

**AN UPDATE ON POLYCYSTIC OVARY SYNDROME-ITS
INVESTIGATION AND MANAGEMENT: SOME RESEARCHABLE
ISSUES**

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ABSTRACT

The polycystic ovary disease/syndrome (PCOD/PCOS) is the most common cause of menstrual irregularity, hirsutism and anovulatory infertility in women. The clinical spectrum in subjects with PCOS varies widely from mild hyperandrogenism with apparently regular menses to more severe disorder with menstrual abnormalities, anovulatory infertility, and other metabolic disorders. The discovery of hyperinsulinemic insulin resistance in PCOS along with other metabolic alterations and consequences has added new dimensions.

Despite accumulation of vast data on clinical manifestations and the laboratory and experimental studies, the primary defect or etiology has remained an enigma and a subject of interest over the past six decades. Numerous hypotheses have been proposed and plethora of treatment regimens suggested, arising from lack of agreement among investigators.

In order to resolve the differences in the views of different investigators/experts on PCOS, a meeting was organized jointly by NIH and NICHD, U.S.A. in 1990 for developing a consensus. But no consensus was reached. A second meeting of experts was held in October 1997; but no progress was made. In 2003, a Revised Consensus Workshop was organized in Rotterdam. The Netherlands. According to this revised diagnostic criteria, the presence of any two out of the following three would suffice: 1) Oligo- or anovulation, 2) Clinical and/or biochemical signs of hyperandrogenism, 3) Polycystic ovaries, and exclusion of other etiologies.

In the light of the above, the proper course probably would be to make the basic diagnosis of PCOS according to the 2003 Revised Consensus. However, because of the wide heterogeneity in etiopathogenesis and clinico-pathological manifestations, the existence of multi-system endocrinopathy comprising constellation of varying signs and symptom has to be always kept in mind. Therefore, these subjects would need to be properly categorized based on clinico-pathological findings, and they should receive specific treatments based on etio-pathological findings and their priority needs. A major emphasis should also be given for preventive care.

Keywords: PCOS, PCOD, Hyperandrogenism, Insulin resistance, Anovulation, and Menstrual irregularity.

A critical review of the literature reveals that polycystic ovarian disease/syndrome (PCOD/PCOS) is the most common endocrinopathy in women and it is the most common cause of menstrual irregularity, hirsutism and anovulatory infertility in females. The clinical spectrum in subjects with PCOD varies from mild hyperandrogenism with apparently regular menses to more severe disorder with manifestations of menstrual disorders, hyperandrogenism causing hirsutism, acne and virilisation (rarely), anovulatory infertility, obesity and other metabolic disorders at the other end of the spectrum. The primary cause or defect is unknown; it is associated with diverse etiology or pathologic physiology. Thus, it is not possible to remove the cause; the treatment is symptomatic and varies with the associated clinico-pathological conditions. Despite accumulation of vast data on clinical manifestations and the laboratory and experimental studies, the primary defect or etiology has remained an enigma and a subject of interest over the past six decades. Abnormalities of numerous organ systems have been implicated such as the ovary, hypothalamic -pituitary axis, the adrenal cortex, the thyroid, the adipose tissue and the compensatory hyperinsulinemia due to insulin resistance, but the underlying cause has not been identified. These have produced abundance of theories and plethora of treatment regimens. The situation is complicated by complexity of pathophysiological interactions, the heterogeneity of clinical expressions and by the failure of investigators to agree on a common definition and diagnostic criteria¹⁻⁸.

The actual prevalence rate is not known; it varies with the type of the subjects being studied and the diagnostic criteria applied⁹⁻¹².

Furthermore, the long-term deleterious sequelae now emerging may demand suppression of the syndrome in earlier life^{13,16}. Being the most prevalent multi-system endocrinopathy among the women further elucidation of basic pathogenesis would be very important to allow the application of more specific and successful modalities of treatment, both therapeutic and preventive.

CURRENT STATE OF KNOWLEDGE

Pathologic Physiology and Etio-Pathogenesis

The problem of polycystic ovarian disease/syndrome (PCOD/PCOS) has been the subject of research studies over the past six decades. Earlier, the diagnosis of polycystic ovaries was being made mainly on the basis of clinical manifestations such as infrequent ovulation or anovulation with associated menstrual abnormalities and signs of hyperandrogenism with or without obesity. Many could detect enlarged ovaries on pelvic examination; sometimes these were confirmed at laparotomy which was primarily intended for wedge resection of the ovary. With the availability and use of laparoscopy and culdoscopy the diagnosis became easier.

Following the first report of elevated blood levels of luteinizing hormone (LH) in PCOS subjects in 1958, it was considered to be a criterion for diagnosis, and the availability of radio-immunoassays in 1971 stimulated reliance on biochemical diagnosis of PCOS. Subsequently, PCOS has been reported also in association with normal blood levels of LH. However, it should be pointed out that since LH secretion occurs in pulsatile mode, any rise in LH may be missed if proper sampling in blood collection is not followed. Nevertheless, in a good proportion of women with PCOS a rise in the blood level of LH and/or and increase of LH: FSH ratio are observed and these are considered to be important diagnostic criteria^{17,18}.

In 1981 there was the first report on ultrasound (US) findings in PCOD subjects. Adams et al refined and critically defined the diagnostic criteria by pelvic ultrasound for PCOS¹⁹. Early ultrasonography with contact B - Scanners was too crude to detect the ovarian morphology associated with PCOS. With the advent of Real-time Grey Sector

Scanners, particularly the transvaginal scanner, it became possible to obtain very clear pictures of PCO by non-invasive means²⁰. The ultrasound presentation appeared remarkably close to ovarian appearance on cut section, and comparison between laparoscopic and ultrasound diagnosis showed excellent correlation. Steady improvements in resolution and availability of transvaginal ultrasound had led to widespread use of this technology. The US is now being routinely used in many centres and is standard in UK for diagnosis of PCOS. Subsequently, with the availability of power Doppler it has become possible to measure the degree of stromal hyperaemia which has some correlation with androgen production²¹²³.

The Source and Role of Hyperandrogenism

Since 1950s a large number of scientific studies had been carried out for understanding the pathologic physiology/pathogenesis of PCOD, and the main focus was on finding the cause of hirsutism or hyperandrogenism. These studies comprised: (a) measurement of various urinary steroids before and after adrenal suppression and ovarian stimulation, (b) estimation of steroid contents of the ovarian tissue and ovarian venous blood and (c) *in vitro* incubation of ovarian slices with various radio-labelled steroid precursors. Available evidences indicated that the sources of abnormal androgens could be the ovary or the adrenal²⁴ or both. In the ovary two types of enzyme defects or dysfunction were suggested - a) 3 β -hydroxy steroid dehydrogenase (3 β -HSD) deficiency and b) aromatase defect. As a result, excess amounts of dehydroepiandrosterone (DHEA) and androstenedione were produced²⁵⁻¹¹. These are relatively weak androgens. However, when these were administered to normal human volunteers, these increased the blood levels of testosterone, the most potent androgen, through peripheral conversion²⁸. All these findings adequately explain the cause of hyperandrogenism producing hirsutism, acne etc. in PCOS subjects; but it does not provide any answer to why and how polycystic changes occur in the ovary.

For finding an answer to the above question, Roy et al²⁹ administered DHEA and androstenedione to growing adult female rats and produced cystic changes in the ovary. This was the first experimental evidence for possible etio-pathogenic role of androgens in the

development of PCOs. They propounded the hypothesis that high levels of androgens, secreted by the ovary or the adrenal cortex or both, probably modified the pattern of FSH and LH secretion of the pituitary. This led to chronic anovulation and thus exposing the ovaries to sustained gonadotropin action. Added to this, androgens probably modify the response of ovaries/ovarian follicles to gonadotropins, leading to polycystic changes in the ovary.

PCOs have been produced in experimental animals by hypothalamic lesions, continuous illumination, induced hypothyroidism with or without administration of hCG, and by administration of steroid hormones such as testosterone, dehydroepiandrosterone (DHEA), androstenedione and estradiol^{29,32}. All the above conditions have been associated with persistent anovulation. Clinically, PCOS have been found in association with increased secretion of androgen from the ovary or the adrenal or both, in classical and non-classical congenital adrenal hyperplasia (CAH), hyperprolactinemia, hypothyroidism, hypothalamic amenorrhea, Cushing's syndrome, virilizing adrenal or ovarian tumor, hyperthecosis of the ovary and hyperinsulinemic insulin resistance^{33,36}. In all these clinical conditions there is chronic anovulation or oligo-ovulation.

According to Barbieri³⁷, during 1964-1990 more than 4500 articles focussing on PCOS and/or hyperandrogenism have been published. Subsequently to-date, additional large number of publications have appeared. In majority of PCOS subjects with hyperandrogenism, there is chronic anovulation or oligo-ovulation. All these observations, lend strong support to the hypothesis propounded by Roy et al in 1962²⁹. In a vast majority of subjects, this concept appears to be valid.

In more recent studies by Abbott et al it has been reported that experimentally induced prenatal androgenization of female rhesus monkeys exhibit ovarian endocrinological features that closely resemble those found in women with PCOS^{38,39}. These include: hyperandrogenism, anovulation with hyperinsulinemia, high blood level of LH and enlarged multi-follicular ovaries. These findings also implicate the etio-pathogenic role of androgen in PCOs. It may be pointed out that unlike other experimental animals, the rhesus monkeys share important similarities in reproductive and physiological traits with the human.

Alterations in Gonadotropin Secretion and Anovulation

As discussed earlier, hyperandrogenism may cause alteration in gonadotropin secretion pattern and this leads to anovulation. In PCOS anovulation is usually chronic and is manifested as oligomenorrhea or amenorrhea of perimenarcheal onset. Nevertheless, a history of regular menses is also possible. However, the accuracy of self-reported menstrual regularity may vary, and thus assessment of anovulation becomes most difficult aspect of diagnosis. But daily maintenance of basal body temperature (BBT) chart could be very useful; and if needed, measurement of blood progesterone level during luteal phase may clarify the position further. In fact, some women who report normal menses may be anovulatory; some recent prospective study has clearly demonstrated this⁴⁰. The occurrence of regular ovulatory menses may appear contradictory to our original definition of PCOS. But it is well to point out that it is now accepted that a subset of women with this syndrome with typical polycystic ovaries on ultrasonography may experience ovulation^{41,42}.

As mentioned earlier, the most common form of gonadotropin alterations in PCOS are elevated blood levels of LH and an increase in LH/FSH ratio^{17,18}. The onset of anovulation and the initial rise in LH secretion may be due to the altered steroid hormone feedback on the hypothalamic-pituitary axis, and probably also by the hyperinsulinemia acting at the hypothalamic-pituitary level, whenever it is present. The elevated LH stimulates androgen secretion by the theca cells within the ovarian follicles, and these get converted to estrogen within the granulosa cells by the aromatase activity under the action of FSH. As a result, there is increased secretion of both androgen and estrogen from the ovaries in PCOS. A part of the elevated blood androgen is converted into estrogen by peripheral aromatase activity, resulting in higher circulating estrogen which may be partly or mainly responsible for sustained increase in LH level by its positive feedback action at the hypothalamic-pituitary level.

The above contention is strongly supported by the results of hormonal studies in anovulatory PCOS subjects carried out before and after laparoscopic ovarian diathermy⁴³. Before the surgery, the blood levels of LH, testosterone and estrogen were elevated. Following the

operation, the levels of LH, testosterone and estrogen were decreased and the FSH was increased. Subsequently, 81 per cent of these women became ovulatory. Thus, it is clearly evident that abnormal secretion of ovarian steroid hormones plays a major role in sustained alterations in the secretion of gonadotropins from the pituitary, leading to chronic anovulation.

With chronic anovulation associated with PCOS, the blood level of estrogen may be elevated and this may, at least partially, be responsible for increasing LH secretion. Sustained rise in estrogen may also increase prolactin secretion, and unopposed estrogen action causes endometrial hyperplasia. The latter condition, if remains untreated, may increase the risk of endometrial carcinoma. There is some suggestion that high level of LH in early follicular phase may cause early maturation of oocytes, which on ageing may resist fertilization or may become more susceptible to early abortion after fertilization.

In the above context then, how to explain the occurrence of PCOS in some apparently normo-ovulatory women? In such cases the high concentration of androgens within the ovarian follicles probably accelerate follicular growth by augmenting FSH receptor expression. As a result, multiple follicles start growing. But because of relative FSH deficiency, its threshold level is not reached in many follicles and their further growth is arrested and they become atretic. This may possibly increase the rate of follicular atresia and thus producing polycystic appearance. But some folliculogenesis and follicular development continue to occur and the ovulatory process is completed. Further, the level of androgen in peripheral or systemic circulation may not be adequate enough to alter gonadotropin secretions, and thus ovulation is not disrupted.

It may be noted that even in ovulatory women with PCOS some hormonal abnormalities are present. There is hyperandrogenism, presumably with elevated intraovarian androgen, and often there is insulin resistance with compensatory hyperinsulinemia. Sometimes, luteal phase defect may also be seen. All these associated abnormalities may affect the quality of oocyte development and contribute to their infertility. (Roy, unpublished). Although these women are ovulatory, it would be important

to treat them for hyperandrogenism and/or hyperinsulinemia before attempting for fertility.

Insulin Resistance and Its Role

A further milestone has been added after the discovery of the association of PCOS with insulin resistance and compensatory hyperinsulinemia³⁶⁴⁴⁴⁷. Insulin resistance is defined as an impaired biological response to either exogenous or endogenous insulin. The concept of insulin resistance should apply to any of the biological actions of insulin, and might include its effects on carbohydrate, lipid and protein metabolism, vascular endothelial functions and gene expression⁴⁸.

For the measurement of insulin resistance, the following three methods have been given the most attention:

- a) The euglycemic insulin clamp;
- b) The minimal model; and
- c) Fasting blood insulin level.

The first two are much more elaborate research methods and not suitable for wider clinical use. From a clinical perspective, the most practical way and most powerful indicator of assessing insulin resistance would seem to be the measurement of insulin in plasma in the fasting state and/or after a glucose load. We have been mainly following measurement of blood levels of glucose and insulin in the fasting state and/or after glucose load. This has been found to be quite sensitive and convenient approach for detecting hyper-insulinemic insulin resistance. In the majority of our patients blood level of fasting insulin is normal, but after glucose load it shows exaggerated response in many.

There are evidences to indicate that hyperinsulinemia probably acts at multiple sites⁴⁹⁵⁰. These include: a) the hypothalamic-pituitary axis, b) the liver, c) the ovary and probably also d) the adrenal cortex. Acting at the higher level it stimulates LH secretion. In the liver it decreases production of sex hormone binding protein (SHBP) and IGF-1 binding protein; these result in an increase in free androgen in the blood and an increase in free IGF-1 in the ovary. Within the ovary, it promotes

secretion of androgen either acting directly on the stromal and theca cells, or through potentiating the actions of LH and IGF-1.

According to some investigators dysregulation in androgen biosynthesis in the ovary (and sometimes also in the adrenal cortex) is the basic endocrinopathy in the most of the PCOS cases^{51,52}. This involves augmentation in the activities of the enzyme cytochrome P450-17a, which catalyses the activities of two enzyme systems i.e. 17-hydroxylase and 17,20 lyase. All these induce hyperandrogenism which then, many feel, produce abnormalities in gonadotropin secretion and anovulation leading to development of PCOs. These lend further support to the hypothesis originally propounded by Roy et al²⁹.

Insulin resistance and hyperinsulinemia and are presently considered risk factors in the development of atherosclerosis. Hyperinsulinemia may cause a rise in serum triglycerides and lower the level of high-density lipoprotein cholesterol (HDL), and may play an etiological role in the development of hypertension. It also elevates the level of plasminogen activator inhibitor (PAI), the major inhibitor of fibrinolysis. The PAI is an independent risk factor for atherosclerosis. Hyperinsulinemia increases the risk of cardiovascular diseases^{49,50}. Thus, the metabolic disorders associated with PCOS alongwith their long-term sequelae have added new dimensions to the investigation and management of PCOS.

The term insulin resistance should not be confused with the concept of "Insulin Resistance Syndrome" (IRS) or Syndrome X⁵³. The latter is a constellation of associated clinical and laboratory findings, consisting of glucose intolerance, central obesity, dyslipidemia (increased triglycerides, decreased HDL, increased LDL), hypertension, increased prothrombotic and anti-fibrinolytic factors, and predilections for atherosclerotic vascular disease. There is a number of other insulin -resistance conditions with special clinical presentations (e.g. PCOS, pregnancy, glucocorticoid therapy) that may not include all the features of the insulin resistant syndrome (IRS).

Hyperinsulinemia has been reported to be associated with acanthosis nigricans, which is characterized by development of velvety hyperpigmented patches on the skin noted in armpits, back and sides of

the neck, skin folds and pressor points⁴⁶⁵⁴⁵⁵. This is believed to be due to the action of insulin on the IGF receptors in the skin. The presence of the triad - hyperandrogenism (HA), insulin resistance (IR) and acanthosis nigricans (AN) is named as "HAIRAN" syndrome.

Acanthosis nigricans (AN) may be seen in about 10 to 15 per cent of PCOS subjects. AN may sometimes appear much earlier than the onset of hyperandrogenism or PCOS; it may appear in prepubertal years. We had seen one 11 year old girl who had intense hyperpigmentation (AN); there was no sign of any pubic or axillary hair growth or breast development. Her fasting blood insulin level was quite high and after glucose load it showed very exaggerated response. She had been put on metformin therapy, and the importance of preventive care has been explained to her parents.

Obesity

About 50 per cent of women with PCOS are obese⁵⁶⁵⁷. This obesity is usually of android type, with increased waist-to-hip ratios. In the presence of obesity, insulin resistance is worsened and the risk of diabetes and cardiovascular diseases increase. Therefore, the treatment of obesity should be a major focus of preventive health care for women with PCOS. However, in such patients weight loss is difficult to achieve. This may in part be due to an impairment of adipocyte lipolysis, which in turn is linked with insulin resistance⁵⁸.

Definition and Diagnostic Considerations: Diverse Views

There is probably no single symptom that defines polycystic ovary syndrome, except anovulation or oligo-ovulation during menstrual cycles. About 52 per cent of women with PCOs have some evidence of elevated male sex hormones such as increased body hair or hirsutism. About 45 per cent have some irregularity of the menstrual cycle. There is no one good diagnostic biochemical test for PCOS. Some of the findings include increased testosterone and androstenedione, decreased binding protein for sex hormones and increased ratio of serum LH:FSH. On ultrasound (US), the follicular number is the most widely used and most reproducible parameter in describing polycystic ovaries. Most investigators require a minimum of 10 echo-free cyst, 2-8 mm in diameter in each ovary. The

ovarian volume is often increased, averaging 1.5 to 3 times the normal means, and the majority shows an increase in ovarian stromal density. In general, the finding of multiple small cysts in a single plane of the ovary is considered most characteristic of polycystic ovaries, particularly if these cysts are peripherally arranged in the so-called "pearl necklace" configuration. Although the US findings that constitute PCOS are generally agreed upon, the significance of these findings is not. Many normal women have this finding on ultrasound. On the other hand, some women with clinical diagnosis of PCOS apparently lack one or more ultrasound features of the syndrome, but such a negative study should not preclude the diagnosis.

As mentioned earlier, over the decades, numerous hypotheses have been proposed and plethora of treatment regimens suggested, arising from lack of agreement among the investigators. There is still no agreement in regard to whether it would be called "PCOD" or "PCOS" and literature is replete with study reports in two different streams under two different titles. Goldzieher¹, one of the pioneers who prefers to call it PCOD, stated, "its characteristic signs and symptoms are not found with sufficient consistencies to justify the designation of the syndrome". On the other hand, the arguments of those investigators who prefer to call it PCOS are as follows. A different term is probably needed to describe the complex reproductive symptoms in women currently referred to as PCOS, and Lobo⁵⁹ prefers to call it "hyperandrogenic chronic anovulation". He feels that whatever it is called, PCOS is not technically a "disease" which has certain characteristic features, but is more accurately a 'syndrome' i.e., a set of symptoms or a symptom complex. In addition, now a number of other terminologies have appeared in the literature. These are polycystic ovary (PCO), polycystic appearing ovary (PAO), multicystic or multifollicular ovaries, polyfollicular ovaries, hyperthecosis of the ovary, functional ovarian hyperandrogenism etc.^{59,61}. Though these are seemingly different definitions, they may not be totally unrelated. There are evidences to indicate that these are probably being seen and described at different stages of development of a full-blown disease or syndrome, which is currently being viewed as a multi-system endocrinopathy.

PAO/PCO has been described as a condition showing cystic changes in the ovary, but there are no clinical and/or laboratory

manifestation of a fully developed syndrome. PCO has been found in apparently normal ovulatory women. Although few population studies have been done, PCO may be a common finding in upto 20-25 per cent women and it is first noted in childhood and early adolescence. A question is often asked whether the PCO noted on ultrasound represents a pathologic finding. Some feel that it would be inappropriate to describe a condition as common as PCO as pathological; but at the same time PCO with irregular menses and hirsutism may not be totally normal. Furthermore, it is impossible to predict whether or not PCO with normal cycles would later on develop cycle irregularity and/or infertility. Only longitudinal prospective studies could provide an answer. Interestingly, it has been reported that PAO women present some characteristics of PCOS (polycystic ovaries, insulin resistance, and increased follicular response to gonadotropins), while other important features of PCOS (hyperandrogenism, chronic anovulation, elevated LH level) are absent⁶⁰. They consider it is possible that similar genetic defects are present both in PAO and PCOS women.

First Consensus Conference (1990)⁶²

In order to resolve the differences in the views of different investigators/experts on PCOD, a conference was organized jointly by the National Institute of Health and the National Institute of Child Health and Human Development (NIH/NICHD), USA in 1990. But no consensus was reached. Only half of the participants agreed on any specific criteria, which included hyperandrogenemia, menstrual dysfunction, elevated LH and polycystic ovaries on ultrasound. Some working definition was developed as follows: A patient with PCOS must have (a) ovulatory dysfunction and (b) evidence of hyperandrogenism clinically or by laboratory means, but no other cause of hyperandrogenism such as congenital adrenal hyperplasia, Cushing's syndrome, and virilizing ovarian or adrenal tumour. The laboratory and radiographic studies are important in excluding other causes of these symptoms. Menstrual abnormalities, often with perimenarcheal onset, are the most common finding among women with PCOS. Although several investigators have used this working definition and published the results of some controlled studies, considerable controversy remains regarding the definition of PCOS⁶³.

Hyperandrogenism has been considered important for the diagnosis of PCOS. But detection of hyperandrogenemia may be difficult. Biochemical detection of hyperandrogenism will suggest a diagnosis of PCOS in some non-hirsute women with ovulatory dysfunction. Conversely, failure to detect hyperandrogenemia in hirsute women does not rule out the diagnosis of PCOS. There are considerable differences in the manifestations of hyperandrogenism among different ethnic groups^{64,65}. This has been found to be more common among the Americans and Italians and very less among the Japanese. Similar differences are also observed among various population groups of different ethnic origin in India. Although the ovary is the main source of hyperandrogenemia, a subset of women with PCOS have adrenal androgen excess, usually showing mild elevation of androstenedione and dehydroepiandrosterone. This may be demonstrated in basal levels or by dynamic testing after ACTH stimulation. It is well established from different studies over the decades that in a significant sub-group of patients adrenal gland seems to contribute to hyperandrogenism^{24,33, 64,66,67}. However, Lewis⁶³ feels if there is "evidence that the adrenal gland is the main source of androgen production it dictates another diagnosis". This viewpoint is not accepted by other investigators, including the senior author (SR) having long experience in this field. In the concept of PCOS being a multi-system endocrinopathy, elevated androgen level from the adrenal gland is well fitted. Hypersecretion of androgen from the ovary and/or adrenal gland may be due to dysregulation of the enzyme cytochrome P450c 17a mainly in the ovary and in some cases also in the adrenal. This may be caused by elevated LH and/or insulin levels.

Some feel that ultrasound is not required for the diagnosis of PCOS, nor does it provide sufficient evidence to make a diagnosis in the absence of other findings. However, most studies show an association between the ultrasound features of PCOS and hyperandrogenism or ovulatory dysfunction. This observation suggests that polycystic ovary may represent a risk factor (or a fore-runner) for development of the fullblown disorder.

Second Expert Group Meeting (1997)⁶⁸

In October 1997 there was another meeting of the experts during ASRM's 53rd Annual Meeting, and they discussed the complexity in the diagnosis and treatment of PCOS. In this meeting some of the

participants of the earlier NIH meeting were also present. Some of them stated that there was little agreement in NIH meeting in 1990. There was only a general agreement' that they were probably not dealing with a single disease entity.

In this meeting, Dr. Andrea Dunaif in her presentation stated that among her patients with PCOS, hyperinsulinemia was detected only in those who had associated anovulation. However, it should be mentioned here that there are evidences which are contrary to this view point. Carmina et al reported that among their patients with polycystic appearing ovaries (PAO), hyperinsulinemia was found in ovulatory women⁶⁰. Further, Roy (unpublished) has several normo-ovulatory women with hyperandrogenism and ultrasonography picture of PCOS. Some of them have also hyperinsulinemic insulin resistance, obviously in the absence of anovulation.

Revised Consensus Workshop (2003)⁴²

Diagnostic criteria - Since the NIH-Sponsored Conference on PCOS, it has become appreciated that the syndrome encompasses a broader spectrum of signs and symptoms of ovarian dysfunction than those defined by original diagnostic criteria. In 2003 Revised Consensus Workshop on Diagnostic Criteria and Long-term Health Risks Related to Polycystic Ovary Syndrome was organised in Rotterdam, The Netherlands, and the report has been published by the American Society for Reproductive Medicine in Fertility and Sterility in January 2004.

In 1990 diagnostic criteria, both of the following are included:

1. Chronic anovulation, and
2. Clinical and/or biochemical signs of hyperandrogenism, and exclusion of other etiologies.

According to the revised 2003 diagnostic criteria of PCOS, the presence of any two out of the following three would suffice:

1. Oligo- or anovulation
2. Clinical and/or biochemical signs of hyperandrogenism
3. Polycystic ovaries, and exclusion of other etiologies (congenital adrenal hyperplasia, virilizing tumors and Cushing's syndrome).

Long-term Health Risks - There is now clear evidence that women with PCOs are at increased (3-7 times) risk of developing type 2 diabetes, and also at increased risk of cardiovascular disease. Women with PCOS have evidence of dyslipidemia and markers of abnormal vascular function. They are also thought to be at increased risk of endometrial cancer through chronic anovulation with unopposed estrogen exposure of the endometrium. However, epidemiological evidence in support of the above is limited.

In the light of the above, a very broad definition of PCOS based on the concept of ovarian dysfunction associated with multi-system endocrinopathy comprising constellation of varying signs and symptoms would be the best course. The basic diagnosis may be made using the criteria of 2003 consensus. But these subjects would need to be properly categorized based on clinico-pathological alterations, and they should receive specific treatments based on etio-pathological findings. Since the diagnosis of PCOS is largely by exclusion of other conditions producing PCOs, this would need much wider range of investigations.

While many physicians empirically diagnose a woman with PCOS based on the clinical features, proper diagnosis by careful exclusion would require obtaining blood samples for a variety of hormones, including those produced by the ovaries, adrenal glands, pituitary gland and thyroid gland. A thorough physical examination and pelvic ultrasound are also important. Screening for blood lipid profile including HDL cholesterol, triglycerides, glucose and insulin should also be the part of complete evaluation. For many years, therapies for PCOS have included drugs to control the symptoms, such as contraceptive pills for irregular menses, anti-androgens like spironolactone and cyproterone acetate (CPA) for excess hair, acne etc., and fertility drugs to induce ovulation. Since many women with PCOS have insulin resistance, some of the new therapies would include drugs called insulin sensitizers, or drugs to decrease insulin resistance, e.g. Metformin, Pioglitazone. Women with PCOS may also suffer from chronic health consequences including hypertension, diabetes, increased risk of breast and uterine cancer, increased triglycerides, obesity and increased risk of heart disease. These also would need attention.

SYSTEMATIC EVALUATION A.

Clinical Investigations

Careful Clinical History

- History of mode of onset and progress of signs and symptoms
- Age of onset and the pattern of past and present menstruation - irregularity/oligomenorrhea/amenorrhea
- Previous investigations done and the treatment received and the results thereof.
- Personal history - occupation, life style; history of low birth weight or precocious puberty.
- Ethnic origin and family history of similar problem and of diabetes mellitus.

Physical Examination

- Height, body weight, body mass index (BMI)
- Blood pressure, pulse rate
- Waist and hip circumference
- Signs of hyperandrogenism - hirsutism and its distribution, acne; pubic hair pattern; clitoral enlargement.
- Hyperpigmentation, particularly on the back and sides of the neck, axillae, skin folds and pressor points.
- Breasts - lobule-alveolar development which is less in case of chronic anovulation; galactorrhea.
- Pelvic examination.

B. Laboratory Investigations

- Pelvic ultrasonography (transabdominal and transvaginal), specially for PCO pattern and stromal hypertrophy in the ovaries.
- Glucose tolerance test - measure glucose and insulin at least at '0' hour (fasting) and at 2 hrs. after 75 gm glucose given orally.

- Fasting levels of FSH, LH, PRL, TSH; testosterone, androstenedione, 17a OH-progesterone & DHEAS, on any of day 3 to 5 after natural or progestin withdrawal bleeding.
- Lipid profile; liver and kidney function tests.

RATIONAL MANAGEMENT

After doing investigations along the above lines, the following categories of subjects are likely to be encountered.

A. Those showing hyperinsulinemia and/or insulin resistance with or without obesity:

1. Peri-adolescent and young adult girls - unmarried.
2. Adult women - married; may or may not need immediate help for fertility.

B. Those without insulin defect, with or without obesity:

1. Unmarried adolescent or young adult girls.
2. Adult married women; may or may not require help for immediate fertility.

Group A: Those with insulin defect the management will be as follows:

All subjects in this group may initially be treated with Metformin 500 mg. (sustained-release tablet) twice a day for about 3 months. In case of obesity, weight reduction through diet control and physical exercises is advised. Diet should have low calorie, low carbohydrate, low fat, and high protein and high fibre. Blood glucose and insulin levels are to be monitored and the effects of this treatment on clinical parameters and abnormal hormonal profile (PRL, LH and androgen levels) and on lipid profile are to be studied at the end of 2 and 3 months.

In cases with other abnormalities, specific therapy for their correction is to be added to the regimen as listed below:

- If prolactin is high: Treatment with bromocryptine 2.5 mg at bed time or twice daily for 2-3 months.
- If LH is high with high androstenedione or testosterone: To treat with estrogen (E) plus progestin (P) (oral contraceptive pill with added estrogen) for 3-6 months, and spironolactone 50-100 mg/day for 3-6 months.
- If 17(OH Progesterone/DHEAS is high: To treat with daily midnight dose of dexamethasone - (0.5 mg) for one month, and then with 0.25 mg for 3 months and may add spironolactone -50 mg twice daily.
- Those interested in fertility, may be treated first with increasing doses of clomiphene citrate (CC) alone - 50 mg ->75 mg -> 100 mg daily for 5 days (Day 5 to 9) in each cycle; then if needed, with CC plus dexamethasone/or hCG injection.
- Other measures would include: emphasis on changes in life style and preventive measures against long-term risk factors which include infertility, diabetes, abnormal lipid metabolism and cardio-vascular disorders.

Group B: Those without insulin defect the management will be as follows:

- Those with hormonal abnormalities would be given specific therapy as described above under Group A.
- In case of obesity, weight reduction through diet control and exercise as advised in Group A.
- Those requiring fertility may be treated first with clomiphene citrate (CC) alone, and then with CC plus dexamethasone or CC plus hCG as described above. Occasional cases may need treatment with HMG followed by hCG.
- For others, emphasis has to be on changes in life style and preventive measures against LONG-term risk factors WHICH include infertility, diabetes, abnormal lipid metabolism and cardio-vascular disorders.

Details of Different Treatment Schedules

The different drugs and other procedures that are likely to be used in the management of PCOS include:

- 1) Oral contraceptives with or without added estrogen;
- 2) Spironolactone or Cyproterone acetate; 3) Bromocriptine;
- 3) Clomiphene Citrate; 5) Metformin; 6) Pioglitazone;
- 7) Dexamethasone; 8) Human chorionic gonadotropin (hCG);
- 8) HMG plus hCG; 10) Laparoscopic ovarian drilling; and 11) Changes in life style and other preventive measures

All the above drugs have been in clinical use for varied purposes for several decades. These have been found to be quite safe and without any significant side effects when used properly and judiciously.

1) Oral Contraceptives - These are combinations of estrogen (E) and progestogen (P). Novelon tablet contains ethinyl estradiol - 30^μg plus desogestrel 150^μg. This combination primarily decreases ovarian steroid hormone secretion through suppression of FSH and LH secretion from the pituitary. When greater suppression of LH is desired 50^μg of ethinyl estradiol may be added to each dose, which is administered daily after dinner for 21 days each cycle¹. This therapy also decreases adrenal androgen secretion. Estrogen increases the sex hormone binding globulin (SHBG) and thereby decreases the free testosterone and androstenedione. Cyclic administration of E + P produces regular withdrawal bleeding thereby correcting the menstrual irregularity.

This mode of therapy in young unmarried girls may also serve as a preventive measure for fertility. Several such patients treated with E plus P for 1 year or more, achieved pregnancy after marriage with relative ease (Roy unpublished). Others also endorse such a viewpoint.

Minor *side effects* include nausea, vomiting, breast changes and weight gain. *Contraindications* include pregnancy, liver disease, jaundice, diabetes, thrombo - embolic disease, and cancer of breast or endometrium.

2a) Spironolactone - It is an aldosterone antagonist and in addition, it has specific anti-androgenic effect. This drug competes at androgen receptor level and also inhibits the 5 alpha reductase activity thereby decrease conversion of testosterone into dihydrotestosterone (DHT), thus lessening hair growth, acne and sebum production⁶⁹⁷⁰. This is to be administered in 50-100 mg doses twice daily for 3 months or longer.

Minor and transient *side effects* include polyurea, dizziness, headache, electrolyte disbalance.

2b) Cyproterone acetate (CPA) - It is a specific anti-androgen which competes with androgens for receptor binding; it is also a potent progestational agent. In combination with ethinyl estradiol (Diane - 35) it is being marketed as an oral contraceptive. This combination is very effective in cases of PCOS having menstrual irregularity with hirsutism, acne etc.

It does not have much side effect; but is quite costly.

3) Bromocryptine - It is a synthetic ergot derivative and a potent dopamine agonist. It decreases the prolactin (PRL) release from the pituitary by acting on dopaminergic receptors on lactotroph cells in the pituitary. Therefore, it is used in cases with hyperprolactinemia⁷¹. This is to be administered in 2.5 mg doses given twice daily. Since PRL is a sleep-related hormone, the main dose will be at bed time and the other in the morning. The effect is to be monitored by blood PRL estimation, and the dosage adjusted accordingly.

Side effects- Nausea, vomiting, postural hypotension and syncope; but these are mild and rare.

Contraindications- Hypersensitivity to ergot alkaloids, diabetes, liver and renal dysfunction, cardio-vascular disease.

4) Clomiphene citrate- It is a nonsteroidal agent having a weak estrogenic but a more potent anti-estrogenic property. It competes with and modulates estrogen receptors in target tissues; by blocking estrogen feed back action at hypothalamic-pituitary level it stimulates gonadotropin secretion and thereby induces ovulation in anovulatory women⁷²⁷⁵. It is

usually administered in doses of 50 mg to 100 mg daily for five days in a cycle (Day 5 to 9). Higher doses (150-200 mg) for 5 days or smaller doses (50-75 mg daily) for longer duration of 10 days (Day 3-12) have also been tried.

Side Effects are relatively rare and may include abdominal discomfort, ovarian enlargement, visual blurring, hot flashes and hair loss.

Contraindications- Liver dysfunction, pregnancy, abnormal ovarian enlargement.

5) Metformin- It is biguanide and it has been extensively used in the treatment of non-insulin dependent diabetes mellitus. It is an insulin sensitizer, and probably acts by promoting peripheral glucose utilization. Hyperinsulinemia and/or insulin resistance is noted in a good proportion of PCOS subjects. Metformin improves insulin sensitivity and decreases androgen levels and helps in restoring normal menstrual cycle⁷⁶⁻⁷⁸. In the absence of spontaneous menses, ovulation induction may be achieved with relative ease either with clomiphene citrate alone or with CC plus hCG or HMG plus hCG

When a PCOS patient on metformin therapy becomes pregnant, this drug should be continued throughout pregnancy. Properly conducted clinical studies have shown that metformin treatment prevents first trimester spontaneous abortion and the chances of gestational diabetes. It does not have any teratogenic or other deleterious effects on the child followed upto 3-4 months after birth^{79,80}.

Dosage- 500 mg three times daily or 850 mg twice daily before meals for 2 to 3 months or more. The new Metformin 500 mg (S.R.) sustained release tablets are given once or twice daily, and shows better results.

Side effects- Gastro-intestinal disturbances, and very rarely lactic acidosis. For prevention of lactic acidosis, it should not be used in patients with serum creatinine higher than 1.5 mg/ml, and blood lactate level may also be monitored.

Contraindications- Renal failure, hepatic insufficiency, high blood lactate concentration.

6) Pioglitazone- It is a thiazolidenedione derivative. In cases with resistance to metformin, this may be administered in doses of 30 to 45 mg daily orally either alone or in combination with metformin⁸¹. This drug increases glucose insulin dependency and peripheral glucose disposal, and decreases insulin resistance and hepatic glucose output. It should be mentioned here that another similar effective drug, troglitazone, has been withdrawn from the market because of toxicity.

Contraindications- This drug cannot be given to cases with impaired kidney function. Blood urea, creatinine and serum lactate levels should be monitored.

7) Dexamethasone- It is a very potent gluco-corticoid, which can cause marked pituitary-adrenal suppression. Because of circadian rhythm, high-level ACTH secretion occurs around 2.00 A.M. in very early morning, which accounts for **213rd** of diurnal production of adrenal cortical hormones. Therefore, a daily midnight dose of 0.25 mg to 0.5 mg dexamethasone will cause a significant reduction in adrenal androgen secretion. Roy et al were among the first to have used such regimen as early as 1968⁸². Glucocorticoid therapy has also been reported to augment gonadotropin secretion. In cases with relative clomiphene resistance, dexamethasone has been used as an adjunct, giving better results⁸³⁻⁸⁴.

Side effects- Weight gain, hyperglycemia; however with this dosage regimen side effects are very rare.

8) hCG- Human chorionic gonadotropin is administered in doses of 5000 IU or 10000 IU for induction of ovulation - when dominant follicle(s) reaches the size of 18 mm. This is usually used as an adjunct to clomiphene citrate therapy. It may also be used in mid-luteal phase for providing luteal support.

9) Pituitary Gonadotropins plus hCG- In resistant cases, for induction of ovulation low dose HMG or purified/rFSH plus hCG have been used successfully in PCOS subjects. In hyperinsulinemic subjects coadministration of metformin has been found to be very useful⁸⁵⁻⁸⁷.

10) Laparoscopic Ovarian Drilling- Laparoscopic ovarian drilling (LOD) has now been advocated as an alternate line of treatment for anovulatory infertility due to PCOS after failure of other regular courses. LOD is reported to correct the endocrine abnormalities associated with the syndrome, and produce high ovulation and pregnancy rate. Some investigators feel that LOD may be used at an early stage of management of PCOS patients; however, others do not agree.

Electrocautery or laser is used to destroy a portion of ovaries. Earlier studies in women with PCOS have reported that ovarian drilling resulted in about 80 per cent ovulation, and a 50 per cent pregnancy rate. After LOD there is a persistent fall of androgens (testosterone and androstenedione) and LH, with a subsequent increase in the level of FSH. With such corrected function of hypothalamic-pituitary-ovarian axis, ovulation is promoted⁴³⁸⁸⁸⁹. These endocrine changes reported after LOD are similar to the older data noted after wedge resections which were abandoned due to excessive adhesion formation during post-operative period. LOD also reduces the size of the ovary. Younger women with a body mass index in the normal range are most likely to benefit from LOD.

Unlike ovulation stimulation regimens, there is no increase in risk of multiple pregnancy or ovarian hyperstimulation after LOD. Interestingly, in a study where four patients had drilling of just one ovary, there was evidence of ovulation from the other ovary during the first cycle in three of the patients. The risks of laparoscopic drilling include the usual risks of laparoscopy like infection of the incision site, bleeding from the incision, internal bleeding, accidental injury to internal organs or major blood vessels, pain or problems due to anaesthesia.

11) Changes in Life Style & Other Preventive Measures- In obese PCOS women, the primary emphasis would be on weight reduction through diet control and active physical exercise. Diet changes would include: (a) low total calorie, (b) low carbohydrate and low fat, and c) high protein and high fibre. In these subjects, varying degrees of stress factors are also operating; some are related to their infertility and others may be in their family and/or work environments. Therefore, they need effective stress management measures. All these would improve their fertility chances and decrease dyslipidemia and other associated disorders⁹⁰.

In younger girls presenting with hyperandrogenism and/or insulin resistance, prolonged suppression of ovarian function with E+P and/or using insulin sensitizing drugs would have preventive value against infertility, early onset of diabetes mellitus and atherosclerotic cardiovascular disorders.

SOME RESEARCHABLE ISSUES

On Etio-pathogenesis

Role of Hyperandrogenism

From various experimental studies and clinical conditions there are strong evidences to indicate the role of excess androgen in the etio-pathogenesis of PCOS. However, some investigators have pointed out that the experimental models using lower animals (non-primates) cannot be used as these do not replicate the heterogenous clinical features as noted in PCOS subjects⁹¹. However, such basic differences are also well known in other fields of research involving laboratory animals and human subjects. Nevertheless, studies in experimental animals have helped in some of our basic understanding which is also valid in the human being. As for example, chronic anovulation leads to polycystic changes in the ovary, and androgen can play an etiological role in producing oligo - / anovulation and PCOs. Furthermore, prenatal androgenization of female rhesus monkeys has been reported to produce PCOs in adulthood with similar ovarian and other endocrinological changes, as noted in women.³⁹ Although these alterations have analogy to naturally occurring classical CAH, clinical implications of these findings are difficult to prove in non-CAH subjects⁹²⁹³. It is hard, if not impossible, to elucidate whether these PCOS subjects were exposed to any hyperandrogenic (endogenous or exogenous) state during their intra-uterine life.

Further researches are needed to understand the heterogeneity of expression of hyperandrogenism in: (a) idiopathic hirsutism, (b) non-classical (adult onset) CAH and (c) hyperthecosis of the ovary with stromal luteinization. Idiopathic hirsutism has been reported to have i) weak hyperandrogenism, ii) PCOs, and iii) increased blood LH; but with regular 'cycles' and no hyperinsulinemia. But interestingly, about 40 per

cent of hirsute patients with history of 'regular cycles' could actually be oligo-/anovulatory.

In the rhesus monkey model, attempts should be made to produce PCOs in growing adult female monkeys, as has been done in growing adult rats by Roy et al²⁹. Then study the similarities and differences between this and pre-natally androgenized female monkeys.

The heterogeneity in expression in different clinical variants and experimental monkey models may be due to other genetic and environmental factors including life style, stress factors etc. Familial occurrence of hyperandrogenemia in PCOS provides evidence for genetic basis⁹⁴. Further studies indicate an autosomal dominant inheritance⁹⁵.

11. *Alterations in Intra-ovarian Control Mechanism*

Some of the recent developments have added new dimensions to the intra-ovarian control mechanism. Within the ovarian follicles, the presence of FSH -- receptor -- binding -- inhibitor (FSH - RBI or FSH-BI) has been reported; it has been shown to neutralize the action of FSH⁹⁶. Probably it has some role in intra-ovarian control mechanism, the precise mode of which is not known. In normal ovarian function, the LH acts on ovarian stromal cells and theca cells of the ovarian follicles and these cells produce androstenedione; then this androgen gains access into the granulosa cells in the ovarian follicles. FSH within the follicles stimulates the enzyme aromatase, which in turn converts androgens to estrogens; FSH also stimulates folliculogenesis and follicular maturation. The rising titre of estrogen in the blood produced by the developing follicles induces LH surge which leads to ovulation.

It is noteworthy that FSH brings about these changes inspite of the presence of certain level of FSH-RBI within the follicles. It is possible that a balanced ratio of FSH/FSH-RBI is important for normal folliculogenesis, ovulation etc. Interestingly, higher level of FSH - RBI has been reported in PCOS⁹⁶. It is possible that higher level of FSH-RBI may inhibit FSH action, and thereby proper follicular development is prevented which leads to anovulation. Sustained or chronic anovulation may produce polycystic changes in the ovary.

Estrogen (E) as well as androgens (A) have been reported to sensitize the ovaries to gonadotropin action, and these modify the follicular response. Therefore, the absolute as well as relative concentrations of E and A in follicular fluid may be an important determining factor. The levels of A may be increased in the presence high LH, and also by insulin. Ultimately, these may lead to higher FSH-RBI/FSH ratio within the follicle which may be an important factor in the pathogenesis of PCOs. Polycystic ovaries have been found in a variety of clinical conditions and in all these anovulation is a common factor. Now question arises whether the final common path is mediated through higher level of FSH-RBI within the follicles. This hypothesis needs to be tested by properly designed studies.

Diagnostic Issues

1. What would be a simple and convenient way to determine insulin resistance? Several types of approaches have been suggested.
 - a) Blood glucose/insulin ratio at fasting state and after glucose load. This value may be higher in obese subjects only.
 - b) Ratio of area under curve (AUC) of glucose to AUC of Insulin levels. This is quite labourious and is not sensitive enough for routine use.
 - c) Blood levels of glucose and insulin at fasting state and after glucose load, and compare these with reference range. For this there is a need to determine normative values for different population groups by the concerned laboratories.
2. For determining hyperandrogenemia, which are to be measured for biochemical evidence- DHEAS, testosterone or androstenedione? DHEAS is considered to be mainly of adrenal origin and testosterone is from the ovary. Adrenal androgen levels are related to age and BMI, for which normative values need to be generated in different population groups.

It is also to be considered whether total androgens or free forms are to be measured. According to Revised Consensus of 2003, measurement of free form using sophisticated technique only could be of some value⁴². For practical purposes this would then be out of reach to most of the laboratories.

Therapeutic Issues

1. For induction of ovulation, use of clomiphene citrate (CC) has been the mainstay for more than 40 years since its first use by Greenblatt and co-workers⁷²⁷³. But this has some drawbacks in general and particularly in PCOS subjects.

- a) Compared to its success rate in ovulation induction, pregnancy rate is much lower. This may be due to the antiestrogenic effects on cervical mucus and/or the endometrium. Could this be overcome by giving a short course of low dose estrogen immediately after clomiphene therapy?
- b) Ovarian hyper stimulation has been noted with the use of CC alone or with hCG in PCOS subjects. This risk is more with the use of HMG plus hCG.
- c) Some cases may become resistant to CC. Could the use of relatively lower doses (50-75 mg daily) of CC for longer duration of 10 days (Day 3-12) solve this problem?⁹⁷

2. Could the use of Letrozole, an aromatase inhibitor be a better substitute in some cases? This drug inhibits conversion of androgen to estrogen. Thus decreasing the negative feedback action of estrogen on hypothalamic-pituitary axis it probably increases gonadotropin secretion leading to ovulation^{98,100}. However, it might also increase intraovarian androgen level which may have beneficial or deleterious effects, depending upon its concentration. Further controlled studies are needed before its indiscriminate use.

3. There are some reports to indicate that the use of insulin -sensitizing drugs like metformin, troglitazone (now withdrawn for toxic effects) and pioglitazone can have beneficial effects even in normoinsulinemic PCOS subjects^{78,81,101-102}. How are these working? Do they have any direct effects on the ovary and elsewhere? If so, what is the nature and mechanism of action?

If these are used indiscriminately in all PCOS subjects, what would be the rationale, indications and monitoring mechanisms? Any changes in clinical parameters like menstrual irregularity, hirsutism or

acne etc. are time-consuming and often inconsistent. Therefore, there is an urgent need for proper scientific studies to find answers to these important issues.

CONCLUSION

Polycystic ovary disease/syndrome (PCOD/PCOS) is the most common endocrinopathy in women causing menstrual irregularity, hirsutism and anovulatory infertility. Its clinical presentations are heterogeneous and its etiopathogenesis is also diverse; it has been termed as a multi-system endocrinopathy. It has been a subject of research and debate over the past six decades. More recent discovery of its association with insulin resistance and hyperinsulinemia and their long-term consequences now emerging calls for early preventive measures. For any rational management of this disorder, proper elucidation of the varied pathologic physiology and heterogeneous etiopathogenesis through well planned research is urgently needed.

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Lkkjk'k

बहुपटीय डिम्बग्रन्थि रोग / संलक्षण (पी.सी.ओ.डी / पी.सी.ओ.एस.) महिलाओं में अनियमित मासिकस्राव, पुंवरमता तथा डिम्बाक्षरण बांझपन का अत्यधिक सामान्य कारण है। बहुपटीय डिम्बग्रन्थि संलक्षण से ग्रस्त रोगियों की क्लिनिकल स्थिति में अति-एन्ड्रोजनकता सहित स्पष्टतः नियमित मासिकस्राव संबंधी अपसामान्यता के साथ अत्यधिक तीव्र विकार डिम्बाक्षरण बांझपन ताम अन्य चयापयी विकारों सहित व्यापक भिन्नता पाई जाती है। हाइपरइन्सुलिनिमिक इन्सुलिन प्रतिरोधक की खोज द्वारा बहुपटीय डिम्बग्रन्थि रोग के साथ-साथ अन्य चयापचयी विकल्पों तथा परिणामों में नए आयाम जुड़ गए हैं।

क्लिनिकल स्पष्टता ताम प्रयोगशालीय एवं प्रयोगात्मक शोध अध्ययनों पर आधारित व्यापक आंकड़े उपलब्ध होने के बावजूद, विगत छः दशकों से भी अधिक समय से यह प्राथमिक विकार अथवा हेतुकीय दोष रोग निदान तथा रूचि का विषय बना हुआ है। अन्वेषकों में सहमति के अभाव में अनेक संकल्पनाएं प्रस्तावित की गई तथा रक्तवृद्धि संबंधी उपचार प्रणालियों के बारे में सुझाव दिए गए हैं।

बहुपुटीय डिम्बग्रन्थि संलक्षण के संबंध में विभिन्न अन्वेषकों/ विशेषज्ञों के विचारों में मतभेदों का समाधान करने के लिए वर्ष 1990 में सर्वसम्मति बनाने के उद्देश्य से एन.आई.एच तथा एन.आई.एच.सी.डी., यू.एस.ए. द्वारा एक संयुक्त बैठक आयोजित की गई थी। किन्तु इस संबंध में कोई सर्वसम्मति न बन सकी थी। विशेषज्ञों की द्वितीय बैठक अक्टूबर, 1997 में नीदरलैंड में एक संशोधित सर्वसम्मति कार्यशाला आयोजित की गई थी। किन्तु इस दिशा में कोई प्रगति नहीं हो सकी थी। इस संशोधित नैदानिक मानदण्ड के अनुसार निम्नलिखित तीन में से दो मानदण्ड पर्याप्त होंगे: (1) डिम्बक्षरण हेतु डिम्बोत्सर्ग (2) अति एन्ड्रोजनकता के क्लिनिकल तथा/अथवा जैव-रसायनिक संकेत, (3) बहुपुटीय डिम्ब-तथा अन्य हेतुकीय पृथकता।

उर्पयुक्त तथ्यों को ध्यान में रखते हुए, वर्ष 2003 में संशोधित सर्वसम्मति के अनुसार समुचित उपचार विधि द्वारा बहुपुटीय डिम्बग्रन्थि संलक्षण का बुनियादी उपसा करना संभव होगा। किन्तु, हेतु की विकृतिजन्य तथा क्लिनिकल प्रयोगशालीय स्पष्टता में व्यापक विषमता विद्यमान होने के कारण भिन्न-भिन्न संकेतों तथा लक्षणों के समूह सहित बहु-प्रणाली अन्तःस्रावी रोग विज्ञान को भी ध्यान में रखा जाना है। अतः इन रोगियों की लाक्षणिक विकृतिजन्य जांच संबंधी निष्कर्षों के आधार पर उचित वर्गीकरण करना होगा तथा उनके हेतुकीय विकृतिजन्य निष्कर्षों पर आधारित उनका विशिष्ट उपसा किया जाना चाहिए और उनकी प्राथमिक आवश्यकताओं का समझा जाना चाहिए। निवारक परिचर्या पर भी प्रमुख रूप से बल दिया जाना चाहिए।

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MALE INVOLVEMENT IN FAMILY PLANNING PRACTICES

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ABSTRACT

Various national family health surveys (NFHS) indicate that male participation in family planning (FP) is very marginal. An active involvement of men in family planning is expected to ensure a better acceptance of the FP programme. The present study was initiated among 300 husbands and their wives attending the Out-patient Department (OPDs) of Safdarjang Hospital, New Delhi. The aim of the study was to find out the involvement of male partner in family planning and their Knowledge, Attitude and Practice (KAP) towards it with reference to literacy and age. Majority of the subjects (89%) were aware of condom as a contraceptive and it was the most preferred method of contraception with no associated problems of use (95%). Literacy status of the husband positively influenced their discussions with spouses about family planning and taking joint decisions subsequently. This trend was more prevalent in the younger than the older age group. Couples' choices on permanent sterilization were favourably tilted towards wife than the husband in majority of the cases (71.2%). The above findings suggest that literacy status of the male partner ensures a better husband-wife communication and active male involvement in family planning.

Keywords: Male involvement, Family planning, Decision-making, Literacy, Age

Reproductive health implies that people lead a responsible, satisfying and safe sex life in which they have the capacity to reproduce and the freedom to decide when and how often to do so. It also entrusts men and women the right to be informed of, and have the access to safe, effective, affordable and acceptable methods of fertility regulation¹.

In the past, population control programmes have given little emphasis on men's involvement. The national population policy 2000 (NPP-2000), for the first time stressed on an increased participation of

men in Planned Parenthood. There are now national and international efforts to strengthen male involvement in family planning, decision-making and other reproductive health behaviour. Gender inequalities persisting in patriarchal societies require that men play a critical role in every aspect of life. Various national family health surveys shows that male participation in family planning is very marginal². The major obstacle in involving male in reproductive health programme is their reluctance to use the services. Men are suspicious about family planning as something that undermines their power of maleness. As a result, it is the women who bear the major share of the effective family planning measures. This gender inequality in the practice of family planning needs urgent corrective measures in the form of active co-operation and participation from men. The present study was thus undertaken to find out men's involvement and their knowledge, attitude and practices (KAP) towards contraception and FP.

MATERIALS AND METHOD

Study Area: The study was conducted at the Out-patient Department (OPD) of Safdarjang Hospital, New Delhi. Though the catchment area of the hospital spreads from Hauz khas to Dhaula Kuan, being a centrally sponsored hospital, it caters to a much wider population with no limitation of areas.

Study Population: 300 husbands and their wives were interviewed by a pre-tested structured questionnaire. The KAP of husbands towards family planning was studied over a period of one month.

Methodology: The study focussed mainly on the involvement of male partner in family planning practices and his attitude towards contraception. The literacy status and the age of the husbands were also taken into consideration while studying their KAP towards family planning.

This is a hospital based cross-sectional study. The data collected were analysed by using SPSS Software package.

FINDINGS AND DISCUSSION

Most of the study couples were in the age group of 20-39 years. Thus, majority of the subjects in the study group was in the younger age group and the so-called target group. Most of them (55%) were literates up to secondary or higher secondary level of education; followed by primary education (22 %) and graduation or above comprising 14 percent of the study population. Illiterate husbands comprised only 9 percent. A majority of the study subjects (69%) were into private jobs.

Most of the men had the knowledge of one or more than one contraceptive methods. Knowledge on condom was the highest with 89 percent followed by Cu-T and oral pills 41.7 percent each. Only 7.7 percent of husbands had no knowledge of any contraceptives (Table-1). This is in contradiction to the findings of a study in Pondicherry where men's knowledge about female contraceptive methods was reported very low and vice-versa³.

TABLE 1
KNOWLEDGE ABOUT CONTRACEPTIVES

Type of contraceptive	Nos.	%
Condom	267	89
CuT	125	41.7
Oral pills	123	41
Permanent method	44	14.7
Others	5	1.7
Do not know	23	7.7

While analysing the sources of knowledge about contraceptives, it was found that media played a major role in 59 percent of cases followed by friends (25 %) and relatives (16 %).

While comparing the literacy status of the husbands with their attitude towards family planning, it was seen that when the literacy status was high, there was also a significant increase in the husband-wife communication about family planning was observed (Table 2). Similar findings were also reported earlier⁴. It was also observed that more husbands (56%) in the younger age group (21-30 years) discussed family planning with their spouses as compared to only 22 percent in the age group of >40 years.

TABLE 2
HUSBAND'S ATTITUDE IN DISCUSSING
FAMILY PLANNING WITH WIFE

Discussion		Literacy status					Age of Husband			
About FP	Illiterate	P	S	HS	G	Total	21-30	31-40	>40	Total
Yes	6	27	66	34	22	155	94	57	4	155
	23%	40%	60%	61%	54%	52%	56%	50%	22%	52%
No	20	40	44	22	19	145	75	56	14	145
	77%	60%	40%	39%	46%	48%	44%	50%	78%	48%
Total	26	67	110	56	41	300	169	113	18	300
	100%	100%	100%	100%	1100%	100%	100%	100%	100%	100%

$X^2 = 16.937$ df4P<0.01; $X^2 = 29.157$ df-22 P>01 P: Primary
S Secondary HS: Higher secondary G: Graduate

With regard to decision-making, literate husbands favoured taking decision jointly with their wives, an observation which was found to be statistically significant. At the same time, it was found that husbands didn't favour the independent decisions by wives on family planning (Table 3). Joint decision-making has been reported in some other studies but in such cases husbands wished to be recognised as the prime decision makers even though they may have agreed to a joint decision-making¹⁴. The present study revealed that husbands in the younger age group (21-30 years) favoured joint decision making (34%) as compared to husbands in the older age group of 40 years and above (11%).

TABLE 3
DECISION MAKING BY SPOUSES ON FAMILY PLANNING

Decision maker	Literacy status						Age of Husband			
	Illiterate	P	S	HS	G	Total	21-30	31-40	>40	Total
Husband	22	51	63	34	20	190	104	70	16	190
	85%	76%	57%	61%	49%	63%	62%	62%	89%	63%
Wife	1	1	9	2	3	16	8	89%	0	16
	4%	1%	8%	4%	7%	5%	5%	7%	0%	5%
Both	3	15	38	20	18	94	57	35	2	94
	12%	22%	35%	36%	44%	31%	34%	31%	11%	31%
Total	26	67	110	56	41	300	169	113	18	300
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

$X^2 = 17.656$ df-8 P<0.05 $\chi^2 = 52.231$ df44 P>0.1 P: Primary S: Secondary HS: Higher secondary G: Graduate

Couples choices as to who should opt for permanent sterilization is shown in Table 4. In most cases, it was the wife who had undergone or would be going for permanent sterilisation (71%). The national population policy also clearly points to such a gender imbalance as maximum percentage of sterilisation conducted till date in the country is tubectomies. In the present study, the couples preferred a two-children norm and a permanent sterilisation after two-children (35.3%). A previous study has reported that the decision to accept a permanent method of sterilization was mostly influenced by family size⁵.

TABLE 4

	Done	After 2 children	After >2 children	Not decided	Total
Husband	57 {19.1%}	24(7.9%) 82(27.4%)	6(19%)	0	87(28.9%)
Wife	80 {26.5%}		26 (8.8%)	25 (8.4%)	213 (77.7%)
Total	137(45.6%)	106 (35.3%)	32 (10.7%)	25 (8.4%)	300 (100.0%)

Analysis of the family planning method adopted by the couples showed that most of the couples (90%) preferred condom as the safest method of contraception followed by CuT in 60 percent of cases (Table 5). Such preference for condom has also been observed in other studies⁵.

In the present study, there was hardly any problem reported from couples following the use of condom. On the other hand, about 40 percent of the couples reported some problem with the use of CuT and 20 percent with the use of oral pills.

TABLE 5
PROBLEMS IF ANY IN THE CURRENT METHOD OF FAMILY PLANNING

Problems	Condom	CuT	Oral pill	Permanent method
Yes	0	11 (40.7%)	2 (20.0%)	1 (4.5%)
No	20(100.0%)	16(59.3%)	8 (80.0%)	21 (95.5%)
Total	20	27	10	22

CONCLUSION

Active cooperation and participation from men is vital for ensuring a greater family planning programme acceptance. The present study reveals an increased awareness and use of condom as a temporary male contraceptive method. This is suggestive of a perceptible change in the socio-behavioural attitude amongst the male partners of the younger generation that needs to be supported and maintained. The study also showed that literacy status of the male partner had a strong influence on the female involvement in family planning and a better husband-wife communication. Thus, irrespective of the age of the husband, the efforts of counselling on family welfare would provide a better impact on user acceptance. Most of the couples preferred to adopt a two-children norm. However, the study revealed a discriminatory attitude of the male partner when it comes to opt for a permanent method of sterilization as in most cases it is the female who volunteered for it. This gender imbalance in the practice of contraception needs urgent corrective measures in the form of IEC programmes that eventually may result in a better male involvement in family planning.

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विभिन्न राष्ट्रीय परिवार कल्याण स्वास्थ्य सर्वेक्षणों से प्राप्त निष्कर्षों से पता चलता है कि परिवार कल्याण नियोजन के विषय में पुरुषों की भागीदारी बहुत कम है। परिवार नियोजन अपनाए जाने के बारे में पुरुषों की सक्रिय भागीदारी से परिवार नियोजन की स्वाकार्यता अधिक सुनिश्चित होनी अपेक्षित है। प्रस्तुत अध्ययन सफदरजंग अस्पताल, नई दिल्ली के बहिरंग रोगी विभाग में आने वाले 300 दम्पतियों पर किया गया था। इस अध्ययन का उद्देश्य पुरुष सहभागियों की शिक्षा और आयु को ध्यान में रखते हुए परिवार नियोजन के बारे में उनकी भागीदारी और उनके ज्ञान, व्यवहार व अभ्यास का पता लगाना था। अधिकांश उत्तरदाताओं (89%) को एक गर्भ निरोधक उपाय के रूप में निरोध के बारे में जानकारी थी और इसके प्रयोग में उन्हें कोई भी समस्या न होने के कारण गर्भ निरोध हेतु निरोध को वे (95%) सर्वाधिक वरीयता देते थे परिवार नियोजन के बारे में संयुक्त निर्णय लेने में पतियों के शैक्षिक स्तर का सीधा प्रभाव था। अधिक आयु वर्ग के दम्पतियों की अपेक्षा युवा दम्पतियों में यह रवैया अधिक पाया गया था।

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MORBIDITY STATUS OF WIDOWS IN INDIA

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ABSTRACT

Selected morbidity status of widows in India was analysed from the data records of the National Family Health Survey conducted throughout India during 1998-99. The objective of the study was to determine the pattern of morbidity (i.e. asthma, tuberculosis, jaundice and malaria) among widows with reference to selected socio-economic and demographic characteristics such as age, type of residence and standard of living index (SLI) etc. The study revealed that the prevalence of Asthma, TB and Malaria was higher among widows and increased rapidly with age compared to currently married women. Jaundice was most prevalent among the younger compared to older widows and the ones in the age group 60 and above suffered the least. Factors such as household standard of living, living arrangements and life style variables like smoking demonstrated a strong association with the prevalence of Asthma and TB. Diseases like Malaria, Asthma and TB were much higher among those living in most distressful conditions. Rural widows were two times more likely to suffer from malaria than their urban counterparts, in the state-wise comparison, Andhra Pradesh had a higher prevalence of these four diseases among widows than the national average. The above findings justify the need for adequate intervention measures for social uplift of this vulnerable group of the society, which would benefit them in improving their health status too.

Key Words: Widows, Morbidity, Prevalence, Standard living index.

Widowhood is characterized by pangs of separation and consequent mental agony, social Isolation and economic dislocation. Along with poverty, landlessness, homelessness and malnutrition, they endure physical violence and verbal abuse leading to serious deterioration of their health. Widows, in the lower economic status, are more vulnerable to negative consequence in health compared to other women. Reproductive and child health advocates the life cycle approach to health

and fertility and the health care of elderly and vulnerable women have been given their due recognition.

The proportion of widowhood varies with time, from country to country and within the country. Man-made factors like wars and terrorism increase the incidence of widowhood in a population. In developed countries, the natural phenomenon that has added to the rate of increase of widows in recent years is the increased longevity among women. According to 1991 census, there are more than 26 million widows in India. Among them, 22 percent each belong to the age group 15 to 49 years and 50 to 59 years and the rest 56 percent in the age group 60 years and above. As per census data, there are interstate variations in the proportions of widows. Goa has the highest percentage of widows (9.7 percent) compared to the lowest found in Nagaland and Sikkim (2.4 and 2.5 percent respectively).

There are very few studies in India, which have analyzed the morbidity status of elderly widows. In an earlier study, the old age sufferings due to various diseases based on data of Maharashtrian women¹ was reported. It was stated that cough and joint pains are more frequently occurring in rural areas whereas occurrence of life style related diseases is higher in urban areas¹. The disability status of elderly women using data of NSSO 42nd round was also reported². Similarly, various aspects of widows' social isolation, which sometimes led them to suffer from mental distress and hypertension, were brought to focus in earlier studies³. Economic deprivation is considered as a probable factor to contribute to such a high morbidity and mortality rates among widows as compared to currently married women⁴.

OBJECTIVES

The present study was designed to examine:

- (i) The morbidity status in terms of asthma, TB, Jaundice and Malaria among widows,
- (ii) The differentials, if any, among the states in the above-mentioned morbidity, and
- (iii) The associated factors influencing morbidity among widows.

METHODOLOGY

Morbidity status of widows in India was analysed from the data of National Family Health Survey-II (NFHS-II), 1998-99. NFHS-II data consisted of four major morbidity conditions i.e. asthma, tuberculosis, jaundice and malaria, among each member of the household. In the present study efforts were made to correlate the morbidity patterns with age, caste, household size, standard of living, place of residence and life style variables like smoking and drinking etc. The study has certain limitations too. As indicated, NFHS-II data on morbidity included information on all the members of a household from the heads of the household or from any knowledgeable adult in the household. No effort was made to confirm the disease through clinical tests. Thus, certain cases of underreporting on the incidence/prevalence of morbidity cannot be completely ruled out. There are valid reasons for this argument. It is likely that respondents might not have reported the prevalence of a disease such as tuberculosis in their households due to social stigma. Underestimation is also possible for the reason that the respondents might be ignorant of any person having a particular disease in their households. Due to the lack of clinical confirmation, a specific disease may have been misreported as some other disease; for example, chronic bronchitis may have been reported as asthma or tuberculosis and fever due to common flu as malaria.

FINDINGS AND DISCUSSION

Demographic and Socio-economic Status

According to NFHS-II, about 60 percent of the widows are in the age group of 60 years and above and 22 percent below 49 years. Educational level among widows is low, 72 percent of them are illiterate and 16 per cent with education up to primary level. Only 10 and 2 percent of the sample widows have education up to secondary and higher level respectively. Living arrangement is categorized into three groups such as living alone, two adult household and two-generation household. One-tenth of widows are reported to be living alone, majority (78%) living with two-generation households and the rest living in two-adult households. Majority (68%) of them are housewives, 16 percent working as labourers, 9 percent cultivators and the remaining working in other types of

remuneration jobs. Household standard of living index (SLI) is measured by a composite score of several indicators of household possession, movable and immovable property (NFHS-II). About 38 percent of the sample households have poor standard of living compared to 18 percent in high standard of living and the rest with moderate standard of living. Life style indicators such as chewing tobacco and *pan masala* (*beetle nuts*), drinking alcohol and regular smoking are not very conducive to good health. It is noted that 25 percent of widows chew *pan masala*, 3.6 percent drink alcohol and 5.4 percent do smoke. The corresponding figures in the currently married category of women are 11.8 percent, 2.2 percent and 2.3 percent for chewing *pan masala*, consuming alcohol and smoking respectively. Thus, the lifestyle habits are much lower among the currently married women than the widows. The consumption of raw tobacco is much harmful and these habits probably aggravate many health problems among widows.

Morbidity Status

Prevalence of Asthma, TB, Jaundice and Malaria varied by marital status as reported from studies in China⁴. Figure 1 presents the prevalence of these diseases by marital status of women in India. It shows that widows suffer from Asthma three times more than the currently married women. Proportion of widows suffering from TB as well as Malaria is also higher than the currently married women, which is reverse in case of Jaundice. Table 1 presents the prevalence of asthma, tuberculosis, jaundice and malaria among widows by socio-economic characteristics such as place of residence, standard of living, education, age group, living arrangement and their life style behaviour like chewing tobacco, drinking alcohol and smoking.

Asthma: Asthma is a chronic respiratory disease characterized by sudden attacks of laboured breathing, chest constriction and coughing. In India, 2,468 persons per 1,00,000 population (2.5%) were reported to be suffering from asthma at the time of the survey. However, the relative prevalence rate among widows was much higher (7.4%). Prevalence of asthma Was more among widows who resided in rural areas. It was also seen that Asthma is higher among widows who are smoking regularly. Prevalence of Asthma was found to have an inverse relationship with education and household standard of living but a positive relationship with age (Table 1).

Tuberculosis: According to NFHS-II, the overall prevalence of tuberculosis in India is 544 per 1,00,000 general population. The prevalence of tuberculosis among widows is higher in rural areas than in urban areas. The prevalence rate for TB is much higher (10 per 1,000) among widows than for general females (4.6 per 1,000).

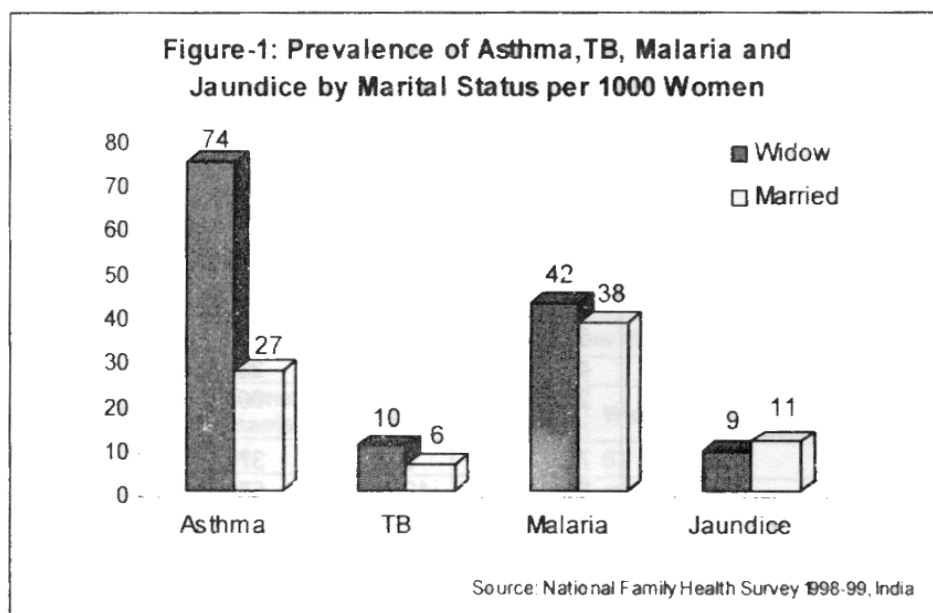
TB showed a consistent higher prevalence among widows residing in rural areas and in those with the habit of chewing and smoking tobacco and drinking alcohol. Living alone and a lower standard of living were greatly associated with an increase in TB prevalence. Though education demonstrated a little effect on the pattern, illiterates and those aged 60+ showed a higher prevalence of TB.

Malaria: NFHS-II data on malaria were collected from respondents with the question that whether any member of their family suffered from malaria at any time during the three months preceding the survey. As per NFHS II, 3,697 persons in 1,00,000 population in India were reportedly suffering from malaria. Since the prevalence of malaria is known to vary considerably by season; the NFHS-II estimate should be used with caution for the level of prevalence of malaria occurring throughout the year.

The prevalence of malaria was seen associated with residence (more among rural widows), chewing tobacco and drinking alcohol. There was also strong association with the occurrence of malaria among widows with poor standard of living, education and living arrangement. A higher prevalence was observed in lower SLI, illiterates and those in younger age group and living alone (Fig. 1).

Jaundice: NFHS-II gathered information whether any member of the household suffered from jaundice at any time during the 12 months preceding the survey. In India as a whole, 1,361 persons per 1,00,000 population were reported to have suffered from jaundice. People living in rural areas are somewhat more likely to suffer from jaundice than those living in urban areas. However, no significant difference in the prevalence between the widows and the general population In India as a whole was observed.

Jaundice was found more associated with those living alone, younger age, lower standard of living index as well as with those widows who chew and smoke tobacco and drink alcohol.



Morbidity of States

Table 2 shows the state-wise comparison of prevalence rates of morbidity among widows. The prevalence of Asthma among widows varied considerably in between states, from the lowest of 41 per 1,000 in Delhi to the highest of 110 per 1,000 in Rajasthan. Other states with relatively high prevalence rates (more than 100 per 1,000) are Bihar (104) and Kerala (106). The prevalence of asthma was much higher among the widows than among the currently married females in all the states in India.

The extent of variations in the prevalence rate of tuberculosis between the states was also large. Tuberculosis prevalence ranged from 1 per 1,000 in Himachal Pradesh to 20 per 1,000 in Bihar. Tuberculosis prevalence rate among widows was noticeably high in Orissa, Assam, Andhra Pradesh and Uttar Pradesh. The prevalence of Tuberculosis was also higher among the widows than among the currently married women in all the states except in the states of Haryana, Himanchal Pradesh, Goa and Delhi.

TABLE 1
PREVALENCE OF ASTHMA, TB, MALARIA AND
JAUNDICE PER 1,000 WIDOWS BY BACK GROUND
VARIABLES IN INDIA

Variables	Asthma	TB	Malaria	Jaundice
Residence				
Urban	61	07	23	8
Rural	79	11	49	9
Household standard of Living				
Low	86	14	59	13
Medium	71	08	39	8
High	58	05	14	6
Education				
Illiterate	79	11	47	9
Primary	68	07	33	11
Secondary	44	02	20	2
Higher	28	07	00	7
Chew Tobacco				
No	71	9	37	8
Yes	84	12	57	13
Drink Alcohol				
No	73	on	41	9
Yes	95	28	62	18
Smoke regularly				
No	72	9	42	8
Yes	169	19	46	22
Age Group				
Less than 34	21	7	39	27
35-49	56	9	57	15
50-59	66	9	42	7
60+	88	10	38	7
Living Arrangement				
Alone	92	19	95	22
two adults	84	CD	48	10
More than 3 adults	71	9	35	7
Total	74	10	42	11

The prevalence of malaria varied widely across the states, at least partly because of seasonal variations at the time of survey. Malaria was the most often reported incidence in the north-eastern states and Madhya Pradesh where more than 10 percent of the households are infected with malaria during the three months preceding the survey (figures of northeastern states not shown). On the other hand, there were fewer cases of malaria in Kerala, Tamil Nadu, Karnataka, Himachal Pradesh, Goa and Delhi (less than 5 per 1,000 population).

State-wise differentials were also substantial for Jaundice. It was most common in Assam and Andhra Pradesh (17 per 1,000) but attained considerable proportions in most other north-eastern states (figures are not shown) as well as in Punjab, West Bengal, UP and Gujarat. Andhra Pradesh showed a higher prevalence of these four diseases than the national average while Tamil Nadu, Gca, Himachal Pradesh and Delhi consistently depicted a lower prevalence than the national average (Table 2).

TABLE 2
PREVALENCE RATE OF ASTHMA, TB, MALARIA AND JAUNDICE
PER 1000 WIDOWS IN MAJOR STATES AND INDIA IN1998-1999

States	Suffering from diseases							
	Asthma		TB		Malaria		Jaundice	
	Widow	Currently married	Widow	Currently married	Widow	Currently married	Widow	Currently married
Andra Pradesh	89	44	14	06	67	54	17	09
Assam	62	23	15	07	27	28	17	21
Bihar	104	26	20	12	49	40	05	13
Goa	48	20	02	07	04	14	06	14
Gujarat	73	25	10	04	86	52	10	09
HARYANA	71	26	04	05	21	24	04	09
Himachal Pradesh	55	11	01	03	04	03	—	06
Jammu	61	19	08	07	08	05	08	11
Karnataka	49	20	05	03	04	04	04	03
Kerala	106	47	08	02	01	00	06	02
Madhya Pradesh	79	24	10	08	110	101	13	19
Maharasht ra	85	29	04	03	58	43	05	14
Orissa	54	33	18	11	79	64	11	06
Punjab	71	15	10	02	15	14	13	09
Rajasthan	110	40	05	05	40	43	05	08
Tamil Nadu	43 #	17	04	04	06	04	05	05
West Bengal	57	24	08	05	07	12	11	13
Uttar Pradesh	75	23	12	08	42	38	11	09
Delhi	41	13	05	06	05	05	02	06
India	74	27	10	06	42	38	09	11

Determinants of Morbidity: A Logistic Regression Analysis

Clearly, as discussed in the earlier section, age and type of residence are the two important variables in the prevalence of morbidity among widows. In addition, education, life style such as alcohol consumption, regular smoking, tobacco chewing, and living arrangements are important characteristics that have adverse effects on one's ability to control diseases. Standard of living in the household again has a direct impact on health because it influences the ability to seek good health care and treatment.

In order to understand the effect of each background variables on the prevalence of Asthma, TB, Malaria and Jaundice; a multivariate logistic regression analysis was used (Table 3). The independent variables were coded and reference category of each variable was mentioned in the same table. The variables were self-explanatory. The results clearly indicated that education of widows was the main link with the prevalence of Asthma, TB and Jaundice. However, SLI, living arrangements and life style variables, especially smoking habit had strong association with the prevalence of Asthma, TB and Jaundice. Illiterate widows and those with education up to primary level were four times more affected by Malaria than those studied up to higher secondary and more. There were underlying variables like widows' household standard of living index (SLI) and the living arrangements which sometimes force them to live in most miserable and fragile health conditions. The variables such as living arrangements and age showed significant association with the prevalence of Jaundice.

As mentioned earlier, Asthma is a chronic problem in the population of poor health status and more prevalent among the aged widows (60⁴). This may be the outcome of life style behaviour of smoking and chewing tobacco. It is the regular smoking habit, which shows substantial influence in the prevalence of TB as well as Asthma. From Table 3, it is clear that chewing tobacco and smoking have a significant effect on Asthma. The prevalence of Asthma, TB, and Malaria were much higher among these who were living in most distressed conditions. The prevalence of diseases was higher among those living alone than among those living with two-generation households. The prevalence of jaundice had no relation with the household standard of living and place of residence. However, widows of younger age group (<35) were four times

TABLE 3
LOGISTIC REGRESSION ANALYSIS OF RESULTS ON
DETERMINANTS OF DISEASES SUCH AS ASTHMA, TB,
MALARIA AND JAUNDICE

Variables	Asthma	TB	Malaria	Jaundice
	Odds Ratio	Odds Ratio	Odds Ratio	Odds Ratio
Residence				
Urban	0.894	1.098	0.648 ^a	0.967
Rural®				
Household standard of Living				
Low	1.275 ^b	3.096 ^a	2.269 ^a	1.145
Medium	1.184 ^c	1.976 ^b	2.094 ^a	1.104
High®				
Education				
Illiterate	1.420	1.199	4.513 ^c	1.157
Primary	1.499	1.580	3.979 ^c	1.320
Secondary	1.274	0.666	2.876 ^c	0.628
Higher®				
Chew Tobacco !				
No	0.863 ^c	1.075	0.736 ^a	0.621 ^a
Yes®				
Drink Alcohol				
No	1.024	0.556 ^c	0.750 ^c	0.720
Yes®				
Smoke				
No	2.824 ^a	3.884 ^a	2.461 ^a	2.748 ^a
Yes®				
Age Group				
Less than 34	0.197 ^a	0.532	0.856	4.020 ^a
35-49	0.490 ^a	0.628	1.423	2.187 ^a
50-59	0.635 ^a	0.831	1.073	0.961
60+®				
Living Arrangement				
Alone	1.413 ^a	1.443	2.309	2.154 ^a
two adults	1.230 ^b	1.026	1.085	1.406
More than 3 adults®				
Constant	0.124	0.010	0.006	0.010

a Significance level < 0.001 percent,
c: Significance level < 0.05 percent,

b: Significance level < 0.01 percent
®: reference category

more likely to suffer from jaundice than the aged widows. In comparison to widows in the households of high standard of living, widows with low standard of living had three times higher risk of suffering from TB. Rural widows were two times more likely to suffer from malaria than their urban counterparts. Further, living in good social environment helped in leading a comparatively healthier life among the widows.

CONCLUSION

There are several important issues and research areas that emerged from the current study. Most importantly, those living with two-generation households showed a better chance of warding off the diseases than those living alone. This is extremely important since living arrangements have direct as well as indirect (emotional well being) impact on health. Household standard of living is another important determinant for the prevalence of TB, Malaria and Asthma i.e. those living in distress conditions are more vulnerable to these diseases. The prevalence of TB increases with age and regular smoking increases the risk of infection. The state of Andhra Pradesh showed a higher prevalence rate for all the four diseases among the widows than the nation average. Based on the above analysis, effective intervention measures using two important variables may be formulated so as to improve their economic conditions and living arrangements that would ensure a better health support to this most vulnerable group of the society.

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वर्ष 1998-99 के दौरान समस्त भारत में किए गए राष्ट्रीय परिवार कल्याण सर्वेक्षण के रिकार्डों से प्राप्त आंकड़ों के आधार पर विधवाओं के रूग्णता स्तर का विश्लेषण किया गया था। इस अध्ययन का उद्देश्य विधवाओं की आयु, आवास के स्वरूप और जीवन-स्तर सूचकांक इत्यादि जैसी चयनित सामाजिक-आर्थिक एवं जनांकिकीय विशिष्टताओं को ध्यान में रखते हुए उनकी रूग्णता संबंधी शैली (अर्थात् दमा रोग, क्षयरोग, पीलिया तथा मलेरिया) का पता लगाना था। अध्ययन से प्राप्त निष्कर्षों से पता चलता है कि विवाहित महिलाओं की अपेक्षा विधवाओं में दमा, क्षयरोग और मलेरिया की व्यक्ति दर अधिक थी और आयु बढ़ने के साथ-साथ उनमें ये रोग से और अधिक बढ़ जाते थे। युवा विधवायें, वृद्ध विधवाओं की तुलना में पीलिया रोग से पीड़ित पाई गई थी और 60 वर्ष तथा इससे अधिक आयु की विधवाएं पीलिया रोग से बहुत कम पीड़ित पाई गई थी। दमा और तपेदिक की व्याप्ति परिवार के जीवन स्तर, रहन-सहन के तौर-तरीकों ताम जीवन-शैली धूम्रपान आदि जैसे विभेदक घटकों से जुड़ी पाई गई थी। अधिक कष्टदायी

स्थितियों में रहने वाली विधवायें, मलेरिया, दमा और तपेदिक जैसे रोगों से अधिक पीड़ित पाई गई थी। शहरों में रहने वाली विधवाओं की अपेक्षा गांवों में रहने वाली विधवाओं में मलेरिया की व्याप्ति दर दुगुनी पाई गई थी। राज्य-वार तुलना की दृष्टि से आंध्र प्रदेश में रहने वाली विधवाओं में इन चारों रोगों की व्याप्ति दर, राष्ट्रीय औसत की अपेक्षा उच्च पाई गई थी। अध्ययन से प्राप्त निष्कर्ष इस बात की पुष्टि करते हैं कि समाज के इस उपेक्षित समूह के सामाजिक उत्थान के लिए पर्याप्त उपाय किए जाने की आवश्यकता है, जिससे इस समूह को अपने स्वास्थ्य स्तर में सुधार लाने में सहायता मिलेगी।

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**IMMUNISATION OF CHILDREN AND MOTHERS IN NORTH-
EASTERN STATES**

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ABSTRACT

Immunisation status of children and mothers in the northeastern states (except Assam) was evaluated in comparison with data at the national level using a WHO 30-cluster survey methodology. About 1,400 children (1-2 years age) and mothers (with children up to one year of age) from one district each from these states were included in the study. The different vaccines that the children received and information on pregnant women receiving Tetanus Toxoid and ANC were collected. The study revealed that about 52 percent of children in north-eastern states received the full dose of (BCG, DPT, OPV, Measles) vaccination as against 63 percent at the country level. Further, about 33 percent of the pregnant women received the complete package of ANC consisting of minimum three ANC visits, two TT/Booster doses and IFA tablets compared to 53 per cent at the all India level. The proportion of fully immunized children and fully vaccinated mothers was lower among illiterate mothers and those living in small, inaccessible and tribal villages. The above findings indicate that literacy among women is the key for better compliance of immunization. Information, Education and Communication (IEC) activities need to be targeted to educate mothers with a special focus on those residing in remote villages in these states.

Keywords: Immunisation, Vaccination, ANC, WHO methodology, Women literacy

The Department of Family Welfare, Ministry of Health and Family Welfare, Government of India, assigned to the Indian Council of Medical Research (ICMR) to undertake Coverage of Evaluation Surveys (CES)¹ for Universal Immunisation Programme (UIP)² in all the States and Union Territories. Earlier, these Coverage Evaluation Surveys were conducted through UNICEF. The Coverage Of Evaluation Surveys undertaken by the

Institute for Research in Medical Statistics (IRMS), New Delhi (one of the permanent Institutes under the Indian Council of Medical Research), covered 90 districts in the country. Number of districts selected from different north-eastern (NE) states was broadly in proportion to their population. While selecting the districts in each major state, due representation was given to major geographical regions. Based on data collected for the study, the immunization status of children as well as antenatal care of pregnant women in the region and at the all India level were evaluated.

METHODOLOGY

This survey was carried out in one district each in the north-eastern states of West Tripura, Sikkim, Mizoram, Meghalaya, Manipur, Nagaland and Arunachal Pradesh (excluding Assam) by giving due representation to major geographical regions. Information was collected from 1,400 children aged between 1 and 2 years at the proportion of 210 per district and from equal number of pregnant women having children up to one year of age.

The WHO 30-cluster survey methodology³ has been used in the Coverage Evaluation Survey (CES). From each district, a sample of 30 villages/wards was selected using the systematic sampling of Probability Proportion to Size (PPS). Further, with a random start from each selected village/ward, samples of seven children (aged 12-23 months) have been selected in the form of clusters of contiguous households. The results on immunisation coverage levels have been obtained at the state level and all India level. The results have also been obtained by background characteristics of sample households using post-stratified methodology⁴.

Three types of schedules namely Child Coverage Schedule, TT Immunisation of Women Schedule and Village Level Schedule were used in the survey. In the Child Coverage Schedule, information on date of birth, age, sex, religion, caste, literacy of parents, availability of card, immunization status, pulse polio, vitamin A, source of information, and reasons for non-immunizations was collected.

In the schedule for TT immunisation of pregnant women, age of the child, caste, religion of the head of the household, education of

couples, availability of immunisation card, immunisation for TT1, TT2, booster, antenatal care visits, IFA tablets and reasons for not availing of ANC/TT and its association with the place of residence were collected.

The village level schedule was used to collect details of distance travelled to reach the health facility, condition of roads and the size of the village and composition. The survey work was conducted by personnel of IRMS, Delhi, in association with the Department of community medicine, Assam Medical College, Dibrugarh in the year 1999.

FINDINGS AND DISCUSSION

It was observed that the ratio of children and the mothers are almost in equal proportion in all the states included in the present study. Excepting Mizoram, majority of the women lived in rural areas. Interestingly, there was not much difference between the proportion of male and female children throughout the north-eastern region indicating there is hardly any gender discrimination by parents with regard to preference in the sex of the child (Table 1).

The proportion of children receiving all the vaccinations like BCG, DPT, OPV, measles in north-eastern states were about 51.9 percent as against 63.3 achieved at the all India level. The proportion of children not immunized at all in these states was about one and half times more (14.0%) than the non-immunized children for the country (9.6%) as a whole (Table 2).

About one-third (32.8%) of pregnant women received the full package of ANC (i.e. minimum three ANC visits, TT2/Booster and IFA tablets) in all the north-eastern states as compared to 52.5 percent for India as a whole. Similarly, while the national average with regard to women taking IFA tablets was 72.5 percent, it was only (40.4%) among women in north-eastern states. The percentage of women with no ANC visits was 27.2 percent in these states as against 11.4 percent only for India as a whole. The number of pregnant women who did not receive any TT vaccination was approximately one and half times less in these states as compared to the figure at all India level (Table 3).

TABLE 1
CHARACTERISTIC OF CHILDREN AND WOMEN IN
N E STATES (%)

State	Characteristics		Children N (%)	Women N (%)
West Tripura	Residence	Urban	50 (23.1)	51(23.2)
		Rural	166 (76.9)	169(76.8)
	Sex	Male	109 (50.5)	
		Female	107 (49.5)	
Sikkim	Residence	Urban	35(16.7)	35(16.7)
		Rural	175(83.3)	175 (83.3)
	Sex	Male	117(55.7)	
		Female	93 (44.3)	
Mizoram	Residence	Urban	146(69.5)	147(70)
		Rural	64(30.5)	63(30)
	Sex	Male	110(52.4)	
		Female	100 (47.6)	
Meghalaya	Residence	Urban	71(33.8)	70(33.2)
		Rural	139(66.2)	128 (66.8)
	Sex	Male	106(50.5)	
		Female	104(49.5)	
Manipur	Residence	Urban	91(43.3)	93(43.9)
		Rural	119(56.7)	119(56.1)
	Sex	Male	107(51.0)	
		Female	103 (49)	
Nagaland	Residence	Urban	63(29.9)	63(29.9)
		Rural	148(70.1)	148 (70.1)
	Sex	Male	103(48.8)	
		Female	108(51.2)	
Arunachal Pradesh	Residence	Urban	72(33.6)	81(38.6)
		Rural	142(66.4)	128 (61.4)
	Sex	Male	104(48.6)	
		Female	110(51.4)	

TABLE 2
IMMUNISATION OF CHILDREN IN THE NORTH-
EASTERN STATES
AND AT THE COUNTRY LEVEL (%)

Vaccine	NE States	India
BCG	84.1	85.9
DPT1	76.3	87.6
DPT2	72.5	84.7
DPT3	67.6	80.8
OPV1	76.6	87.7
OPV2	72.5	85.0
OPV3	67.7	81.0
MEASLES	54.3	66.5
Immunisation Status		
FULLY IMMUNISED	51.9	63.3
PARTIALLY IMMUNISED	34.1	27.1
NOT IMMUNISED	14.0	9.6

TABLE 3
ANTE-NATAL CARE OF PREGNANT WOMEN IN THE NORTH-
EASTERN STATES AND AT THE COUNTRY LEVEL (%)

ANC Status	NE States	India
THREE OR MORE ANC VISITS	63.5	62.0
PARTIAL ANC VISITS	37.3	26.6
NO ANC VISITS	27.2	11.4
Tetanus Toxoid Immunisation		
TT1	67.5	86.4
TT2/BOOSTER	61.2	77.9
NONE	22.5	13.6
IFA TABLETS	40.4	72.5
FULL ANC PACKAGE (3ANCJFA, TT2/BOOSTER)	32.8	52.5

The immunization coverage of children and ANC care of pregnant women by background characteristics is presented in Table 4. Significant difference (p<001) was observed among the fully immunized children of literate parents, especially children of literate mothers as compared to illiterate parents. A similar trend was observed for the ANC of pregnant women. The results revealed that female literacy plays an

TABLE 4
 COVERAGE LEVELS BY BACKGROUND
 CHARACTERISTICS (%)

Characteristics		Children Fully Immunised	Pregnant Women	
			TT2/ Booster	Full ANC
Overall		51.9	61.2	32.8
Residence	Urban	61.0	62.2	38.0
	Rural	46.8	60.7	29.8
Sex	Male	51.2		
	Female	52.6		
Religion	Hindu	64.6	76.7	38.4
	Muslim	39.7	73.0	29.5
	Sikh	44.4	80.0	40.0
	Christian	42.3	43.6	23.8
Caste	SC	45.3	85.1	41.7
	ST	40.9	45.6	28.1
	Others	67.9	77.2	37.2
Literacy of Mother/ Women				
Illiterate		31.7	40.1	19.1
Primary		47.5	61.3	30.2
Middle		51.4	65.1	37.3
Higher Secondary		60.3*	65.7	40.8*
Graduate and above		74.9*	76.9	33.5*
Literacy of Father/ Husband				
Illiterate		26.7	44.5	16.4
Primary		38.3	59.8	33.5
Middle		51.2	59.0	32.1
Higher Secondary		56.0	61.6	35.7
Graduate and above		66.3	77.2	41.9
Literacy of Parents/ Couple				
Both Illiterate		20.0	34.2	11.2
Only Mother Literate		43.9*	67.6	27.9*
Only Father Literate		42.8	46.9	28.5
Both Literate		57.4*	66.7	37.2*

*Significant difference p<0.001

important role in availing of ANC. The other significant observation from the present study was that the parents in the north-eastern states don't have a special preference for the male child. It is revealed that while 52.6

percent of the female children as compared to 51.2 percent of male children were fully immunized. The findings indicate that immunization status can be further improved by improving the literacy level of people in these states. A steady rise in the number of fully immunized children and pregnant women availing of full ANC services was observed in households where both the wives and husbands are literate. The findings also show that religion played a role in availing of the health care services to a great extent, may be due to the fact that many other characteristics are influenced by religion. 64.6 percent of Hindu children compared to percent of Muslim children were fully immunized in the NE states. Similarly, 38.4 percent of Hindu pregnant women compared to 29.5 and percent of Muslim and Christian women respectively availed of full ANC services respectively.

Availing of immunisation services also depends on the distance to reach a Sub-Centre (SC) / Primary Health Centre (PHC). If the health facilities were closer to the place of residence, the number of users for immunization services was higher (Table 5). Immunization status of the village children was higher (42.8%) where the distance to PHC/SC was <1km compared to those (24.8%) residing in remote inaccessible areas with a distance of >5km to PHC/SC. This indicates that distance of a village from the health facility is one of the important factors for determining the immunization status of children.

TABLE 5
IMMUNISATION STATUS OF CHILDREN BY
DISTANCE FROM SC/PHC (%)

Immunisation Status	Distance of PHC/SC (km)			
	<1	1-2	2-5	>5
Fully	42.8	34.2	35.2	24.8
Partially	27.3	33.4	26.4	28.2
None	29.9	32.4	38.4	47.0

The reasons provided by the respondents for non-immunization of children and mothers are presented in Table 6. Lack of information was observed as one of the important factors for non-immunization of children (more than 64% for all the immunizations) as well as for pregnant mothers (more than 74% for all ANC services) in these states.

TABLE 6
REASONS GIVEN FOR NON-IMMUNIZATION OF CHILDREN
AND PREGNANT MOTHERS (%)

Reason	Children				Mother	
	BCG	DPT	OPV	Measles	TT	ANC/IFA
Lack of information	67.3	65.8	64.7	71.2	76.2	73.9
Lack of motivation	19.5	21.4	22.3	21.4	5.2	10.2
Obstacles	13.2	12.8	13.0	7.4	18.6	15.9

CONCLUSION

It has been observed that sample characteristics of children and pregnant women in the NE states were broadly in proportion to the characteristics of the state population. The survey revealed that though the immunization programme touched about 85 percent of target children, only 52 per cent of children received the full dose of vaccination (BCG, DPT, OPV, Measles). Similarly about 60 per cent of pregnant women only received both the doses of TT/Booster. In the same way, about one third of pregnant women received full package of ANC i.e., minimum three ANC visits, TT2/Booster and IFA tablets. The coverage levels were lower for children belonging to illiterate mothers and those residing in inaccessible villages.

For improving the situation, efforts should be made to increase Information, Education and Communication (IEC) activities in order to educate the mothers especially in rural areas. Improvement in female literacy coupled with the reduction in the dropout rate would add to achieve a higher target of immunization among children and pregnant women.

Lkkjk'k

प्रस्तुत अध्ययन के अर्न्तगत उत्तर-पूर्वी राज्यों (असम को छोड़कर) में शिशुओं और माताओं के प्रतिरक्षण स्तर का मूल्यांकन किया गया है। यह मूल्यांकन विश्व स्वास्थ्य संगठन की 30 क्लस्टर सर्वेक्षण तकनीक का प्रयोग करके राष्ट्रीय आंकड़ों की तुलना में किया गया था। इस अध्ययन में इन राज्यों के प्रत्येक जिले से लगभग 1400 शिशुओं (1-2वर्ष) के आयु वर्ग के और एक वर्ष की आयु तक के बच्चों वाली माताओं को शामिल किया गया था। बच्चों को दिए जाने वाले सभी टीकों और टेटनेस ताम्र प्रसव-पूर्व परिचर्या प्राप्त करने वाली गर्भवती

महिलाओं के बारे में सूचनाएं एकत्र की गई थी। अध्ययन से प्राप्त निष्कर्षों से पता चलता है कि राष्ट्रीय स्तर पर टीकाकरण (63%) तुलना में लगभग 52% बच्चों को बीसीजी, डीपीटी, ओपीटी और खसरे के टीकों की सभी खुराकें दी गई थीं। इसके अतिरिक्त गर्भवती महिलाओं को अखिल भारतीय स्तर पर दिए गए प्रतिरक्षण (53%) की तुलना में प्रसव-पूर्व परिचर्या हेतु जांच के लिए कम से कम तीन बार बुलाकर पूरी-पूरी जांच की गई थी तथा टेटनस टाक्सायड की दो खुराकें/बूस्टर डोज तथा आयरन और फालिक एसिड की गोलियां दी गई थीं। सभी टीके लग जाने वाले बच्चों और टेटनस/बूस्टर खुराक तथा आयरन और फालिक एसिड गोलियां लेने वाली गर्भवती महिलाओं का अनुपात निरक्षर और छोटे दुर्गम एवं आदिवासी क्षेत्रों में रहने वाली माताओं में निम्न था। अध्ययन से प्राप्त निष्कर्षों से पता चलता है कि टीकाकरण के बेहतर अनुपालन में महिलाओं के साक्षरता स्तर की मुख्य भूमिका है। इन राज्यों के दूरवर्ती ग्रामों में रहने वाली महिलाओं पर विशेष ध्यान देकर उन्हें जागरूक बनाने के लिए सूचना, शिक्षा एवं संचार गतिविधियों के संचालन पर बल दिए जाने की आवश्यकता है।

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IMPLEMENTATION OF UNIVERSAL PRECAUTIONS IN A LARGE HOSPITAL IN DELHI

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ABSTRACT

The study was undertaken in a large tertiary care hospital in Delhi to study the implementation of Universal Precautions' among 129 randomly selected health care workers of different categories employed in 9 high-risk units. Data were collected through interviews, observations and study of records. Findings revealed that only 51.9 percent of the respondents were aware of the term Universal Precautions' and 41.9 percent knew its correct definition. Practicing the precautions varied from zero to hundred percent by different categories of health care personnel. At the minimum, 35.5 per cent was found wearing gloves while 12.5 per cent was wearing masks, gowns and plastic aprons during various procedures involving blood and body fluids. In 81.6 percent of the observed cases, syringes and needles were detached before discarding. Compliance was seen to be more during procedures where exposure was apparent but less where exposure considered not so obvious. The study emphasizes on training, continuing education, stricter enforcement of discipline in practicing universal precautions among all categories of health care professionals.

Keywords: Universal precautions, Blood and body fluids, Hand washing, wearing gloves, Disposal of sharps, Training, Awareness, Compliance.

We live in the midst of infections surrounded by microbes since time immemorial. Particularly, the health care professionals are at high-risk of acquiring infections. Hospital Acquired Infection (HAI) or Nosocomial infection is a worldwide problem in all hospitals. This risk was very low till some 50 years back when the use of antibiotics was less. With the availability of anti-microbial agents, health care professionals started depending more on prophylactic antibiotic therapy than observing

strict aseptic and antiseptic precautions. The need to prevent and control hospital-acquired infection has been re-emphasized with the emergence of Acquired Immuno Deficiency Syndrome (AIDS). Life-threatening viral infections such as Hepatitis B, Hepatitis C and Human Immunodeficiency Virus (HIV) have brought the focus back to the basic preventive measures like hand washing, the use of gloves and the use of other protective measures. 'Universal Precautions' were defined by the Center for Disease Control and Prevention, Atlanta^{12,34} in 1987; the Ministry of Health and Family Welfare, Government of India in 1992⁵; and NACO, Ministry of Health and Family Welfare, Government of India in 1999⁶. They are based on the premise that all blood and body fluids are potentially infectious and all health care workers should follow certain precautions while taking care of all patients. 'Universal Precautions' involve the use of protective measures such as gloves, gowns, aprons, masks and protective eyewear which would reduce the risk of exposure to health care workers' having non-intact skin or mucous membrane from the potentially infective material contaminated with blood and body fluids. In addition, all health care workers should take precautions to prevent injuries caused by needles, scalpels and other sharp instruments or devices. Pregnant health care workers, because of the risk of perinatal transmission, should be especially careful and strictly adhere to follow the prescribed precautions. All health care workers might also transmit blood-borne pathogens to patients or acquire these pathogens to themselves. Therefore, health care workers who are exposed to different kinds of hospital acquired infections because of their professional contact with blood and body fluids, should practice Universal Precautions to minimize the risk of transmission of these infections. Therefore, adequate facilities must be provided to workers to practice 'Universal Precautions'.

OBJECTIVE

The aim of the study was to find out the extent of knowledge, practice and implementation of 'Universal Precautions' by different categories of health care personnel in a large hospital in Delhi.

MATERIALS AND METHOD

The study population comprised different categories of health care workers like doctors, nurses, para-medical staff and support staff in a

very large tertiary care, multi-disciplinary hospital. Administrators of the selected study units were also included in the study sample. The study units comprised those areas in the hospital where exposure to blood and body fluids was maximum. Thus, nine study units purposively selected were included the blood bank, laboratory, labour room, gynaecology/obstetrics out patient department (OPD), operation theatre (OT) and wards, surgery OPD, intensive care unit (ICU), injection room, immunization room and dental clinic. Health care workers of various categories from these sections were randomly selected in proportion to their existing strengths in the different study units. The sample size was 10 percent of the existing strength in each category for interviews and five percent for observations. Thus, a total of 129 respondents consisting of 23 doctors (17.8%), 33 nurses (25.6%), 20 paramedical staff (15.5%), 33 support staff (25.6%) and 20 administrators (15.5%) were interviewed. A total of 77 health care workers including 18 doctors (23.4%), 22 nurses (28.6%), 12 paramedical staff (15.6%) and 25 support staff (32.5%) were observed. Data were collected through interviews using semi-structured interview schedules, observations using a checklist of activities and the study of records. Records pertaining to the availability and consumption of articles required for the implementation of 'Universal Precautions' for the previous month were taken into consideration in each study unit and the data were analyzed using the SPSS 10.0 package.

FINDINGS

Findings revealed that out of 129 respondents, 48.1 percent (62) did not hear the term 'Universal Precautions' for infection prevention. The rest (51.9%) of the respondents (67) reported to have heard the term for the purpose of precautions to prevent infections from blood and body fluid infections from patients. Though unaware of the term 'Universal Precautions', 41.9 percent (54) of the respondents were, however, aware of precautions to be practiced while handling blood and body fluids. Among the support staff, 6.2 percent (8) of respondents were not aware of the precautions while handling blood and body fluids. Only 31.8 percent (41) knew that the commonest way of acquiring infections is through handling of blood and body fluids or through sharp injuries in hospitals (Table 1). From the respondents who were aware of either 'Universal Precautions' or blood and body fluid precautions, only 41.9 percent (54) could correctly define it though a large percentage knew the components (99.2% to 100% of

components) of various precautions. However, 18.2 percent (22) of respondents were unaware of the use of such precautions during resuscitation, which included 17.4 percent (4) of doctors. A high percentage of respondents (94.2% to 100%) knew the various articles/items required for the proper implementation of these precautions. However, 25.6 percent (31) of respondents including 26.1 percent (6) of doctors were not aware of the specific requirement of mouthpieces and resuscitation bags during procedures. Similarly, the requirement of protective eyewear was not felt by 26.4 percent (32) of respondents, which included 24.2 percent (8)of nurses.

TABLE 1
KNOWLEDGE OF HEALTH WORKERS ABOUT THE MEANS OF
SPREAD OF BLOOD-BORNE INFECTIONS

Means of spread in hospital	Category of health care worker					Grand Total (n=129)
	Doctor (n=23)	Nurse (n=33)	Para-medical Staff (n=20)	Support (n=33)	Administrator (n=20)	
Through blood transfusion	3(13.0)	10(30.3)	7 (35.0)	3(9.1)	6 (30.0)	29 (22.5)
Infected equipment or material	13(56.5)	8 (24.2)	3(15.0)	7(21.2)	7 (35.0)	38 (29.5)
Through sharps injuries	5(21.7)	12(36.4)	8 (40.0)	12(36.1)	4 (20.0)	41 (31.8)
During surgical procedures	2(8.7)	2(6.1)	-	-	-	4(3.1)
Do not know	-	1 (3.0)	2(10.0)	11 (33.3)	3(15)	17(13.2)
Total	23(100)	33 (100)	20(100)	33(100)	20(100)	129(100)

(Figures in parentheses are in percentage)

Hand washing: Hand washing is an important aspect in the implementation of Universal Precautions, the knowledge of which was found high (93.8% to 100% for different procedures) among the respondents. However, after handling a blood or body fluid stained container, the practice of hand washing was almost zero, to a dismal 5.6 per cent following injections and to a high of 100 per cent following deliveries or exposure to body fluids. Hand washing was most unsatisfactory (less than 50%) in cases of post handling of blood (48.3%), collection of blood samples or venesection (24%), surgical dressings (43.5%), laboratory work involving blood and body fluids (33.3%), transporting blood and body fluid samples (35.3%) and resuscitation (37.5%) (Table 2).

TABLE 2
PRACTICE C
PROCEDURES

Hands washed with soap after the procedure	Category of health care worker				Total
	Doctor	Nurse	Paramedical Staff	Support Staff	
Exposure to blood	6/6 (100)	4/6 (66.7)	-	676(100)	16/18 (88.9)
Exposure to body fluids	4/4 (100)	4/4 (100)	-	4/4(100)	12/12 (100)
Handling blood	11/16 (68.8)	6/10 (60)	2/10(20)	9/22 (40.9)	28/58 (48.3)
Giving injections	0/16(0)	3/38 (7.9)	-	-	3/54 (5.6)
Collecting blood samples/ venesection	3/20 (15)	9/26 (43.6)	0/4 (0)	-	12/50 (24)
Surgical dressings	4/16 (25)	6/14 (42.9)	7/12(58.3)	1/4 (25)	20/46 (43.5)
Major surgery	2/4(50)	4/4 (100)	-	-	6/8 (66.7)
Conducting delivery	4/4 (100)	4/4 (100)	-	-	8/8 (100)
Laboratory work	2/4(50)		2/8 (25)	-	4/12 (33.3)
Bid. stained container	0/4 (0)	-	0/4 (0)	0/8(0)	0/16(0)
Transporting samples	-	-	3/6(50)	9/28 (32.1)	12/34 (35.3)
Handling infective waste material	-	-	9/24 (37.5)	33/50 (66)	42/74 (56.8)
Resuscitation	2/6 (33.3)	2/4 (50)	2/6 (33.3)	-	6/10 (37.5)

Numerator = Positive observations, Denominator = Total observations
(Figures in parentheses are in percentage)

Gloves: The knowledge of use of gloves during procedures requiring the implementation of Universal Precautions varied from 70.7 to 100 percent among the respondents. During observation, the use of gloves varied from a low of 35.5 percent during the transportation blood and body fluid

TABLE 3
PRACTICE OF GLOVES WORN DURING DIFFERENT PROCEDURES

Gloves worn during the procedure	Category of health care worker				Total
	Doctor	Nurse	Paramedical Staff	Support Staff	
Handling blood	12/16 (75)	8/10(80)	4/10(40)	11/22 (50)	35/58 (60.3)
Giving injections	9/16 (56.3)	11/38 (28.9)	-		20/54 (37)
Collecting blood samples/venesection	9/20 (45)	13/26 (50)	4/4(100)	-	26/50 (52)
P/V or P/R examn.	14/14 (100)	4/4 (100)	-	-	18/18(100)
Stitching of wounds	12/12 (100)	2/2(100)	-	-	14/14(100)
Surgical dressings	16/16 (100)	14/14 (100)	6/12(50)	-	38/46 (82.6)
Major surgery	4/4 (100)	4/4(100)	-	-	8/8(100)
Conducting delivery	4/4 (100)	4/4 (100)	-	-	8/8(100)
Laboratory work	1/4 (25)	-	6/8 (75)	-	7/12(58.3)
Handling blood stained container	0/4 (0)		3/4 (75)	7/8 (87.5)	10/16(62.5)
Transporting samples	-	-	0/6 (0)	12/28 (42.9)	12/34 (35.3)
Handling infective waste material	-	-	17/24 (70.8)	38/50 (76)	55/74 (74.3)
Resuscitation	2/6 (33.3)	3/4 (75)	5/6 (83.3)		10/16(62.5)

Numerator = Positive observations Denominator = Total observations (Figures in parentheses are in percentage)

to a medium of 37 per cent during injections and as high as 100 percent during per vaginal or per rectal examinations, stitching of wounds, major surgical procedures and deliveries. The use of gloves was found unsatisfactory (less than 65%) during the collection of blood samples or venesection (52%), handling of blood (60.3%), laboratory work involving blood and body fluids (58.3%), handling of a blood or body fluid stained container and resuscitation (62.5%) (Table 3).

Other protective barriers: The knowledge to wear *masks* during different procedures varied from 75.4 percent to 100 percent among the health personnel surveyed. On observation, the wearing of masks varied from a low of 50 per cent (2 out of 4) during dental procedures, 56.3 percent (9 out of 16) during resuscitation, 62.5 percent (5 out of 8) during deliveries and 63.6 percent (14 out of 22) during minor to a high of 100 percent (8 out of 8) during major surgical procedures. The knowledge to wear *gowns* during different procedures varied from 56 to 100 percent. Wearing of gowns, in general, was less (13.5 percent, 10 out of 74). Among the hospital staff, 25 percent (4 out of 16) followed precautions in handling contaminated equipment or instruments during resuscitations, 50 per cent (6 out of 12) in laboratory work involving blood and body fluids, 50 per cent (4 out of 8) while conducting a delivery and 54.5 percent (12 out of 22) in minor surgical procedures and to a high of 100 per cent (8 out of 8) in major surgical and dental procedures (in the form of overalls). A very high percentage of respondents (90.9 %) and (96.2 %) involved either in the procedures of major surgeries or conducting deliveries respectively knew the usage of plastic aprons. However, these were actually practiced by 12.5 percent (1 out of 8) during major surgical procedures and while conducting deliveries (50 percent, 4 out of 8). *Protective eyewear* was worn by anybody, anywhere in the hospital and for any procedure. 90.2 percent of the respondents concerned with the transportation of samples reported that they used *leak proof containers* while transporting blood and body fluid samples. But, it was observed to be true only in 44.1 percent (15 out of 34) of the cases.

Sharps: 96.5 percent (82 out of 85) of the respondents reported that they discarded needles and syringes in puncture proof containers after use. However, it was practiced only in 92.6 percent (50 out of 54) of the cases. While each and every nurse in the study population (38 out of 38) practiced the procedure, it was followed by only 75 percent (12 out of 16) of doctors.

Puncture proof containers in the form of open plastic containers with bleach or hypochlorite solution were seen available at all the sites. In 4.6.4 per cent (51 out of 110) of observations they were located at a distance while in rest of the (53.6%, 59 out of 110) cases they were located near the place of use. 39.2 per cent of the respondents concerned with using syringes and needles replied that they detached the needle from the syringe before discarding and this was practiced by 81.6 per cent (62 out of 76) of the personnel. Though, 38.7 per cent of the respondents claimed that the needle was bent or broken before discarding, this practice was not at all observed. 16.1 percent of the respondents said that they recapped needles using both hands and this was practiced by only a few, 1.3 per cent (1 out of 76) of respondents. 3.2 per cent of the respondents said that they discarded the syringes and needles as such, without manipulation, and this was observed among 18.4 per cent (14 out of 76) of the respondents (Table 4). 59 percent of the respondents (39 out of 66) did not know the correct method of passing sharp instruments during surgery, while only 41 per cent (27 out of 66) said that they passed sharp instruments indirectly (hand to tray to hand or forceps to tray to hand). However, during actual observation, (8 out of 8) sharp instruments were in fact, passed directly from forceps to hand.

TABLE 4
PROCEDURE OF DISCARDING SYRINGES
AND NEEDLES AFTER USE

Method used	Category of health care worker						Grand Total	
	Doctor (n=26)		Nurse (n=42)		Paramedical (n=8)			
	Yes	No	Yes	No	Yes	No	Yes	No
Detached needle from syringe	16 (61.5)	10 (38.5)	38 (90.5)	4 (9.5)	8 (100)	0	62 (81.6)	14 (18.4)
Recapped needle using both hands	0	26 (100)	1 (2.4)	41 (97.6)	0	8 (100)	1 (1.3)	75 (98.7)
Recapped needle single handedly	0	26 (100)	0	42 (100)	0	8 (100)	0	8 (100)
Bent or broke needle	0	26 (100)	0	42 (100)	0	8 (100)	0	8 (100)
Discarded as such	10 (38.5)	16 (61.5)	4 (9.5)	38 (90.5)	0	8 (100)	14 (18.4)	62 (81.6)

Figures in parentheses are in percentage)

Resuscitation: Gloves were not used by respondents during 37.5 per cent (6 out of 16) of the resuscitations despite having full knowledge (100 %) of its requirement. Similarly, hands were not washed in 62.5 per cent (10 out of 16) of times following resuscitation despite a higher perception of knowledge (98.7%) among the respondents. Masks were not used during 43.7 percent (7 out of 16) of resuscitations. Mouthpieces, resuscitation bags and ventilation devices were used only during 75 percent (12 out of 16) of resuscitations. 30.3 percent (23 out of 76) of the respondents whose work involved resuscitation reported that they practiced mouth-to-mouth resuscitation during emergencies only. However, this was not observed for a single instance during the study period.

Skin lesions: A total of 60.6 percent (57 out of 94) of respondents involved in patient care said that they would prefer giving direct patient care and 65 percent (80 out of 123) involved in handling of equipment said that they would not mind handling patient care equipment in spite of their exudative lesions or weeping dermatitis. 96.1 percent of the respondents said they would wear gloves and 78.3 percent expressed to cover the lesion with a waterproof dressing under these circumstances. But 19.1 percent (18 out of 94) of the respondents involved with patient care opined to avoid direct patient care and 17.9 percent (22 out of 123) with cuts or abrasions on hands or arms involved in handling of equipments, expressed to avoid handling of these equipments. 98.4 percent said they would wear gloves while 88.4 percent preferred to cover the lesion with a waterproof dressing.

Pregnant health care workers: 23.1 percent (28 out of 121) of the respondents were ignorant that pregnant health care workers should be especially familiar with and strictly adhere to Universal Precautions or blood and body fluid precautions. Most of the respondents agreed that strict adherence to precautions was mandatory in case of pregnant women in order to minimize the risk of transmission of perinatal infection to the infant (96.8% or 90 out of 93 respondents).

Availability of articles: As per hospital authorities, all articles required for implementation of Universal Precautions were available in the hospital. While interviewing, however, only 70 percent of the administrators and 58% of user respondents agreed that articles required for the

implementation of Universal Precautions were adequately supplied by the hospital. A study of the inventory for the previous month confirmed that soaps and gowns were in adequate supply in all the study units. However, gloves, facemasks and plastic aprons were in short supply in some of the study units viz. Gynae/Obst. OT, Surgery OT, Labour Room and Intensive Care Unit. Supply of protective eyewear in limited quantity was initiated lately in the operation theatre in the form of disposable kits. Disposable needles and syringes were in short supply in some study units viz. the Intensive Care Unit and Injection Room. It was observed that puncture proof containers for discarding syringes and needles were available in the form of open plastic containers with bleach or hypochlorite solution. However, availability of containers for the transfer of needles to the site of disposal was insufficient.

Training: According to hospital authorities, there was no schedule for conducting regular training programmes. These were carried out as per orders from the health ministry periodically. A large proportion of the respondents (41.1%) expressed to have received hardly any training related to Universal Precautions or blood and body fluid precautions. This included 69.7 percent of the support staff, 47.8 percent of doctors, 40 percent of paramedical staff and 24.2 percent of nurses.

DISCUSSION

Universal Precautions have been in existence for more than a decade. With the rise in the risk and gravity of transmission of blood borne infections to health care workers, the implementation of Universal precautions has gained momentum. However, it is still far from satisfactory even in a large tertiary care teaching hospital in the heart of Delhi. In the present study conducted on all categories of health care workers in exposure prone areas of the hospital, only half of the respondents (51.9%) were aware of the term 'Universal Precautions' while only 41.9 per cent knew its correct definition. 6.2 per cent of the respondents were unaware of either Universal Precautions or blood and body fluid precautions that included almost a quarter (24.2%) of the support staff; an indication of dangerous health consequences because of ignorance and lack of awareness. A study in Thailand (1993) reported that 94.9 per cent of doctors and 85.5 per cent of nurses had knowledge of Universal Precautions⁷. However, in a similar study of 1,400 health

professionals in China (199S), it was observed that only 12.5 percent of the respondents were aware of the need of Universal Precautions⁸. The awareness of the health professionals in the current study, albeit low, falls in between the figures reported in Thailand and China. Compared to only 3 percent of the health professionals in China, the present study has revealed a much higher percentage (41.9%) of respondents who knew the correct meaning of Universal Precautions.

Percutaneous injuries are the commonest way of acquiring blood borne infections in the hospital. However, an alarming 68.2 percent of the respondents were not aware of this, including 80 percent of the administrators, 78.2 per cent of doctors, 63.6 percent of nurses, 60 percent of paramedical staff and 63.6 percent of support staff. Only 31.8 percent of the total study sample was aware of this fact. Knowledge and understanding of Universal Precautions, especially with respect to safe disposal of sharps is expected among the health care workers and administrators. In the Thailand study, 81.6 percent of nurses and 71.9 percent of doctors were aware of sharps injury as the most important cause of spread of infection among health care workers⁷. However, in the present study only 36.4 percent of nurses, 21.7 percent of doctors, 40 percent of paramedical staff, 36.1 percent of support staff and 20 percent of administrators were aware of this. Precautions during resuscitation including the use of mouthpieces, resuscitation bags, other ventilation devices and disposables and disinfected resuscitation equipment are the major components of Universal Precautions. However, 18.2 percent of the respondents in the present study were unaware of this including 17.4 percent of the doctors.

Though the level of knowledge was high among the study samples in relation to the components of Universal Precautions or blood and body fluid precautions viz. wearing of gloves, other protective barriers and hand washing; the actual implementation was found inadequate. Hand washing is the most simple and basic practice for preventing the transmission of blood borne infections. This practice, however, varied from the lowest zero in cases of handling of a blood or body fluid stained container to the highest of 100 per cent in cases of deliveries or following exposure to body fluids. Hand washing was not practiced following the removal of gloves in almost one third of the observations (29.9%), the greatest offenders being the doctors (47.1% of the total observations).

The wearing of gloves appeared to be a sense of complacency especially among doctors. Only 68.8 percent of doctors and 66.7 per cent of nurses washed hands after minor surgical procedures in this study. The findings are little better than the study conducted at Rohtak district hospital in 1996 where 58 per cent of medical doctors and 24 per cent of nursing personnel washed hands during minor surgical procedures⁹. The differences may be explained on the basis of differences in practice between staff of a tertiary care teaching hospital and a district hospital. The findings of the present study were, however, similar to a study conducted in an acute care medical and surgical wards of a large teaching hospital where 93 per cent of medical officers in acute medical ward, 76.7 per cent in acute surgical ward, 58 per cent of nursing officers in acute medical ward and 54.1 percent of nursing officers in acute surgical ward were washing their hands¹⁰. In the current study, hand washing after procedures involving blood and body fluids was unsatisfactory in case of paramedical and supportive staff as well. Hand washing was observed among 37.5 per cent of paramedical staff and 66 per cent of supportive staff after handling of infective waste material and among 41.7 percent of the paramedical staff and 58.3 percent of the supportive staff after handling contaminated equipment or instruments. Pandit et al¹⁰ reported similar results in a teaching hospital where hand washing by nursing assistants during various procedures was 39 percent in acute medical ward and 44.9 percent in acute surgical ward, while by safaiwalas, it was 68 percent in acute medical ward and 89 percent in acute surgical ward.

The use of gloves while handling blood and body fluids was also seen to be inadequate and varied from a low of 35.5 per cent during the transportation of blood and body fluid samples to a high of 100 per cent during per vaginal or per rectal examination, stitching of wounds, major surgical procedures and deliveries. Gloves were worn while collecting blood samples or during venesection in 52 per cent of the observations. While the paramedical staff wore gloves during all the observations, doctors and nurses did not wear them during almost half of the observations (55% and 50% respectively). In the present study, the use of gloves during venesection though low, but higher than the figure (16 %) reported in Tanzania in 1997¹¹. In the present study, the wearing of gloves was consistently higher during major and minor surgeries and deliveries. Doctors wore gloves in 93.7 per cent of minor surgeries and nurses did so at all times (100%). In the study by Jain et al⁹, only 58 per cent medical

doctors used gloves but not by nursing personnel while assisting minor surgical procedures. In the study by Pandit et al¹⁰, gloves were worn during various procedures by all the medical officers in acute medical ward, 75 per cent of doctors in acute surgical ward, 35 per cent of nursing officers in acute medical ward and 62 per cent of nursing officers in acute surgical ward used gloves. The doctors and nurses in the present study were more consistent with the use of gloves during minor procedures. All the respondents concerned with laboratory work replied in affirmative that they wear gloves during the work involving blood and body fluids. However, 25 per cent of doctors were actually seen wearing gloves while performing laboratory work involving blood and body fluids while 75 percent of the paramedical staff did so during observations. While handling infective waste material, gloves were worn by 70.8 per cent of paramedical staff and 76 per cent of support staff. In the present study, 66.7 per cent of paramedical staff and 86.4 per cent of support staff followed Universal Precautions while handling contaminated equipment or instruments. These findings are similar to that reported by Pandit et al¹⁰ where the use of gloves during various procedures was 72 percent by nursing assistants in acute medical ward and 36 percent in acute surgical ward, 78 percent by safaiwalas in acute medical ward and 95 percent in acute surgical ward.

Facemasks and protective eyewear should be worn in all procedures where blood and body fluids splashes are anticipated. The wearing of masks varied from 50 percent during dental procedures to 100 percent during major surgical procedures. The wearing of gowns was 13.5 percent while handling infective waste material to 100 percent during major surgical procedures and dental procedures. Plastic aprons were worn in 12.5 percent of major surgical procedures and in 50 percent of deliveries. While conducting deliveries, the doctors or nurses wore either gowns or plastic aprons. Protective eyewear was not used in the entire hospital except for blood borne infection positive cases. According to a Canada Communicable Disease Report update 2001, on the surveillance of health care workers exposed to blood and body fluids, of the 222 mucocutaneous exposures, 62 percent occurred in the eyes and 10 percent in the mouth. Two-thirds of this could have been prevented by the use of protective eyewear or face shields since a large percentage (65 %) of health care workers were not using protective eyewears or face shields or surgical masks at the time of exposure¹². Hence, protective eyewear and facemasks need to be worn in the hospital where the risk of splashes

of blood and body fluids are expected and these should be made available by the hospital authorities for all such procedures.

The commonest method of discarding syringes and needles was detaching the needle and syringe before discarding them (81.6%). Only in 18.4 percent of the observations, needles and syringes were actually discarded without manipulation. The practice of detaching the needle from the syringe is not a correct practice and should be discontinued. Though puncture proof containers for discarding syringes and needles were available, almost half (46.4%) of them were located at a distance from the place of use. This too is not appropriate since it increases the risk of sharps injuries. Puncture proof containers should be located near the site of use. Collapsible cardboard boxes were used for transportation prior to disposal instead of boxes of hard cardboard, metal or plastic. The major cause of occupational exposure to blood borne pathogens is through injury from a needle stick or other sharp instruments¹³¹⁴. Hence, it is imperative that these practices be modified at the earliest.

Except soaps, which are needed for hand washing, shortage of articles for implementation of Universal precautions was observed. The demand was higher in places where there is a greater risk of exposure to blood borne infections. Protective eyewear and proper puncture proof containers for the transport of needles to the site of disposal were not available. The availability of articles is an essential prerequisite for the implementation of these precautions. Creating awareness through training programmes for both administrators and the actual health care staff may also help to increase the compliance at each level. A large proportion of the respondents (41.1%) had no training at all for Universal Precautions. Therefore, all categories of staff including the support staff need to be trained in this regard. Training programmes to hospital staff with due impetus to practical training would be more beneficial for improving both the awareness and compliance.

CONCLUSION

Though Universal Precautions have been in existence for more than a decade, the implementation of these precautions by hospital staff is still far from satisfactory. Despite an increased risk of transmission of new diseases through blood borne infections, strict adherence to Universal

Precautions by health care workers in a tertiary care teaching hospital in the heart of Delhi was not observed. Though the level of knowledge was high with regard to some of the aspects of Universal Precautions viz. the wearing of gloves and hand washing, in actual practice, it was far less. Awareness while handling and disposal of sharps and precautions to be used during, resuscitation was not satisfactory. Compliance with Universal Precautions was good during procedures in which the exposure to blood and body fluids is apparent e.g. during surgical procedures, deliveries, etc. The areas found to be neglected were the wards, labour rooms, operation theatre, blood bank, intensive care unit and the laboratories. A casual compliance with these precautions was seen among all categories of health care workers regardless of age or duration of service. These precautions are simple protective measures which need to be put into routine practice through some extra efforts at all levels and must be implemented. It is the responsibility of the hospital authorities and administrators for providing training and supervision in this regard to all categories of staff from time to time since stricter enforcement of Universal Precautions is an important criterion of a good, effective health care delivery system.

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वर्तमान अध्ययन का संचालन दिल्ली के एक बृहत तृतीयक परिचर्या अस्पताल में "सार्वभौमिक सावधानियों" के क्रियान्वयन का अध्ययन करने के लिए किया गया था, जिसके लिए उच्च जोखिम वाले नौ यूनिटों में कार्यरत विभिन्न वर्गों के यादृच्छिक आधार पर चुने गए 129 स्वास्थ्य परिचर्या कार्मिकों को चुना गया था। आंकड़ों का संचयन साक्षात्कार, प्रेक्षण तथा रिकार्डों का अध्ययन करके किया गया था। निष्कर्षों से पता चलता है कि 51.9 प्रतिशत उत्तरदाताओं को "सार्वभौमिक सावधानियों" शब्दावली की सही व्याख्या से भी अवगत थे। विभिन्न वर्गों के स्वास्थ्य परिचर्या कार्मिकों में इन सावधानियों का अनुपालन शून्य से लेकर 100 प्रतिशत तक किया जाता था। कम से कम 35.5 प्रतिशत कार्मिक रक्त तथा अन्य संबंधित प्रक्रियाओं में हाथों में दस्ताने पहने देखे गए थे और 12.5 प्रतिशत कार्मिक मास्क, गाउन तथा प्लास्टिक के अप्रैन पहने हुए पाये गये थे। प्रेक्षित मामलों में से 81.6 प्रतिशत मामलों में यह देखा गया था कि कार्मिकों द्वारा प्रयुक्त सीरिजों को फैंकने से पहले नीडल उनसे अलग कर दी गई थी। इन सावधानियों का पालन अधिकांश शल्य आदि कसों में किया जाता था, किन्तु जहां संक्रमण का खतरा कम होता था वहां ऐसा कम ही किया जाता था। अध्ययन के निष्कर्षों में इस बात पर बल दिया गया है कि विभिन्न वर्गों के स्वास्थ्य से सार्वभौमिक सावधानियों का अनुपालन कड़ाई से कराने के लिए उन्हें शिक्षित किया जाना चाहिए, तथा सतत शिक्षा प्रदान की जानी चाहिए।

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