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Role of Herbal Immunomodulators and Antioxidants in Recurrent Pregnancy Loss

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Abstract

Recurrent pregnancy loss (RPL) is defined as three or more consecutive spontaneous losses of pregnancy. Ayurvedic texts such as Charak and Sushrut Samhita have suggested certain herbs, which are immunomodulatory, antimicrobial and antioxidant in nature. Toxoplasmosis, (Other (syphilis, varicella-zoster, parvovirus B19),) Rubella, Cytomegalovirus (CMV), Herpes and infections are some of the most common infections associated with congenital anomalies and RPL. Most of these infections cause mild maternal morbidity, but have serious consequences in foetus. Cap. Torchnil is a combination of 11 herbs. A multicentric post marketing research was conducted involving 7789 patients of RPL and 124 obstetricians through a questionnaire in 2002. Cap. Torchnil plays an important role in reducing RPL possibly because of its immunomodulatory, antioxidant and antimicrobial actions, which are characteristics of most herbal rasayanas.

Introduction

Recurrent pregnancy loss (RPL) is defined as three or more consecutive spontaneous losses of pregnancy. Despite the tremendous scientific and technological advances it has remained a dilemma. It still remains a diagnostic challenge and frustrating therapeutic experience to most obstetricians. It is a highly frustrating experience for the patient. Despite great advances made by the modern science and cutting edge technology, the large number of cases, almost 43%, are still classified as due to unknown aetiology. Known aetiological factors include anatomical defects in Mullerian tract, TORCH infections, immunological problems (allo-immunity and autoimmunity). Many modern therapies, which are in current use, do not lead to a successful pregnancy outcome, resulting in great frustration to the patient and also to the obstetrician. It is because of this that the author decided to look into Ayurveda for a possible better solution. Ayurvedic texts dedicated entire chapters for repeated pregnancy loss and suggested therapeutic measures for its prevention.

Sushrut samhita has suggested almost 50 drugs in different groups for this purpose and author selected about 11 ingredient herbs out of them to make the combination of Torchnil, based on their properties and biological actions.¹ Ingredients of Torchnil are as follows:

1. Glycyrrhiza glabra (Yashtimadhu)
2. Tinospora cordifolia (Guduchi)
3. Solanum indicus (Ringimul)
4. Piper longum (Lendi pimpli)
5. Tribulis terrestris (Gokshuru)
6. Clerodendrum serratum (Bharang-Mul)
7. Punica granatum (Pomegranate)
8. Vanda roxburghii (Rasna)
9. Rubia cordifolia (Manjishtha)
10. Solanum xanthocarpum (Kantakari)
11. Vetiveria zizanioides or Andropogon muricatus (Vala)

Pregnancy is a state of oxidative stress. During pregnancy, large amounts of LDL cholesterol are brought into liver for metabolism for the excessive energy requirements of the body leading to increased lipid peroxidation. Pregnancy while not a disease is often accompanied by a high-energy demand for many bodily functions and increased oxygen requirement. Uncontrolled iron supplementation and inclement environmental factors may add to oxidative stress. Further feeble antioxidant defense, could lead to excessive oxidative stress leading to many diseases of cellular and/or tissue components.²

Immunology plays a significant role in the outcome of the pregnancy. There are many placenta-mediated mechanisms that prevent the immune response of the mother against the foetus, which is a foreign body. In normal pregnancy, asymmetrical antibodies develop resulting in T helpers cell 2 (Th2) type response. It is associated with good progesterone secretion from the placental tissue resulting in a successful outcome of pregnancy. A response to foetal antigenic stimulus is normally dampened by the progesterone induced blocking factor (PIBF) secreted by the chorionic tissue of placenta, thus prevent this low antigenic reaction. In case if foetal antigenicity produces symmetrical antibodies, due to greater sharing of HLA antigens in partners, it results in Th1 cell response leading to deficient PIBF secretion. These changes lead to pro-inflammatory cytotoxic reactions associated with high NK cell activity and lead to abortion. So in short, the immunological response from the mother is blocked by progesterone and if this progesterone-blocking factor is suppressed, it lead to unsuccessful pregnancy outcome. Thus the immunomodulation plays a prominent role in the outcome of pregnancy. Development of autoimmunity also plays a role in repeated pregnancy loss. In many cases of RPL, auto-antibodies can be detected (almost 14%) and this condition is termed as anti-phospholipid syndrome.

TORCH is an acronym for a special group of infections. These may be acquired by a woman during pregnancy. "TORCH" infections include many microbial infections such as, 'T' stands for Toxoplasma infection, also called toxoplasmosis; 'O' represents other infections, such as hepatitis B, syphilis, and Varicella zoster, the virus that causes chickenpox; 'R' stands for rubella, the virus that causes German measles; 'C' is for cytomegalovirus, or CMV and 'H' represents herpes simplex virus, the cause of genital herpes. As a group, the TORCH infections represent a common cause of birth defects like congenital heart disease, microcephaly, cataract, hearing defects and RPL. They can leave a child with severe mental retardation or learning disorders. Some children appear normal at birth, only to have behavioural, emotional, or learning problems later in life.³⁻⁵ Human immunodeficiency virus (HIV) is one of the many infectious agents that can contribute to cerebral palsy and mental

retardation. Even the Listeria infection is known to cause cerebral palsy in infants later in life.

Material and Methods

Since Torchnil gave good results in RPL due to TORCH infections, we wanted to ascertain the antiviral activity of the individual herbs used in Cap. Torchnil. An assessment was done in vitro HIV culture for their reverse transcriptase and P24 inhibitory activity as compared to respective controls AZT and lamivudine.

The anti-HIV activity screening of the medicinal plants has been carried out by estimating virus-associated p24 antigen in the presence and absence of the plant extracts. The HIV was grown in HIV sensitive T cell lymphoma culture (H9 cell culture) and p24 is core antigen of HIV which can be used as one of the replication markers. The p24 inhibition was studied using p24 capture ELISA.6-8 The estimation of p24 was done with the help of p24 Capture ELISA kit purchased from 'Zeptomatrix'. The assay was done in triplicates. With this we quantitated the virus associated p24 antigen in the presence and absence of the extracts and analyzed per cent inhibition.

Other screening assay performed was the Reverse Transcriptase (RT) inhibition in the presence and absence of the plant extracts. RT enzyme of HIV is the important unique enzyme, which performs the important part in HIV replication. The genes for HIV-RT, which are responsible for the drug resistance, undergo frequent mutations. During the HIV replication, HIV-RT uses HIV-RNA as a template for forming the complimentary DNA (cDNA) strand. The HIT-RT inhibition assay is based on the quantitation of the uptake of radio-labelled Thymidine in the cDNA. These individual plants were also studied for anti-HIV activity in vitro, which is assessed by testing inhibition of HIV 1 reverse transcriptase.9 These studies were carried out at Haffkin Institute for Training, Research and Testing, Mumbai.

Post market multicentric clinical research study of Torchnil in RPL

Mode of administration in patients: In all cases of RPL it is administered at a dose of one capsule twice daily during the pre conception period for three to six months followed by administration in same dose throughout pregnancy. Post marketing research of Cap. Torchnil has been done to find out its effectiveness and safety. This study covered the obstetricians in few cities in Maharashtra, viz. Mumbai, Navi Mumbai, Nashik and Nanded etc. Those obstetricians treating their RPL patients with Cap. Torchnil were given a common questionnaire and were requested to fill the same at their convenient time. 124 Doctors responded to the questionnaire. Qualifications of these practitioners are as following, MD (Ob and Gyn) 110; MBBS, DGO 5; MBBS, 7 and Ayurvedic practitioners, 2 (as given in Table 1).

Results and Discussion

Torchnil formulation is devised to fight viral infections, inflammations, oxidative stress and immune processes in the placenta in the pregnant mother for the purpose of safe motherhood. Pregnancy, as a state of oxidative stress, is now a well-recognized fact. There is sufficient laboratory evidence to show that these herbs have excellent antioxidant capability. 69 patients of BOH were tested for the presence of antibodies specific to any of the TORCH infections. Out of them 52 patients were TORCH positive and 17 were TORCH negative. Purely Toxoplasma antibodies were found in 24 patients comprising 37.6%. Single presence of CMV (Cytomegalo virus) antibodies were found in three cases forming the incidence of 4.3%. Similar number of cases was afflicted by Rubella. 12 patients were found to have mixed infections comprising 17.39% incidence. The study group in either category were given Cap. Torchnil and in controls, the standard medical line of treatment which included, rovamycin, low dose aspirin, prednisolone and heparin depending on the case. Torchnil formulation is devised to fight viral infections, inflammations, oxidative and immune process in the placenta in the pregnant mother. The results show that the live birth rate in study group is almost 95% when compared to control group which is around 75%. Also because of good foetal weight the incidence of foetal distress and the consequent LSCS incidence also are low when compared to the control group.10

All the medicinal plants in Torchnil were tested for p24 inhibitory activity. Data presented in Table 2 presents the p24 inhibitory activity of 11 plants as compared to cell associated viral p24. Phosphate buffer saline is an inert control, as it does not have any inhibitory action on p24. The results showed that *Vetiveria zizanioides* (Vala) possessed the highest p24 inhibitory activity, which is comparable to lamivudine (drug control). Overall in vitro p24 inhibition activity of the medicinal plants was significant (Table 2).

As shown in Table 3 the values for p24 antigen inhibition was higher for all the medicinal plants because the activity was compared to the virus control provided in the ELISA kit which is the purified standard p24 antigen, used as a positive control. It was observed that *T. terrestris* showing the most significant inhibition with 90.43% P24 (Table 3).

Qualification of the obstetrician	Number
Total number of obstetrician responded to fill in the questionnaire proforma	124
MD, DGO	110
MBBS, DGO	5
MBBS	7
Ayurvedic qualified Ob Gyn practitioners	2

Table 2 : Report for the in vitro evaluation of p24 inhibitory activity of the mixture preparation of medicinal plants

Sr .No.	Sample	% p24 Inhibition
1.	Glycyrrhiza glabra (Yashtimadhu)	-
2.	Tinospora cordifolia (Guduchi)	13.6
3.	Solanum indicus (Ringimul)	16.95
4.	Piper longum (Lendi pimpli)	6.78
5.	Tribulis terrestris (Gokshuru)	22.03
6.	Clerodendrum serratum (Bharang-Mul)	8.47
7.	Punica granatum (Pomegranate, Anardana)	1.69
8.	Vanda roxburghii (Rasna)	169
9.	Rubia cordifolia (Manjishtha)	15.25
10.	Solanum xanthocarpum (Kantakari)	20.34

Table 3 : Report for the in vitro evaluation of p24 inhibitory activity of the medicinal plants

Sr .No.	Sample	% p24 Inhibition
1.	Glycyrrhiza glabra (Yashtimadhu)	84.57
2.	Tinospora cordifolia (Guduchi)	87.07
3.	Solanum indicus (Ringimul)	87.28
4.	Piper longum (Lendi pimpli)	87.39
5.	Tribulis terrestris (Gokshuru)	90.43
6.	Clerodendrum serratum (Bharang-Mul)	86.96
7.	Punica granatum (Pomegranate, Anardana)	84.89
8.	Vanda roxburghii (Rasna)	74.57
9.	Rubia cordifolia (Manjishtha)	83.91
10.	Solanum xanthocarpum (Kantakari)	89.02

11.	Vetiveria zizanioides (Vala) Control	25.42	11.	Vetiveria zizanioides (Vala)	90.22
12.	Phosphate Buffered saline (positive control)	Nil	Control Virus control (standard p24 Ag in absence of any extract/inhibitory moieties) Nil		Nil
13.	Lamivudine (Drug control)	25.42			

The mixture of all the plants in Torchnil was also tested for p24 inhibition. Table 4 presents the data on their in vitro evaluation of p24 inhibitory activity. Per cent p24 inhibition was calculated by considering the maximum p24 concentration in presence of phosphate buffered saline unlike previous study where we have considered the Virus control (standard p24 Ag in absence of any extract/inhibitory moieties) for calculating the inhibitory activity. It showed higher activity of 23.57% than that of a control drug, lamivudine with 20.71% inhibition. Piper longum tested individually for p24 inhibition, showed a better p24 inhibition (43.57%) when compared with lamivudine.

The data in Table 5 present the in vitro evaluation of anti-HIV reverse transcriptase activity of the 11 plants present in Cap. Torchnil. Among these, Solanum xanthocarpum (Kantakari) gave the highest inhibition of about 37%, followed by Punica granatum (Pomegranate), which gave 34% inhibition when compared to AZT (15%).

Table 4 : Report for the in vitro evaluation of p24 inhibitory activity of the mixture preparation of medicinal plants

Sr. No.	Sample	% p24 Inhibition
1	Mixture of 11 plant extracts	23.57
2	Piper longum (Lindi pimpli) Control	43.57
3	Lamivudine (Drug control)	20.71
4	Blank (Medium control)	—

Table 5 : Report for the in vitro evaluation of anti-HIV activity

Sr. No.	Sample	% RT Inhibition
1.	Glycyrrhiza glabra (Yashtimadhu)	11.53
2.	Tinospora cordifolia (Guduchi)	3.84
3.	Solanum indicum (Ringimul)	No Inhibition
4.	Piper longum (Lendi pimpli)	No inhibition
5.	Tribulis terrestris (Gokshuru)	2.44
6.	Clerodendrum serratum (Bharang-Mul)	17.07
7.	Punica granatum (Pomegranate, Anardana)	34.15
8.	Vanda roxburghii (Rasna)	No inhibition
9.	Rubia cordifolia (Manjishtha)	29.27
10.	Solanum xanthocarpum (Kantakari)	36.58
11.	Vetiveria zizanioides (Vala)	19.51
	Control	—
	AZT	15.38
	Phosphate buffered saline	Nil

In the multicentric clinical study, covering over all 124 obstetricians responded to the request and provided the following information with regard to their experience of treating 7789 patients with Torchnil capsules for repeated pregnancy loss. Out of 124, 111 doctors could enumerate the number of patients treated by them. 108 were satisfied with the results and were willing to recommend Cap. Torchnil to their other colleagues. 10 had no comments while 6 refused to recommend (Table 5). The data revealed that 55 doctors could give rate of success as 70-80%. 43 could not give the success rate in % values but were satisfied with the results, 5 thought that it was too early to comment while 11 refrained from any comments.

Possible mechanisms of action of the ingredients of Torchnil are as follows:

1. Glycyrrhiza glabra (Yashtimadhu)

Glycyrrhizin and glycyrrhithic acid from this plant are shown to be good antioxidants. They inhibit thiobarbituric acid reactive substances (TBARS) formation and restore superoxide dismutase (SOD).¹¹ Glycyrrhizin inhibits ROS generated by neutrophils and acts as an anti-inflammatory agent at the site of inflammation. Its anti-inflammatory action is based on its weak deoxycortisone-like and ACTH action. Glycyrrhizin possesses anti-viral activity against HIV.^{12,13} It is also a potent immunomodulatory with anticcomplimentary action. Glycyrrhenic acid also possesses antioxidant activity.¹⁴ Glabridin from G glabra prevents LDL oxidation.¹⁵

2. Tinospora cordifolia (Guduchi)

It is bitter and astringent in taste. It is ushna virya (increase BMR) and sweet in vipak (neutral post digestion ash). Its special property is that, it is anti-toxic. It is an acclaimed rasayana. It stimulates reticuloendothelial system, bone marrow cellularity and proliferation of stem cells. It also enhances the haemopoietic growth factor, IL-3. It is also an effective antioxidant by virtue of its capacity to enhance GSH and Vitamin C.¹⁶ It

Table 6 : Data on number of doctors who could enumerate number of the patients treated by them with Cap. Torchnil

Number of doctors satisfied with the results and willing to recommend to other colleagues	111
No comments	10
Number of doctors who will not recommend	6
Total	124
Number of doctors who could give rate of success as 70-80%	55
Number of doctors who could not give success rate in % but happy with overall results	43

decreases plasma TBARS, ceruloplasmin and alpha tocopherol. By raising the general immunity it helps to fight against the infection. It is a potent adaptogen, hepatoprotective agent and immunostimulant. It strengthens macrophage activity.17

Number of doctors who felt it is too early to comment	5
Number of doctors who refrained from any comments	10

3. Piper longum (Lindi pippali)

It is pungent in taste and sweet (Neutral ash) in vipak, is described as Anushna sheeta (it does not raise BMR), and its special gunas are catabolic, unctuous and acute.18 It is an acclaimed rasayana. Its anti-allergic action reduces passive cutaneous sensitivity and protects against antigen-induced bronchospasm and protects mast cells. It effectively suppresses cutaneous anaphylaxis in animals. It is hepatoprotective and is also a good bio enhancer. It is an effective adaptogen and immunomodulator.19

4. Tribulis terrestris (Gokshuru)

It is a nutritive agent with 10-55% protein. It is diuretic and improves the glomerular filtration rate (GFR)18 besides increasing the contractile effect of ureters.20 It inhibits the angiotensin converting enzyme. It thus causes antihypertensive action.21

5. Clerodendrum serratum (Bharang-Mul)

Its tastes are bitter, pungent and astringent, its vipak (alkaline post digestion ash) is pungent, it is ushna virya (increase BMR) and is anabolic and acute.18 It is an excellent anti-histaminic agent and on prolonged administration causes protection against anaphylaxis.22 It is anti-inflammatory and an immunomodulator. It is commonly recommended in bronchial asthma, fevers, chronic conditions, e.g. sinusitis. It is anti-inflammatory,19 anti-allergic22 and anti-nociceptive.23

6. Punica granatum (Pomegranate, Anardana)

Its tastes are sweet, astringent and sour, its virya is described as anushna sheeta, its vipak is pungent and its gunas are catabolic and unctuous. Its rind is used in treatment of diarrhoea and dysentery. Its rind is effective against vibrio cholera. It is a good nutrient that contains large number of micronutrients like b-carotene, vitamins B1, B2, C, potassium, phosphorus, magnesium, proteins and phytoestrogens. It contains a phytochemical, punicalin, which has antiviral (anti-HIV, antibacterial and antifungal activity).

7. Vanda roxburghii (Rasna)

It is guru (anabolic) in character, bitter in taste, vipak is pungent and virya is ushna. In Ayurveda, it is advised for the relief of all types of inflammations of joints, especially useful in autoimmune disorders like rheumatoid diseases. It is an anti-inflammatory agent.18 It is also a powerful antibacterial and antifungal agent and suppresses autoimmune activity.

8. Rubia cordifolia (Manjishtha)

Traditionally, it is used for treating urinary tract infections and as an anti-inflammatory drug. Its property is guru, its taste is astringent, bitter and sweet, vipak sweet and ushna virya. It is a powerful anti microbial agent especially in skin and urinary tract infections. It is urolythotriptic and diuretic.18 During pregnancy, urinary infections are common.

9. Vetivera zizanoides (Vala)

Traditionally, it is used as a homeostatic blood purifier, diuretic and anti-pyretic.18

10. Solanum xanthocarpum (Kantakari)

It is bitter and pungent in taste, its vipak is pungent, it is ushna virya and it is catabolic and dry in nature. According to the Ayurvedic practices it is used to promote conception.18 It is widely used in respiratory infections and asthma and it improves pulmonary function.24

11. Solanum indicum (Ringimul)

Its taste is pungent and bitter, its vipak is pungent, its virya is ushna. Its characteristic gunas are catabolic, dry and acute. It is commonly used in asthma, chronic febrile conditions. It is also advised for begetting a male child in the form of nasal drops on the day of pushya nakshatra (Star). This ritual is called punsavan vidhi. Nasal administration of this drug is shown to increase the 17-oxy steroids in the urine of women.18

It can be seen from the above that Glycyrrhiza glabra and Punica granatum contain phytochemicals glycyrrhizin and punicalin respectively, which are well known for their anti-viral action. Our in vitro studies of individual herbs e.g. Vetivera zizanoides, Tribulis terrestris and Solanum xanthocarpum, Piper longum etc. have also shown very significant anti HIV action. Even total formulation proved to be effective against HIV. Rubia cordifolia, Piper longum and Solanum xanthocarpum are anti-microbial in property against the pathogenic organisms in GU, GI and Respiratory tracts respectively. Tinospora cordifolia, Piper longum, Clerodendrum serratum and Vanda roxburghii are powerful immunomodulators. Tribulus terrestris and Glycyrrhiza glabra are potent antioxidants. Tribulis terrestris and Punica granatum are highly nutritious and helps the foetal growth by supplying micro and macro-nutrients. Therefore these formulations combat the infections, immune complexes and stress of lipid peroxidation in placenta. They also promote foetal growth by providing proper nutrition. Through all these multitudinous synergistic actions of Cap. Torchnil causes superior foetal outcome in all cases of RPL except those due to anatomical causes. Torchnil capsules were well tolerated and no adverse side effects were observed.

In conclusion, Cap. Torchnil plays an important role in RPL because of its safety and immunomodulatory, antioxidant and antimicrobial actions, which are the characteristics of most herbal rasayanas.

Table 7 : List of obstetricians from different areas who participated in the post marketing research survey of TORCHNIL

No.	Name	Area
1.	Dr. Rajendra Bedmutha	Nashik
2.	Dr. NS Barde	Nashik
3.	Dr. Pramod Patil	Nashik
4.	Dr. Prasad Joshi	Nashik
5.	Dr. Arti Kulkarni	Nashik
6.	Dr. Abhijit Kakde	Nashik
7.	Dr. Jaywant Aher	Nashik
8.	Dr. Nalini Bagul	Nashik
9.	Dr. Nivedita Pawar	Nashik
10.	Dr. VR Sonambekar	Nashik
11.	Dr. Jyotsna Dumbre	Nashik
12.	Dr. Rachita Biwai	Nanded

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13.	Dr. Padmaja Maslekar	Nanded
14.	Dr. Vidya Patil	Parbhani
15.	Dr. Swati Bhlerao	Nanded
16.	Dr. Meena A Patil	Nanded
17.	Dr. JS Deshpande	Nanded
18.	Dr. Nalini Patil	Sangli-Miraj
19.	Dr. Tushar Chaugule	Sangli-Miraj
20.	Dr. Ujwala Wagh	Sangli-Miraj
21.	Dr. Himabindu	Navi Mumbai
22.	Dr. Anu Vij	Navi Mumbai
23.	Dr. Anuradha Nandapurkar	Navi Mumbai
24.	Dr. AH Parkar	Navi Mumbai
25.	Dr. BG Boricha	Navi Mumbai
26.	Dr. Swathi Kanthe	Navi Mumbai
27.	Dr. Subhadra Neel	Navi Mumbai
28.	Dr. Anita Srivastava	Navi Mumbai
29.	Dr. Mahale	Navi Mumbai
30.	Dr. Pradeep Khopkar	Navi Mumbai
31.	Dr. Vidya Pathare	Navi Mumbai
32.	Dr. Cherry Shah	Mumbai
33.	Dr. Nitin Visariya	Mumbai
34.	Dr. Amish Doshi	Mumbai
35.	Dr. Hema Menon	Mumbai
36.	Dr. Rashmi saraogi	Mumbai
37.	Dr. Sejal Desai	Mumbai
38.	Dr. Amul Rawal	Mumbai
39.	Dr. Tushar Wagh	Mumbai
40.	Dr. AS Gaonkar	Mumbai
41.	Dr. PR Shah	Mumbai
42.	Dr. Dilip Raichura	Mumbai
43.	Dr. Narendra D Joshi	Mumbai
44.	Dr. Pramila Kenkre	Mumbai
45.	Dr. Rajendra Saraogi	Mumbai
46.	Dr. Jagdip T Shah	Mumbai
47.	Dr. Sheela Verma	Mumbai
48.	Dr. Meeta Mehta	Mumbai
49.	Dr. SP Modi	Mumbai
50.	Dr. Mrs. Deepti Mehta	Mumbai
51.	Dr. PB Paidhungat	Mumbai
52.	Dr. Aparna Patil	Mumbai
53.	Dr. Ashok R Anand	Mumbai
54.	Dr. Ganpat Sawant	Mumbai
55.	Dr. Lata Dandekar	Mumbai
56.	Dr. Mashuri Patel	Mumbai
57.	Dr. Pallavi Shukla	Mumbai
58.	Dr. Kishori Kadam	Mumbai
59.	Dr. Ujwal P Mahajan	Mumbai
60.	Dr. Asha Singhal	Mumbai
61.	Dr. Sudha Marwah	Mumbai
62.	Dr. Nikita Kothari	Mumbai
63.	Dr. Mahesh Asher	Mumbai
64.	Dr. HM Solanki	Mumbai
65.	Dr. Neelima Masurkar	Mumbai
66.	Dr. Faram Irani	Mumbai
67.	Dr. Prasad Mahadevan	Mumbai
68.	Dr. Ajit Padgaonkar	Mumbai
69.	Dr. SD Upasini	Mumbai

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70	Dr. Bhawna Mistry	Mumbai
71	Dr. KD Kapasi	Mumbai
72	Dr. Ranna Doshi	Mumbai
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BENEFITS OF OMEGA 3 FATS MAY BE IN DOUBT


Omega 3 fats may have no effect on total mortality, combined cardiovascular events, or cancer. Hooper and colleagues carried out a meta-analysis of randomised control trials and cohort studies of long chain and shorter chain omega 3 intake for at least six months in adults with or without risk factors. Trial results were inconsistent, and the study's pooled estimates showed no strong evidence of reduced mortality or cardiovascular events in participants taking additional omega 3 fats. However, they also showed no increased risk of cancer or stroke (suspected hazards) with higher omega 3 intake.

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