



ICMR BULLETIN

Vol. 24, No. 6 & 7

June-July, 1994

CONTRACEPTION DURING LACTATION

Reproductive physiologists consider evolution of viviparity and lactation as the single most successful attempt of nature in reducing reproductive wastage and ensuring species survival. The growing foetus in utero is assured of adequate nutrition and protection from external environmental hazards. After birth the nutritional requirements of the infant are fully met during early infancy. The presence of the mother affords some protection against adverse environmental factors during infancy. Having assured better survival of the species, nature also provided for concurrent fertility control to obviate over population and the attendant hazards. Placental steroids prevent ovulation during pregnancy. Suckling induced endocrine changes result in relative infertility during lactation. Over millennia, breast feeding has been the major determinant of infant growth, health and survival and the contraceptive effect of lactation has been the principal regulator of human fertility.

The first half of the present century witnessed a profound decline in breast feeding in industrialised countries, so that in the sixties most of the women in developed countries were not breast feeding their infants; bottle feeding had become the convenient norm and the symbol of sophistication. Luckily the tradition of universal prolonged breast feeding in developing countries essentially remained unaltered during this period.

Studies carried out in the sixties and seventies in developed countries brought out unique advantages of breast feeding. The fact that breast feeding is the best for (i) provision of appropriate nutrients in adequate quantities to the infant; (ii) protection against infection; (iii) promotion of growth, prevention of illness and death; and (iv) protection of the mother from early advent of the next pregnancy, was documented by various research scientists. There was a global movement to promote breast feeding in areas where it had declined and protect it in areas where it was the rule.

As a part of studies on the health benefits of lactation, demographers, clinicians and endocrinologists explored the effect of lactation on fertility. These studies clearly indicated that during the first few months of lactation when the women is solely breast feeding the child and is amenorrhoeic, breast feeding alone offers effective protection against pregnancy. However, with the introduction of supplements to the infant, and/or return of menstruation the contraceptive effect of lactation wanes.

Two often repeated and apparently contradictory statements are made regarding the contraceptive effect of breast feeding in developing countries. These are (i) Breast feeding provides reliable contraception only during the first few months and hence it is imperative that lactating women are given appropriate contraception

soon after introduction of supplements/return of menstruation to prevent the too early advent of the next pregnancy and all its adverse effects on maternal and child health; and (ii) in developing countries the contraceptive effect of universal and prolonged breast feeding prevents more pregnancies than all the temporary methods of contraception provided by the governmental and nongovernmental organisations.

Both these statements are true; in fact they are not contradictory but represent two sides of the same coin. Lactating mothers seeking reliable protection against pregnancy cannot depend on the contraceptive effect of lactation beyond the initial few months. However, continued lactation does postpone the advent of pregnancy by a period varying between 6-12 months. The cumulative impact of this partial protection against pregnancy at the community level is very high in countries like India where lactation for 18-24 months is still the norm. In India women using effective temporary contraceptive methods continuously, account for less than 10 per cent of all eligible couple. It is therefore not surprising that in India even the partial contraceptive effect of lactation averts more pregnancies (because breast feeding is almost universal) than temporary methods of contraception (because these are used by a very small proportion of women).

During the last two decades there have been several changes in the life style of women in India. There has been increasing employment of women outside the home and consequent reduction in "demand feeding", earlier introduction of supplements to the infant, and some improvement in maternal nutritional status; these changes singly or in combination may result in considerable reduction in duration of lactational infertility. With the reduction in the duration of lactational infertility, there is an ever increasing need for effective contraceptive use in lactating women to ward off the too early advent of the next pregnancy. There are several contraceptive options available to lactating women. However, none of the contraceptives are perfect; the choice of appropriate time for initiation of contraception and the choice of appropriate method are critical for the well being of both the lactating mother and her offspring. Lactation, nutrition and fertility interactions; the need for contraception during lactation; and the choice of appropriate time and type of contraception in lactating women under existing conditions in India are reviewed here.

Lactation and Fertility

It has been recognised that lactation prolongs post-partum amenorrhoea and provides some degree of protection against pregnancy¹. There are, however, substantial variations in the duration of lactational amenorrhoea and interpregnancy interval between different communities, in urban and rural areas and in different income groups. Variation in the suckling frequency and the time of introduction of supplements have now been shown to be the major factors responsible for these differences².

The effect of lactation on fertility is mainly mediated through the hormone prolactin. During the early weeks of lactation, plasma prolactin levels are high, and suckling induces further elevation of these levels³. The presence of high prolactin levels is associated with (i) altered pituitary responsiveness to GnRH, (ii) loss of pulsatile LH secretion, (iii) inhibition of ovarian follicular development and oestradiol production in spite of normal FSH levels, and (iv) enhancement of negative feedback and the abolition of a positive feedback mechanism between oestrogens and FSH. It is still not known which of these changes in the hypothalamic-pituitary-ovarian axis is the primary alteration induced by prolactin, that, in turn, triggers other alterations. It is also possible that prolactin *per se* might induce many or all of these alterations in the hypothalamic-pituitary-ovarian axis which result in anovulation, amenorrhoea and infertility³.

In the early months of lactation when the infant is exclusively breast-fed, suckling frequency and plasma prolactin levels are high; the mother has lactational amenorrhoea and is infertile. However, once the infant is older and supplements are introduced, suckling duration and frequency are reduced⁴; there is a fall in plasma prolactin levels (Table I)⁵; return of fertility and menstruation occur soon afterwards^{5,6}.

Need for Contraception during Lactation

Ample data exist to indicate that conception during lactational amenorrhoea is rare; less than 10 per cent of women conceive during lactational amenorrhoea and even this risk exists mainly in the month preceding resumption of menstruation⁵⁻⁷. With the return of menstruation the contraceptive effect of lactation wanes; lactation no longer offers effective protection against pregnancy for the individual. However, even the

Table I. Prolactin levels (ng/ml) in relation to breast feeding practices

	Duration of lactation (months)			Total
	<3	3 - 6	> 6	
Supplemented group	47.4 ± 8.23 (6)	51.5 ± 7.67 (5)	43.0 ± 5.73 (11)	46.1 ± 3.91 (22)
Nonsupplemented group	67.6 ± 12.84 (9)	63.5 ± 8.37 (19)	79.5 ± 18.63 (7)	67.7 ± 6.59 (35)

Values are mean ± SE

Mean values for nonsupplemented group were significantly ($p < 0.05$) different from those for the supplemented group.

Figures in parentheses indicate the number of women studied.

Source: Ref. 5

relatively ineffective protection offered by continued lactation after resumption of menstruation is of considerable demographic significance, especially in those segments of the population in whom contraceptive use is very low. Epidemiological studies in India have shown that even in women who are not using any contraceptive, the mean interpregnancy interval is 24-30 months^{4,8}.

There is, however, another side to the same coin; some epidemiological studies carried out at the National Institute of Nutrition (NIN), Hyderabad have shown that though conception during the first six months is rare, no less than a third of all pregnancies occur in lactating women⁹. If such a conception occurs, some woman stop breast feeding; this has an adverse effect on the infant who is suddenly weaned off the breast; others continue breast feeding and incur the dual stress of pregnancy and lactation. Data from these studies showed that among 764 women who conceived while lactating only 15.8 per cent did so in the first year of lactation, 33.6 per cent conceived during the second year; 51.6 per cent of women conceived during the third or subsequent year of lactation⁹. Advent of the next pregnancy during lactation has an adverse impact on maternal nutrition (Table II)⁹. Birth weight of infants is lower if the interpregnancy interval is short⁹. It has been reported that foetal wastage, perinatal deaths¹⁰ and childhood mortality rates¹¹ are higher if interpregnancy interval is less than two years. Initiation of contraception at the

appropriate time in lactating women will prevent these adverse consequences. Contraceptives chosen should, however, not have any adverse effect either on lactation or on the breast-fed infant.

Table II. Effect of pregnancy during lactation on maternal weight in third trimester

Duration of lactation(months)	Height (cm)	Weight (kg)
Not lactating	150.8 ± 4.27 (1522)	49.5 ± 5.12 (1522)
<12	149.2 ± 6.13 (9)	41.9 ± 3.20 (8)
13-24	149.9 ± 4.49 (66)	47.1 ± 6.19* (66)
>24	148.8 ± 5.32 (31)	46.9 ± 7.27** (32)

Values are mean ± SD

Figures in parentheses indicate number of women studied

P * < 0.001; ** < 0.01

Source: Ref. 9

Over the last decade there has been an increasing need for providing contraception to lactating women. Increasing numbers of women are seeking employment

outside the home. Work outside the home substantially curtails suckling frequency and results in faster return of fertility. Health education regarding weaning has led to an increase in the proportion of women introducing supplements by four to six months and consequent earlier return of fertility. Some available data from India and elsewhere indicate that lactational amenorrhoea and interpregnancy intervals are shorter in better nourished women (Table III)⁵. Efforts to improve maternal nutrition might therefore result in more rapid return of fertility in lactating women. In view of all these, it is imperative that all lactating women are provided with contraceptives at the appropriate time so that the too early advent of the next pregnancy does not nullify the impact of intervention aimed at improving maternal and infant nutritional status. A wide spectrum of contraceptives is available today. The health care providers should be given all the necessary information on providing contraceptive care to lactating women so that they in turn counsel lactating women enabling them to make the right choice to suit their needs.

Table III. Effect of body weight on duration of amenorrhoea

Body weight (kg)	Duration of lactation	Lactational amenorrhoea
<40 (276)	21.3 $\pm$ 10.61	13.1 $\pm$ 11.74
40-44 (356)	22.5 $\pm$ 10.32	12.0 $\pm$ 8.23
45-49 (297)	20.8 $\pm$ 10.76	10.7 $\pm$ 9.36
50-54 (209)	20.7 $\pm$ 10.58	9.3 $\pm$ 10.13
>55 (222)	20.7 $\pm$ 8.53	8.2 $\pm$ 7.82

Values are mean $\pm$ SD

Figures in parentheses are the number of women studied

Source: Ref. 5

Appropriate Time for Contraception

The appropriate time for introduction of contraceptives in lactating women varies to a large extent depending upon the breast feeding and weaning practices and also the availability and utilisation of contraceptive facilities. A fully lactating woman is infertile during the first few weeks after delivery and hence does not need additional contraceptive measures during this period.

In the seventies when availability and utilisation of MCH services were low, delivery and postpartum period represented a time when women came into contact with health care personnel and contraceptive care could be readily provided. Moreover it was felt that motivation for accepting contraception might be high soon after a delivery. These led to the evolution and implementation of the All India Postpartum Programme. Initially the Programme mainly provided tubal sterilisation, a procedure for which the postpartum period is eminently suitable. However, the postpartum period may not be the ideal time for initiation of many of the temporary methods of contraception which are currently available in the Family Welfare Programme.

In the present setting, introduction of contraceptives other than sterilisation can be delayed until just prior to the anticipated return of menstruation because women do know that they are unlikely to conceive during lactational amenorrhoea and hence may not be willing to accept contraceptives earlier. Further, the mother does repeatedly get in touch with the health care providers during the first nine months after delivery for immunisation of the infant and these contacts could be utilised in motivating and counselling her, so that she is ready to accept an appropriate contraceptive method when menstruation returns.

There are marked differences in the return of menstruation and fertility not only between different countries and communities but also between different segments of the population in the same community. At the community level the expected time of return of menstruation can be approximately predicted on the basis of existing information on duration of lactation and lactational amenorrhoea. In parous women, the past lactational history can be of some help in assessing the time of return of menstruation in that individual. In any lactational period, return of menstruation usually follows shortly after introduction of supplementary foods, and/or reduction in suckling frequency or duration. In countries with liberalized abortion laws and ready availability of abortion services, lactating women can be requested to seek contraception after resumption of menstruation and/or introduction of supplements to breast-fed infant. The small number of pregnancies occurring during lactational amenorrhoea could be tackled by medical termination of pregnancy (MTP) and concurrent contraception.

Following resumption of menstruation after lactational amenorrhoea irregular cycles are common in lactating women, especially in the first 12-18 months of lactation. Many lactating women come to the gynaecologist when their periods are overdue with a request that if they are pregnant, MTP should be done. It has been estimated that about a third of such women are not pregnant. Under these circumstances it is essential that if clinical examination does not clearly confirm pregnancy, a pregnancy test should be done. If the woman is pregnant, MTP can be done and concurrently appropriate contraceptive use can be initiated. If the woman is not pregnant, unnecessary invasive procedure for MTP can be avoided and she can be given contraceptive of her choice during this visit, without waiting for the next period.

Appropriate Type of Contraception

The decision regarding the type of contraception to be used will have to take into consideration the safety and efficacy of the method, its effect on the lactating woman's health, on lactation and on infant health.

Tubal sterilisation

Tubal sterilisation appears to be the contraceptive method of choice in parous lactating women who have completed their family. Tubal sterilization can be done safely in the postpartum period or at any time during lactation. If anaesthesia given for the procedure is carefully chosen and the infant is not separated from the mother for long, the procedure *per se* has no adverse effect on lactation or on infant growth.

Intrauterine contraceptive devices (IUDs)

IUD is a safe, inexpensive, effective contraceptive with reasonably high continuation rates and hence is the most widely used contraceptive method for birth spacing in India. Available information suggests that IUDs have no adverse effect on duration of lactation, and on the quality and quantity of milk produced and so have no adverse effects on infant growth¹². IUD may thus be the method of choice in lactating women requiring a temporary method of contraception. Time of insertion of IUD should, however, be chosen with care. IUD insertion in the immediate postpartum period is associated with a high expulsion rate¹³. Several IUDs have been specially designed for postpartum use, but expulsion rate continues to remain high. If expulsion

is unnoticed, pregnancy may occur. Yet another problem with postpartum IUD insertion is that even when the IUD is in place, the thread may be drawn up; the clinician will then have to resort to X ray or uterine sounding to find out whether the IUD is *in situ*.

Perforation is a rare complication following IUD insertion; incidence of perforation varies depending upon several factors including design of the IUD, technique of insertion, time of insertion and operator's experience. Some studies from Singapore¹⁴ and India¹⁵ suggest that insertion of IUD in the hyperinvolved small mobile uterus during lactational amenorrhoea might be associated with a higher incidence of perforation of the uterus; the perforated copper IUD provokes peritoneal adhesions and has to be removed by laparotomy as early as possible after the diagnosis. Taking all these factors into consideration it might be preferable to insert the copper T soon after return of menstruation in lactating women; MTP and concurrent IUD insertion can be done in the small number of women who become pregnant during lactational amenorrhoea.

Barrier methods of contraception

The physical barrier methods of contraception are increasingly being advocated because they are "user controlled" methods and have no systemic adverse effects on maternal health, lactation or the breast-fed infant. The fact that all barrier methods have a higher failure rate than oral contraceptives (OCs) or IUDs has to be kept in mind while prescribing these methods, especially in rural areas where even today both availability and access to safe abortion services are limited.

Condoms are the most widely used barrier method in India. It may be used in combination with spermicidal cream to improve ease of use and efficacy. In recent years the fact that this combination of condom and spermicide offers protection both against pregnancy and HIV infection has led to advocacy for its wider use. Correct and consistent use of condom and spermicidal cream is essential for ensuring protection. Health education on these aspects to ensure client's understanding and compliance should precede provision of these methods; efforts should also be made to reinforce these important messages during each follow up visit.

Studies in experimental animals have shown that nonoxynol 9, a widely used spermicidal agent, is absorbed from the vagina and its presence has been demonstrated

in maternal serum, milk and the serum of the suckling rat¹⁶. There are no data on the effect, if any, of this agent on breast-fed infant. It might, therefore, be preferable not to use this spermicide in lactating women especially in the early months of lactation until data on the possible effects on breast-fed infants become available.

Diaphragm and cervical cap are two women controlled barrier contraceptive methods; they are usually used along with spermicidal creams. Fitting the diaphragm and cervical cap requires considerable time of both the client and the health care provider. Women may dislike the genital manipulation involved in fitting and removing the device. These devices need be washed, dried and kept safely for reuse and some women may find this a problem. Cervical cap and diaphragm can be used in lactating women only after involution of the uterus is completed.

Injectable contraceptives

Injectable contraceptives like depo-medroxy progesterone acetate (DMPA) have been widely used in lactating women in some developing countries like Thailand. DMPA has no adverse effect on duration of lactation, quantity or quality of breast milk, or growth of the breast-fed infant. DMPA is transferred through breast milk to breast-fed infants. Long-term longitudinal studies on infants exposed to DMPA in breast milk have not revealed any adverse long-term consequences of such exposure. Information on use of norethisterone enanthate (NET-EN) in lactating women is not as extensive as DMPA; however, findings are essentially similar¹⁷.

Unpredictable pattern of bleeding and disruption of the menstrual cycle is the major side effect associated with the injectables-DMPA and NET-EN. Both these cause a rapid return of menstruation when given to lactating women who are amenorrhoeic. However, by the second or third injection, most of the women become amenorrhoeic again. In women who are normally menstruating at the time of initiation of the injectable, amenorrhoea and unpredictable spotting occur during the first few months and later amenorrhoea of varying duration is the rule¹⁸. Rarely DMPA/NET-EN users experience excessive bleeding. Oestrogen administration is considered as the first line of management of such bleeding episodes in some countries. Administration of oestrogen during lactation, that too in high doses, might have an adverse effect on lactation and the breast-fed infant. In view of this, it is preferable not to

administer oestrogens to lactating DMPA users especially as the bleeding is usually self limiting.

Low dose progestational agents

Low dosage progestogens do not have any adverse effect on duration of lactation, quantity or quality of breast milk and infant growth¹⁷⁻¹⁹. Very little of the steroids is excreted in breast milk and so far, no adverse side effects have been reported in breast-fed infants whose mothers were using low dosage progestogens. It would, therefore, appear that low dosage progestogens, oral, injectable or implant, could be used as the preferred mode of contraception in women who opt for hormonal contraception during the early months of lactation. Low dose progestogens, irrespective of the type of delivery system used, are associated with menstrual disturbances in substantial proportion of the users. The bleeding is seldom excessive and these contraceptives do not have any adverse effect on maternal health. However, unpredictable bleeding and spotting seen in users of low dose progestogens may not be culturally acceptable in some situations. It is essential that women who opt for low dose progestogens are counselled, so that only those who are able and willing to accept irregularities in menstruation choose this form of contraception.

Low dose combination pills

Clinical and metabolic side effects of use of combination pills in lactating women are similar to those seen in nonlactating women. However, use of combination pill early in lactation causes a reduction both in the duration of lactation and in the quantity of breast milk secreted. Data from a recent WHO study suggest that when use of combination pill is initiated at six weeks postpartum, there is a rapid decline in milk volume by as much as 40 per cent at the end of 24 weeks, but the composition of milk remains essentially unaltered²⁰. The infants did not show any growth retardation, most probably because these infants had received adequate supplements; however, if growth monitoring and timely introduction of supplements is not ensured, growth faltering due to reduction in breast milk may occur. Studies conducted in India have shown that combination pill use initiated after six months has no adverse effect on duration of lactation^{5,18} or on infant growth²¹.

Surveys have shown that in spite of information being available on the adverse effect of low dose

combination pill use early in lactation, combination type of oral contraceptives are still being prescribed to lactating women, in the developed as well as in developing countries²². A specific instruction that combination pills should not be used earlier than six month post-partum, in lactating women has been included in the Guidelines for OC Use in the National Family Planning Programme in India, so that the potential adverse effect of combination pill use early in lactation is avoided.

There is substantial evidence that both oestrogens and progestogens in oral pills are excreted in breast milk. Enlargement of the breast, which subsides after discontinuation of OC use or cessation of lactation has been reported²¹ in breast-fed infants of women using combination OCs. No other adverse effects of steroid ingestion through breast milk has so far been reported. Recent studies have shown that the ingested steroids may induce drug metabolising enzymes in the infant's liver²³; the implications, if any, of this finding on efficacy of drugs administered subsequently to these infants, are at the moment not clear. Considering all these aspects, the use of combination pills should preferably be considered only in lactating women who are unable to use other methods of contraception.

Studies undertaken in the NIN, Hyderabad, indicate that use of hormonal contraceptives, irrespective of the type, dosage or route of administration and mechanism of action results in rapid return of menstruation in lactating women who are amenorrhoeic¹⁸. In some countries like Bangladesh²⁴ and India, women do not take contraceptive tablets regularly. Studies from Bangladesh have shown that use of combination pills early during lactation with poor patient compliance might shorten the interpregnancy interval²⁴. Thus, too early initiation of combination pills might not have any beneficial effect as far as fertility regulation is concerned in countries where lactational amenorrhoea lasts for longer than one year, irregularity in pill taking is common, and continuation rate of oral contraceptive use is low.

Conclusion

Lactation mediated infertility is the major natural fertility regulating method especially in the poorer segments of the population in rural India. However, with increasing employment of women outside the home in nontraditional occupations, earlier introduction of supplements to the breast-fed infants and improvement in

maternal nutrition, it is to be expected that there will be substantial reduction in duration of lactational amenorrhoea and lactation mediated infertility. This will result in an increasing need for safe and effective contraceptives for lactating women in all segments of the population in the next few years in India.

Data reviewed here suggest that there is, at the moment, no ideal contraceptive free from side effects and complications, which is suitable for use in all lactating women, at all periods of lactation. Neither is any such method likely to emerge in the foreseeable future. We do, however, have a variety of methods from which the most appropriate method for any couple can be chosen. The resources of the nation and that of the individual, the socio-cultural milieu, health status of the population, health care delivery system, and the needs of the individual are factors which are to be taken into consideration for choosing the appropriate contraceptive method and providing it to women at the appropriate time. A balanced presentation of the risks and benefits of all the available methods of contraception, and counselling is essential to ensure that lactating women choose the right method. Adequate follow up care will go a long way in providing not only safe and effective contraceptive care, but also improvement in maternal and child health.

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ABSTRACTS

Some Research Projects Completed Recently

Risk factors for hepatitis B infection in patients with cancer.

The study was carried out on 330 cancer patients (200 in cross sectional study and 130 in the case control study) to identify the risk factors for hepatitis B virus (HBV) infection, the burden of illness due to HBV and the most cost effective method for prevention of HBV infection among cancer patients. Of the 200 patients in the cross sectional study, 43 were positive for hepatitis B surface antigen (HBsAg) and 46 were positive for antibody. Maximum number of HBV marker positives were among patients with malignancy of the haemopoietic system, carcinoma breast and carcinoma cervix. Significant factors for the transmission of HBV among the patients were found to be antitumour chemotherapy, blood transfusion and surgery.

The case control study comprised 65 cancer patients with acute hepatitis B along with an equal

number of cancer patients with no history of HBV infection, matched for sex and duration of disease. Significant risk factors for HBV infection were found to be antitumour chemotherapy, blood transfusion, surgery and injections with reusable needle. Thus the study showed that apart from the immunosuppressed state, other risk factors also play an important role in the transmission of HBV among cancer patients.

It is thus suggested that as the burden of illness is high among cancer patients, vaccination of high risk groups (*ie*) those preparing for antitumour chemotherapy, those receiving blood transfusions, patients undergoing surgery, and those patients receiving multiple injections, will reduce the high incidence of hepatitis B. Other precautions like use of safe disposable syringes, screening of blood for HBV markers before transfusion and proper sterilization of instruments will further reduce the high incidence. Early

vaccination seems to be the only measure to prevent HBV infection and its consequences among cancer patients.

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Prevalence of hepatitis C in blood donors and persons with chronic liver disease.

The prevalence of hepatitis C Virus (HCV) was assessed in 100 consecutive voluntary blood donors, 100 patients with chronic liver disease and 12 patients with hepatocellular carcinoma.

Six per cent of blood donors had anti-HCV. Fourteen blood donors had alanine amino transferase (ALT) levels more than 45 IU/l; of these 5 were anti-HCV positive, indicating a correlation between high ALT and anti-HCV positivity. Three of the blood donors were HBsAg positive; one of whom was also anti-HCV positive. Prevalence of anti-HCV in patients with chronic liver disease was 17 per cent. Nineteen patients were positive for HBsAg; of these 3 were anti-HCV positive as well. A total of 35 patients gave history of previous blood transfusions; among them 7 were anti-HCV positive. Of the 47 cirrhotic patients with history of significant alcohol consumption, 8 were positive for anti-HCV. There were 4 cases of Wilson's disease; none of whom had anti-HCV antibodies. One patient of haemochromatosis with previous history of blood transfusion was positive for anti-HCV. Three of 18 patients with chronic liver disease with no known cause, were anti-HCV positive.

One of the 12 patients with hepatocellular carcinoma was anti-HCV positive; neither of the 2 HBsAg positive patients of hepatocellular carcinoma had anti-HCV antibodies.

The results suggest that anti-HCV testing combined with donor screening will substantially

reduce the risk of post-transfusion HCV infection.

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Study of normal range of motion at the neck.

The study was carried out to estimate the normal range of various movements of the neck in individuals of various age groups using an objectively reliable, simple instrument—the cervical goniometer, which is based on the principle of gravity and pendulum. Four basic movements at the neck were evaluated on 250 normal healthy subjects (125 male and 125 female) in the age group of 20 to 70 years.

The mean normal values for the individual movements of flexion, extension, lateral-flexion to right and left and rotation to right and left were 53.3, 70.9, 46.6, 48.6, 81.9 and 82.3 degrees respectively. The mean normal values for the range of motion from flexion to extension, total lateral-flexion and total rotation were 124.5, 95.6 and 164.3 degrees respectively.

A significant decrease in each movement was observed with increase in age in both sexes. Although females showed slightly better mobility, differences in the mean values amongst the males and females was not significant.

In 25 patients of ankylosing spondylitis in the age group of 20-30 years, restriction of all the movements in general and lateral-flexion in particular was observed.

Cervical goniometry thus appears to be useful for (i) estimating the normative values of the neck movements (ii) assisting in the detection of ankylosing spondylitis at an early age; (iii) systematically planning and evaluating outcome of therapeutic procedures; and (iv) evaluating the degree of disability.

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New Delhi.

ICMR NEWS

Dr. S.P. Tripathy, who took over as the Director-General, ICMR, on September 8, 1991 retired on May 7, 1994 (on superannuation) after distinguished service of over three decades in the ICMR.

Dr. (Mrs) G.V. Satyavati, a well known pharmacologist (with specialization in Medicinal Plants/Indigenous Drugs/Ancient Systems of Medicine) and a reputed biomedical editor, took over as the new Director-General of ICMR on May 7, 1994. She is the first woman to head a scientific/or research agency in India

The following meetings of various technical groups/committees of the Council were held at New Delhi:

Expert Group on Tobacco related Health Hazards.	May 17, 1994
Task Force on Food Contamination/Adulteration	June 13-14, 1994
Task Force on Male Contraception.	June 22-23, 1994
Project Review Group of the Division of Human Resource Development Research	June 28-29, 1994

Participation of ICMR Scientists in Scientific Events:

Dr. S.K. Kashyap, Director, National Institute of Occupational Health, Ahmedabad, participated in a

symposium on New Epidemics in Occupational Health at Helsinki (May 16-19, 1994).

Dr. N.Raghuramulu, Dy. Director, (Sr. Grade), National Institute of Nutrition, Hyderabad, participated in the ninth workshop on Vitamin D at Orlando (May 28-June 2, 1994).

Dr. B.N. Saxena, Senior Dy. Director-General, ICMR, participated in the Steering Committee meeting of the WHO Task Force on Research on the Introduction and Transfer of Technologies for Fertility Regulation at Geneva (June 6-9, 1994)

Dr. S.K. Kar, Director, Rajendra Memorial Research Institute for Medical Sciences, Patna, participated in the meeting on Protective Immunity in Lymphatic Filariasis at Glasgow (June 30-July 1, 1994).

Dr. Saxena participated in the International Symposium on Ethics in Medicine and Reproductive Biology and in the meeting of the International Federation of Gynaecology and Obstetrics (FIGO) Ethics Committee at Paris (June 6-8, and 9-10, 1994 respectively).

Dr. G.V. Satyavati, Director-General, ICMR, co-chaired the meeting of the Joint Working Group of the Vaccine Action Programme at Washington D.C. (July 11-13, 1994).

Dr. T. Adak, Asstt. Director, Malaria Research Centre, Delhi, participated in a workshop on New Animal Model, organized under the auspices of the Indo-US Vaccine Action Programme at Baltimore (July 11, 1994).

ICMR AIDED SYMPOSIA/SEMINARS/WORKSHOPS/COURSES/CONFERENCES

Symposium/Seminar/Workshop/ Course/Conference	Date & Place	Contact Address
Workshop on Quality Controlled Determination of Antimicrobial Susceptibility.	June 6-11, 1994; (at New Delhi)	Prof. Ramesh Kumar, Chairman, Organising Committee of the Workshop, Department of Microbiology, All India Institute of Medical Sciences, New Delhi.
National Seminar on Recent Trends in Biological Sciences.	July 18-20, 1994; (at Raipur)	Prof. M.L. Naik, Convenor of Seminar, Department of Biosciences, School of Life Sciences, Pt. Ravi Shankar Shukla University, Raipur.
National Workshop on Laboratory Diagnosis of Fungal Infections.	August 1-7, 1994; (at Madurai)	Dr. V.V. Pankajalakshmi, Organising Secretary of the Workshop, Institute of Microbiology, Madurai Medical College, Madurai.

Symposium/Seminar/Workshop/ Course/Conference	Date & Place	Contact Address
Continuing Medical Education in Psychiatry.	September 10-11, 1994; (at Manipal)	Dr.P.S.V.N. Sharma, Organising Secretary, 4th Annual Conference of the Indian Psychiatry Society, Department of Psychiatry, Kasturba Medical College, Manipal.
MICON-International' 94.	November 9-12, 1994; (at Mysore)	Dr. R. Shankaran, Chairperson of the Organising Committee, MICON-International' 94, Defence Food Research Laboratory, Siddhartha Nagar, Mysore.
III International Conference on DNA Fingerprinting.	December 13-16, 1994; (at Hyderabad)	Dr. Lalji Singh, Organising Secretary of the Conference, Centre for Cellular and Molecular Biology, Hyderabad

COUNCIL'S TRAINING PROGRAMMES FOR 1994-95

Virology

At the National Institute of Virology, Pune:

- ... Diploma in Medical Virology (June 1994-May 1995).

- ... Training Course on Air Pollution Monitoring and Risk Assessment (October 19-25, 1994).

- ... Training Course in Pesticide Residue Analysis (December 5-9, 1994).

Reproductive Biology

At the Institute for Research in Reproduction, Bombay:

- ... Workshop on Gynaecologic Cytology and Immunocytochemistry (September 26-October 1, 1994).

Medical Entomology

At the Vector Control Research Centre, Pondicherry:

- ... M.Sc in Medical Entomology (from August 1994: for 2 years).
- ... Short-term Course on Malaria, Filariasis and Urban Vector Control for in-service candidates (June 1994).

Endocrinology

At the National Institute of Nutrition, Hyderabad:

- ... Annual Training Course on Endocrinological Techniques and their Applications (August 1-September 16, 1994).

Laboratory Animal Technology

At the Laboratory Animal Information Service Centre, National Institute of Nutrition, Hyderabad:

- ... Training Course for Laboratory Animal Technicians (June 15-July 31, 1994).
- ... Training Course for Laboratory Animal Supervisors (September 12- December 10, 1994).

Nutrition

At the National Institute of Nutrition, Hyderabad:

- ... M.Sc.in Applied Nutrition (June 1, 1994-February 28, 1995).
- ... Annual Training Course in Nutrition (December 1, 1994-February 28, 1995).

Haematology

At the Institute of Immunohaematology, Bombay:

- ... Training Course in Blood Group Serology and Blood Bank Methodology for Technicians (August 9-September 8, 1994).
- ... Training Course in Blood Group Serology and Blood Bank Methodology for Medical Officers (August 9-October 7, 1994).

Occupational Health

At the National Institute of Occupational Health, Ahmedabad:

- ... Orientation Course on Occupational Health for Industrial Medical Officers (September 19-24, 1994).

INDIAN COUNCIL OF MEDICAL RESEARCH

Grant-in-aid for organising Seminars/Symposia/Workshops

Council provides partial financial assistance for organising Seminars/Symposia/Workshops. Applications for grant of financial assistance (complete in all respects in the prescribed proforma), will be considered only if furnished **atleast four months before the date of commencement** of the Seminar/Symposium/Workshop, *etc.*

Training Course on Modern Techniques for the Chemical Synthesis, Purification and Characterization of Peptides

Institute for Research in Reproduction, Bombay.

Applications are invited from mid-career scientists/technologists (preferably below 40 years) working in regular positions in Universities/National Laboratories/Research Institutions/in-house R&D Centres for admission to a DBT-sponsored short-term training course on Modern Techniques for the Chemical Synthesis, Purification and Characterization of Peptides, to be organized during November 14-December 2, 1994. The course content will cover latest techniques in the synthesis of peptides by the solid phase technology, their purification and characterization. There will be no registration fee. TA/DA will have to be borne by the sponsoring institution. Outstation candidates will be provided accomodation at subsidized rates.

Applicants should give the following details:-

- (i) Educational qualifications, research experience, age.
- (ii) Present place and nature of work.
- (iii) Facilities for R&D available in the candidates' laboratory.
- (iv) Present and future research interests of the candidate's laboratory.
- (v) How the candidate proposes to make use of the training in his/her research programmes.

Applications (duly sponsored) through proper channel, should reach Dr. K.S. Iyer, Course Director, Institute for Research in Reproduction, Jehangir Merwanji Street, Parel, Bombay-400012 (Fax: 91-022-4139412) on or before **August 31, 1994**. Selected candidates will be informed by the third week of September 1994.

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