश और राज्य स्तरीय संदर्भों में पारस्परिक भिन्नता की सीमा का अध्ययन करने के लिए विश्लेषण किया गया था। संकेतकों की भिन्नता की सीमा के आधार पर राज्यों को निम्न, मध्यम और उच्च श्रेणी में वर्गीकृत किया गया था। अलग-अलग स्रोतों से एकत्र किए गए राज्य स्तरीय आंकड़ों के भिन्न-भिन्न संकेतकों में काफी भिन्नता पाई गई थी तथा भिन्नताओं के बारे में कोई प्रवृति विशेष नहीं देखी गई थी। इस अध्ययन से पता चलता है कि अध्ययन संबंधी आंकड़ों में भिन्नता का कारण या तो सैमपलिंग कार्य में त्रुटि हो सकती है अथवा क्षेत्र से आंकडा-संचयन के समय उपयुक्त सुपरविजन अथवा प्रशिक्षण का अभाव हो सकता है।

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Health and Population-
Perspectives and Issues 25 (4) 211-219, 2002

ATTITUDE OF RURAL WOMEN TOWARDS FAMILY PLANNING AND INCOME GENERATION ACTIVITIES: A STUDY IN THREE NORTHERN STATES OF INDIA

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ABSTRACT

The attitude of rural women towards family planning and activities for income generation was studied with a semi structured interview schedule in the villages of three northern states of UP, Bihar and Haryana. It was seen that majority of the rural women (86.1 percent), though illiterate, prefer to have only two to three children. The present status of the family size with four or above children was mainly due to their inadequate knowledge in family planning practices. Both economic standard and family planning behaviour of people were positively correlated to their level of education. Most of the women were interested to earn so as to supplement the family income. Most women expressed that intervention from government or non-governmental organizations to create opportunities for employment generation would help them in seeking more active participation in their routine reproductive behaviour.

Key-words: Income generation, Attitude, Economic backwardness.

Empowering women has been recognized as a key to development. Therefore, in order to make them economically independent and liberated from the clutches of social disparity and discrimination, psychological insecurity, and social and cultural misconceptions, it is imperative that they are provided with opportunities in education. The freedom to take right decisions comes with education and employment. It is not only getting the privilege of planning the family size, the prospects of other opportunities are also there to share in equal footing with men. These include practices of life style and adoption of family planning measures mutually agreeable to each partner. With such a perspective, Government of India initiates many developmental schemes, meant specially for women and girl child, in both rural and urban areas like Integrated Rural Development Programme (IRDP), programme of Training to Rural Youths for Self Employment (TRYSEM), National Rural Employment Programme (NREP) etc. which provide more than 20 per cent of their budgets towards women empowerment. As a sub-component of IRDP scheme, Development of Women

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and Children in Rural Areas (DWCRA) has been introduced in 1982 to accelerate the process of integration of women in the rural development programmes.

Efforts are also on enabling women to play a greater role in society development. Support services like nutrition, health, skill up-gradation, income-generating activities, and employment opportunities for women are being provided through various programmes sponsored by the Government of India[1]. These programmes are specially aimed at families living below poverty line in rural areas. The impact of the DWCRA scheme on rural women with respect to income generation and improvement in family planning practices is not very well studied. In order to find out how far the DWCRA scheme has helped rural women on these issues, 500 village women from five randomly selected districts in the three northern States of Bihar, Uttar Pradesh and Haryana (where DWCRA scheme was in operation) were included in the study and interviewed.

METHODOLOGY

The study was conducted in the year 1997-98. Five districts, two each from Bihar and U.P and one from Haryana with DWCRA scheme in operation during the last five years preceding the study period, were randomly selected. 50 villages, ten from each district, were also randomly selected from the list available from district head quarters. Ten women including the president of the selected women group under DWCRA scheme were further shortlisted from each village in a similar manner. Out of 500 women respondents included in the study, 100 were from Haryana, 200 each from U.P and Bihar. The study districts were Hissar from Haryana, Gonda and Rai Bareilly from U.P, and Madhubani and Hazaribagh from Bihar (now in Jharkhand State).

Data were analysed using an SPSS package.

FINDINGS

The findings from the present study revealed that the uneducated and economically backward rural women (95 percent) in all the three States strongly believed that maternal deaths are preventable. The women felt that they can limit their family size if appropriate knowledge and choices in family planning are made available to them. They were eager to know more about family planning practices and available methods there of. Majority opined that there was nobody in the village to provide knowledge and clarification on these issues so that they take timely action for preventing unwanted pregnancy or maternal deaths. This is indeed a situation of helplessness amongst the rural women. 92 per cent of the women in Haryana, 84 per cent in UP and 82.5 per cent in Bihar preferred smaller families. A large number of women had the desire to control the family size, but, expressed their helplessness of not knowing how to do it; where to get information; and what to do next. The women had the prior knowledge that frequent pregnancy affects good health both for the mother as well as the child.

Only 5-11 per cent of the respondents in the three States did not respond properly to the question that mother's ill health affects both mother and the baby. Abortion was not found favor amongst 51.2 per cent of the rural women. In Bihar, 63 per cent of the respondents did not like aborting a child considering it as a sin irrespective of whether it is wanted or unwanted. However, data from all the three districts indicated that abortion was not considered as a sin if it is used to prevent undesirable childbirth. Families in general, were not averse to the wishes of women deciding to adopt family planning methods (Table 1).

All the respondents (100 per cent) in Haryana opined that illiterate women couldn't keep their children healthy. Only three per cent of the average samples in all the three States responded negatively to this comment. Women from Haryana (99 per cent) and Bihar (84 per cent) also felt that uneducated women can't save their children from the dangers of diseases. Similarly, 90 per cent of all women included in the study expressed that it was the educated women who can use right kinds of family planning methods. Education formed the key point in the perception of women towards family planning (Table 2).

While analyzing the views of illiterate rural women about their acceptance of family planning methods, it was seen that 90 per cent of them in all the three states would prefer to adopt any method of family planning. There was strengthened belief (93.7%) in all the States that women must use any method of contraceptives for effective spacing between births (Table 3). However, spacing for a minimum period of 3 years after the birth of one child was not found well favoured (39%).

The beliefs of illiterate rural mothers about number of children, age of marriage and using children as a source of family income seem to have undergone a state of transition. The women were found not to attach much value to the number of children as a factor in economic gain. Replying to a question whether children in more number increases prestige to a family, the responses in all the three States were not much different. While 80 per cent of the subjects held that more number of children does not add any prestige to a family, only 20 per cent responded in support of it. Similarly, about three-fourth (76%) of the women felt that income of a family doesn't necessarily increase with the increase in the number of children. They were also of the view that a family with more number of children would hardly afford education for children (71.3%). 79.3 per cent of the respondents were of the view that survival of children in large families is less in comparison to small families. To a question whether one should have more children as one used to have in the earlier times, 44.5% of the women replied in negative. Moreover, 88.3 per cent of the rural women felt that a woman should not have more children during the early adolescent age (Table 4). An analysis of the study findings in relation to different aspects of family planning substantiates the fact that illiterate rural women are confused in this regard and they don't have adequate knowledge and correct information about family planning.

TABLE 1
BELIEFS OF RURAL WOMEN* (%)

Beliefs of Illiterate Rural Women	Haryana		UP		Bihar		Total	
	Yes	No	Yes	No	Yes	No	Yes	No
Women firmly believe that maternal death can be prevented.	92.0	8.0	97.5	2.5	96.0	4.0	95.0	5.0
If women really wish they can keep their families small with the knowledge about family planning and its application.	92.0	8.0	84.0	16.0	82.5	17.5	86.1	13.9
Women become highly vulnerable for themselves and children if they become pregnant without good health.	90.0	10.0	95.0	5.0	89.0	11.0	91.3	8.7
Women believe that abortion is a sin/not a sin while using it as a method of family planning to prevent conception.	64.0	36.0	52.5	47.5	37.0	63.0	51.2	48.8

*Number of respondents: 500

TABLE 2
PERCEPTION OF ILLITERATE RURAL WOMEN* (%) ABOUT THEMSELVES AND OTHER WOMEN

Beliefs of Illiterate Rural Women	Haryana		UP		Bihar		Total	
	Yes	No	Yes	No	Yes	No	Yes	No
Uneducated women can't keep their children healthy.	100.0	0.0	89.5	10.5	83.5	16.5	91.0	9.0
Uneducated women can't save their children from the danger of diseases.	99.0	1.0	83.0	17.0	84.0	16.0	88.6	11.4
Educated women make use of different methods of family planning and illiterate women don't know anything about them.	88.0	12.0	99.0	1.0	83.0	17.0	90.3	10.0

*Number of respondents: 500

TABLE 3
OPINION OF ILLITERATE RURAL WOMEN* (%) ON FAMILY PLANNING PRACTICES

Opinion of Illiterate Rural Women	Haryana		UP		Bihar		Total	
	Yes	No	Yes	No	Yes	No	Yes	No
Women should make use of any method of family planning.	92.0	8.0	89.5	10.5	89.5	10.5	90.3	9.7
Women must use any method of contraceptive for effective spacing.	92.0	8.0	99.5	0.5	89.5	10.5	93.7	6.3
Women should maintain a gap of 3 years between one child and the next.	48.0	52.0	37.5	62.5	31.0	69.0	39.0	61.0

*Number of respondents: 500

TABLE 4
PERCEPTION OF RURAL WOMEN* (%) TO SOME SOCIAL BELIEFS IN RELATION TO FAMILY SIZE

Perception of Illiterate Rural women	Haryana		UP		Bihar		Total	
	Yes	No	Yes	No	Yes	No	Yes	No
More children add prestige to the family.	20.0	80.0	20.5	79.5	19.5	80.5	20.0	80.0
Income increases if there are many children.	32.0	68.0	25.5	74.5	13.8	86.2	24.0	76.0
There is difficulty in educating children if the number is more.	76.0	24.0	68.0	32.0	70.0	30.0	71.3	28.7
In case of more children, chances of death of some are more.	76.0	24.0	80.5	19.5	81.5	18.5	79.3	20.7
No family should have more children like in the earlier days.	60.0	40.0	46.5	53.5	60.0	40.0	55.5	44.5
Nobody should go for more children in an early age.	96.0	4.0	79.0	21.0	90.0	10.0	88.3	11.7

*Number of respondents: 500

The practices attached to old values are not found favour in the community at large. However, continuation of old practices need not to be construed as a recognition by the people; be it health, welfare, family planning, education or child marriage etc. People are influenced to perform such practices under social pressure and compulsions but not by their own choice. Therefore, a broader angle of health needs to be followed to change their old beliefs. Addressing such issues through inter-personal counselling is probably enough to bring changes in the individual's behaviour. Only one-fifth of the respondents would prefer more children and similar percentage endorsed the old belief of 'more children more income'. However, 80 per cent of illiterate rural poor women rejected such an old belief. 70 per cent of women felt that even upbringing of children with proper education was most difficult if one has more children. One-fifth of the respondents also felt that children die in the absence of quality care and with more children, proper care was not possible. Eighty per cent of the respondents were found to hold a strong view that one should not have children in early adolescent years of life.

DISCUSSION

Economic Pressure

A large number of women said, "We are very much worried about the increasing cost of marriage, education, housing and day-to-day household activities. Grown up children are not able to get any source of income. Educated children up to 8th class, 10th class and even 12th class are jobless". Such environmental pressure classified[2] as 'SEEK forces' that play a significant role in changing the attitudes of rural women towards family planning, preference for less number of children and contraception etc. Many women said, "we can't afford more than two or three children, but unfortunately, we have more. We are helpless, we don't know what to do".

Marriage, Pregnancy and Family Planning

All the women during the group discussion reported that early marriage (Gauna) in Hindu community takes place at the age of 15-16 yrs for girls and 18-19 years for boys. For marriage, people prefer difference of age at least 2 to 3 years between boys and girls. However, most of the women delivered baby within or around a year of their marriage. This is because, especially in the rural areas, delay in the birth of the first child is culturally unacceptable. This is the reason that the slogan like '*Pehala Bachcha Abhi Nahi, Doke Bad Kabi Nahi*' is culturally an incongruent concept. As per the attitude of rural women, after marriage, delay in the first child is completely unacceptable.

Main worry for women basically starts soon after her painful experiences of delivering the first child. The questions that cannot be answered based on the present findings are: How do women react towards family planning concept after

the first child delivery? With whom she shares her experiences? How much of it she shares with her husband? And how much positive support she receives from her husband and other important family members to postpone or delay the next pregnancy? Any effort by women to practice family planning generally starts only after getting a positive support from her husband or any other elderly women in the family. What was the time-span for all these to happen? This is important because women normally would get pregnant if the decisions are not taken promptly and timely. Because sexual behaviour is such a prompt, spontaneous and natural behaviour, if not planned and managed timely, it would positively result in another conception, regardless of the fact whether the couples like it or not. Pregnancy is thus inevitable and once pregnant, it is not her decision to abort it. This is because abortion, although legally accepted, is culturally and religiously an unaccepted concept as far as rural women are concerned. Desperate desire to stop pregnancy only makes her to get the consent for tubectomy in most cases and she is successful only if health service providers are active, motivated and receptive to the need of the case.

Age at Marriage and Desire for Family Planning

In a majority of cases, girls in villages get married at a age of 15-16 years and become mothers of 2-3 children at the age of 18-21 years. Many of these women prefer to have permanent sterilization. Many women had prior sterilization while taking part in group discussions in the villages. Sterilization was told to be the results of concentrated efforts of *Gram Sevikas and Pradhans* (both women) from villages.

Major Worries and Expectation from Government

Major worries for women in vulnerable communities are economic insecurity, increasing cost of marriage and loss of hopes for future employment of their grown-up children. They don't have any idea of how to plan their family and future. Their major demand is that government should provide service (*Naukri*) to at least one grown up child in the family. All women want to earn some amount of money in order to meet the expenditure of essential demands of their households. All of them have expressed their urgent need for part time employment. They said, "We are ready for any type of work provided it helps us to generate some money easily". Based on their experiences under DWCRA, they said "We can't sell our products, nor we know how to sell? Where to sell? Whom to sell? Nor we would like to indulge ourselves into such activities. We want to get some part time job with the assistance of the Government. We don't want such jobs which provide no surety of returns on our labour and investment". Beneficiaries of DWCRA were extremely happy in the initial stage. But unfortunately, after being in this business for about two years, they were found loosing their hopes as earning dwindle further for the lack of purchase support for their products. Under DWCRA scheme, they consider great achievement to open a bank account with the help of *Gram Sevikas*. They still earn Rs. 150 to 300 per month under the scheme. The earning of such a meagre amount had

helped them to buy small but extremely essential household items. That is the reason; they still attach a tremendous significance to the DWCRA scheme.

Changes in the Outlook of Rural Women

Rural women from all the three States were found to be quite willing to adopt spacing, permanent sterilisation or any such method, which would help them to avoid problems of frequent pregnancies. They just want two to three children, preferably two sons and one daughter or vice-versa. But they don't know how to turn their desire into reality. The confusion about 'Family Planning' works as a strong de-motivator amongst the community members and this has never been taken earlier into consideration by the health personnel. It was found that there is a tremendous change in the outlook of the rural women towards family planning behaviour. This may be due to repeated advertisements given by radio, television etc. Of course, things are also changing very fast in rural areas. But rural women do consult their friends, neighbours, relatives etc. for advise in relation to contraceptives.

CONCLUSION

The perception of the women folk in rural areas of Haryana, UP and Bihar about family planning is quite low. Though they are very much concerned about the difficulties faced by the large families, they are helpless because of their illiteracy and lack of proper information on appropriate family planning methods. They were eager to know and accept different kinds of available family planning methods and like to have only two to three children. It is therefore submitted that proper action from both the government and NGO sectors must be initiated to first to educate these women on different family planning methods. And second, attempts should also be made to raise the literacy level and economic status through different self-help schemes such as SEWA, NREP, and TRYSEM etc. in order to empower them to take right decisions on reproductive matters.

सारांश

प्रस्तुत लेख में एक पूर्व-निर्मित साक्षात्कार सूची की सहायता से भारत के तीन उत्तरी राज्यों - उत्तर प्रदेश, बिहार और हरियाणा के गाँवों में रहने वाली महिलाओं का परिवार नियोजन और आय-अर्जन संबंधी गतिविधियों के प्रति अवधारणा का अध्ययन किया गया था। अध्ययन से प्राप्त निष्कर्षों से पता चलता है कि अधिकांश ग्रामीण महिलाएं (86.1 प्रतिशत) निरक्षर होते हुए भी दो या तीन बच्चे ही चाहती थीं। उनके परिवार में चार-पांच बच्चे हो जाने का कारण परिवार

नियोजन अभ्यासों के बारे में उन्हें पर्याप्त जानकारी न होना पाया गया था। आर्थिक स्थिति तथा परिवार नियोजन के बारे में लोगों के व्यवहार का सकारात्मक संबंध उनके शिक्षा स्तर से है। अधिकतर महिलाओं में अपने परिवार की आय में वृद्धि करने के लिए कुछ अर्जित करने की इच्छा पाई गई थी। ज्यादातर महिलाओं ने यह विचार व्यक्त किया था कि शासकीय स्तर पर अथवा गैर-सरकारी संस्थाओं की सहायता से रोजगार के अवसर जुटाए जाने से उन्हें अपने प्रजनन व्यवहार में सक्रिय सुधार लाने के प्रति भागीदारी निभाने में सहायता मिलेगी।

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