

**ROLE OF AYURVEDIC POLYHERBAL FORMULATION
MAHARISHI AMRIT KALASH: A REVIEW****Dr. Chitra R. Kamath and Bhavini Shah***

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Article Received on
24 March 2016,
Revised on 14 April 2016,
Accepted on 04 May 2016
DOI: 10.20959/wjpr20166-6262

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ABSTRACT

Maharishi Amrit Kalash (MAK) belongs to a group of herbal formulations known as "Rasayanas." This herbal formulation is made up of MAK-4 and MAK-5. Maharishi Amrit Kalash has a diverse, cumulative positive influence on all aspects of health - physical, mental, emotional and spiritual. This type of rasayanas utilizes the whole plant and relies on the healing ability of nature's own intelligence. MAK is one of Ayurveda's most powerful rejuvenators, promoting vitality and strength in both mind and body. Maharishi Amrit Kalash has both a nurturing effect and a detoxifying effect on the physiology. MAK enhances immunity, optimizes physiological

balance (homeostasis), counters the degenerative effects of ageing and promotes health and longevity. MAK-4 and MAK-5 are found to be responsible for reduction in chemical toxicity and chemotherapy toxicity. They show significant response in antioxidant activity, immunity enhancement and also anti cancer activity. The present paper deals with the review of research done on the above mentioned activities.

KEYWORDS: MAK-4, MAK-5, cancer, chemotherapy, immunity, etc.**INTRODUCTION**

Ayurveda is a traditional Indian Medicinal System practiced for thousands of years. Considerable research on pharmacognosy, chemistry, pharmacology, and clinical therapeutics has been carried out on ayurvedic medicinal plants. The polyherbal formulations described in ayurveda have been the basis of treatment of various human diseases. Selection of scientific and systematic approach for the evaluation of herbal formulations based on their use in the traditional systems of medicine forms the basis for an ideal approach in the development of new drugs from plants.

Maharishi Ayurveda is the timeless knowledge of complete health for the individual and society contained in the Veda and Vedic Literature, the most fundamental Laws of Nature governing the orderly evolution of the universe. Through the prevention-oriented knowledge of health care provided by Maharishi Ayurveda, every individual has the real opportunity to achieve long, long life in good health. Maharishi Ayurveda has identified the points of connection between mind and body. The specific meeting point of mind and body has constellation of unique psycho physiological characteristics that constitute the individual.

Maharishi Amrit Kalash (MAK) belongs to a group of herbal formulations called “Rasayanas.”^[1-2] MAK enhances immunity, optimizes physiological balance, counters the degenerative effects of ageing, and promotes health and longevity.^[38] MAK, made under hygienic conditions strictly in accordance with Vedic principles, incorporating the most modern technology and quality control, is a specially manufactured formulation of Maharishi Ayurveda.

MAK was first used as a food supplement in many of the fifty Maharishi Ayurveda Prevention Centers around the world on patients of cancer, atherosclerosis and other chronic diseases as well as on healthy people. Thrilled with results, teams of doctors and scientists at various Medical Schools, Universities, Research Institutes and Laboratories undertook major in vitro studies, animal studies and clinical trials involving MAK. Today MAK is one of the most researched Ayurvedic formulations, showing profound results in a variety of indications.

These studies support two principle themes of research. The first is that Maharishi Ayurveda rasayanas bring about physiological balance and biological integration. The second is that recent studies empirically validate the internal consistency of the theoretical framework of Maharishi Ayurveda, providing evidence that the diagnostic and therapeutic approach of Maharishi Ayurveda can be applied in multiple clinical settings and verified through scientific investigation.^[3]

Maharishi Amrit Kalash is presented in two forms. The paste called MAK-4 is made up of thirty-eight herbs lipophilised in cow ghee.^[4] The hydrophilic tablet known as MAK-5 is composed of thirteen herbs.

MAK -5 contain the following thirteen herbs: *Withania somnifera*, *Glycyrrhiza glabra*, *Ipomoea digitata*, *Asparagus adscendens*, *Emblica officinalis*, *Tinospora cordifolia*, *Asparagus racemosus*, *Vitex trifolia*, *Convolvulus pluricaulis*, *Argyreia speciosa*, *Curculigo orchioides*, *Capparis aphylla* and *Acacia Arabica*.

MAK- 4 consists of the following 38 herbs: *Phyllanthus emblica*, *Terminalia chebula*, *Santalum album*, *Mesua ferrea*, *Convolvulus pluricaulis*, *Cinnamomum zeylanicum*, *Elettaria cardamomum*, *Centella asiatica*, *Curcuma longa*, *Piper longum*, *Glycyrrhiza glabra*, *Embelia ribes*, *Cyperus rotundus*, *Cyperus scariosus*, Ghee, Honey, Sugar, processed in the extracts of: *Aegle marmelos*, *Oroxylum indicum*, *Gmelina arborea*, *Stereospermum suaveolens*, *Clerodendron phlomides*, *Desmodium gangeticum*, *Uraria picta*, *Solanum indicum*, *Solanum xanthocarpum*, *Tribulus terrestris*, *Pedaliium murex*, *Phaseo lustrilobus*, *Teramnus labialis*, *Ricinus communis*, *Sida cordifolia*, *Saccharum spontaneum*, *Eragrostis cynosuroides*, *Asparagus racemosus*, *Boerhaavia diffusa*, *Leptadenia reticulata*, *Saccharum officinarum*, *Gymnema aurantiacum*, *Ipomoea digitata*, *Pueraria tuberosa*.

The most important Ayurvedic food supplement is Maharishi Amrit Kalash, consisting of a preparation of fruits and herbs (MA-4) and herb tablets (MA-5). The well-balanced composition of this food supplement is the basis of its manifold life-supporting properties. The present paper deals with different types of research studies carried out using MAK-4 and MAK-5.

FREE RADICALS

Free radicals are now universally known as “biochemical bad boys” who are estimated to cause 70-90% of degenerative diseases. Free Radicals are molecules or atoms having an unpaired electron, which makes them extremely reactive. When in excess, they attack the normally functioning cells, damage proteins, fats, DNA and RNA. They react with normal fatty cell membranes and produce Lipid Peroxides (LPs). LPs are particularly harmful because they have long life, which allows them to cause sustained damage in the body. This damage is manifested in degenerative diseases such as atherosclerosis, diabetes, cataract, arthritis, premature ageing, wrinkles and cancer.^[5]

Excessive free radicals are generated in the human body by prolonged exposure to sun, environmental pollution, nuclear radiation, smoking, chemical stress induced by pollution, food preservatives, insecticides, various chemical drugs and emotional stress.

Modern biochemistry describes a category of highly reactive chemical compounds, the so-called free radicals that participate in destructive modification processes in the cells. To neutralize these free radicals, a general recommendation is to eat food that is rich in antioxidants, i.e. lots of fruit and vegetables, but also to take vitamin C and vitamin E as food additives.

Scientific research has shown that Maharishi Amrit Kalash contains an extremely high concentration of substances with antioxidative effect and exceeds by far the antioxidative effect of other known products (broad spectrum antioxidant).

ANTI OXIDANT ACTIVITY OF MAK

Scientific research has shown that MAK induces the human body to produce more Super Oxide Dismutase (SOD), a natural enzyme that scavenges Free Radicals. Being a mixture of potent antioxidants, MAK neutralizes and scavenges Free Radicals, thus MAK also acts like SOD in the human body. Many of the clinical effects of MAK are due to its marked potency in inhibiting lipid peroxidation. MAK penetrates deeply into tissues where lipid peroxides are active. It also improves blood circulation, prevents thrombosis, normalizes and strengthens the functioning of tissues and organs and enhances immune responses.

Super Oxide Dismutase (SOD) is an enzyme naturally produced in the body. It neutralizes free radicals and prevents formation of LPs. Different people, by virtue of heredity and/or adopted life style, produce different amounts of Super Oxide Dismutase. When the human body fails to produce adequate amounts of SOD to contain LP level to under 5 mmol per ml serum, secondary oxidative damage starts which leads to degenerative disease. MAK induces the human body to produce large amounts of SOD and also acts itself like SOD in the body.^[5]

MAK enhances immunity and prevents free radical generation. This may be the mechanism by which MAK prevents cancer and even promotes regression of tumors. MAK (4 & 5) has been found to prevent the formation of chemically induced (induced by DMBA) breast cancer up to 88% in rodents. MAK has also regressed tumors in 60% of cases. MAK-4 has been found to reduce the spread of lung cancer in animals.

CANCER

Cancer is one of the major human diseases and causes large suffering and economic loss world-wide. Chemotherapy is one of the methods of treating cancer. However the

chemotherapeutic drugs are highly toxic and have devastating side effects. Various new strategies are being developed to control and treat several human cancers.^[6] Over 60% of anticancer drugs available in the market are of natural origin. Natural products are also the lead molecules for many of the drugs that are in use.^[7] The phytochemicals present in several herbal products and plants may have the potential to act as preventive or therapeutic agents against various human cancers.^[8] The increased popularity of herbal remedies for cancer therapy perhaps can be attributed to the belief that herbal drugs provide benefit over that of allopathy medicines while being less toxic.^[9] Since the conventional therapies have devastating side effects, there is a continuous need for search of new herbal cures of cancer.

RESEARCH ON CANCER

A literature survey revealed some studies done on cancer using MAK-4 and 5. Maharishi Amrit Kalash-4 (MAK-4) and Maharishi Amrit Kalash-5 (MAK-5) are herbal mixtures with anticancer and anticarcinogenic properties. The study demonstrates that MAK-4 and MAK-5 inhibit liver carcinogenesis in mice. These herbal mixtures also increase antioxidant defenses and liver-specific connexin expression, both of which may be involved in the mechanism of action of the anticancer potential of these compounds.^[10]

The study on Antineoplastic Properties of Maharishi-4 [MAK-4] Against DMBA-Induced Mammary Tumors in Rats highlighted that a MAK-4-supplemented diet protected against DMBA-induced carcinogenesis in experimental rats by reducing both tumor incidence and multiplicity during the initiation and promotion phases. Subsequent MAK-4 supplementation produced partial to complete tumor regression in control animals.^[11] The study on Antineoplastic Properties of Maharishi Amrit Kalash [MAK-5], An Ayurvedic Food Supplement, Against 7, 12-Dimethylbenz(a)anthracene-Induced Mammary Tumors in Rats showed that a MAK-5 supplemented diet protected against DMBA-induced mammary tumors in rats and supported tumor regression in control animals.^[12] MAK-4 and MAK-5 supplemented diets protected against DMBA-induced carcinogenesis in rats. Supplementing MAK-4 and MAK-5 individually at the same dosages achieved similar results as combined supplementation.^[13]

When mice were fed with MAK-4, an Ayurvedic food supplement, they showed reduction of metastases of Lewis Lung Carcinoma in both number and size of metastatic nodules.^[14] The another study showed that an ethanol extract of MAK-5 induced morphological and

biochemical changes in murine neuroblastoma cells in culture, indicative of a reversal of the malignant process.^[15]

The further study evaluated that MAK-4 and 5 have anti tumor effects on cell transformation in vitro and in liver carcinogenesis in mice. The research highlighted that a diet supplemented with MAK-4 and MAK-5 inhibited liver carcinogenesis in urethane-treated mice.^[16] MAK-5 treatment enhances the nerve growth factor-mediated neurite outgrowth in PC12 cells.^[17]

RESEARCH ON REDUCTION OF CHEMOTHERAPY TOXICITY

Chemotherapy is associated with many distressing side effects like anorexia, stomatitis, weight loss, diarrhoea, leucopenia and alopecia. Chemotherapy is delayed due to major side effects resulting in poor response. Reduction of these side effects would result in better compliance and improved quality of life. Various drugs have been tried to prevent or control toxicity e.g. Amifostine, G-M CSF, but all of these drugs have either limited utility for one particular side effect and / or associated with their own toxicity. Maharishi Amrit Kalash (MAK-4 & MAK-5) are herbal formulations from Maharishi Ayurveda which have been shown to protect against chemotherapy related toxicity. They are a rich source of antioxidants.^[21]

The natural herbal mixtures MAK-4 and 5 were used for antioxidant adjuvant therapy and a prospective study was done of 62 patients. The study revealed that MAK-4 and MAK-5 supplementation was effective in reducing toxic chemotherapy side effects in patients undergoing intensive chemotherapy. Patients receiving the supplements experienced reduced hematologic toxicity, vomiting and diarrhea and improved sleep, weight and well-being.^[18]

The effect of Ayurvedic food supplement MAK-4 on cisplatin showed that cisplatin significantly decreased GSH (glutathione) and GST (glutathione-S-transferase) activity in both rat kidney and liver. Dietary MAK-4 supplementation reversed this effect of cisplatin on kidney and liver. Thus, dietary MAK-4 supplementation may protect against cisplatin-induced toxicity in patients receiving this type of chemotherapy.^[19]

Adriamycin, the chemotherapeutic agent, given to mice with MAK-4 or MAK-5 showed a reduction in mortality. This showed protective effects of MAK-4 and MAK-5 on Adriamycin-induced microsomal lipid peroxidation and mortality.^[20] Furthermore, Maharishi Amrit Kalash reduces chemotherapy toxicity in breast cancer patients. The

research revealed that MAK-4 and MAK-5 supplemented diets were effective in reducing chemotherapy toxicity in breast cancer patients receiving chemotherapy and effectively supported weight maintenance. MAK helped in maintaining General Health, Karnofsky Status, Appetite & Body Weight. It also was found that MAK does not impede the anti-cancer effects of chemotherapy.^[21]

RESEARCH ON REDUCTION OF CHEMICAL TOXICITY

MAK-4 and MAK-5 showed significant reduction of chemical toxicity. One of the research study done was rats pretreated with MAK-5 showed a significant decrease in toluene-induced reactive oxygen species (ROS) in cerebellar synaptosomal/mitochondrial preparations. Also, the alcoholic extract of MAK-5 significantly reduced toluene-induced ROS generation in the kidney mitochondrial fraction.^[22] A clinical trial on breast cancer patients was conducted at All India Institute of Medical Sciences. In this study, 214 patients of breast cancer were included in the trial. It was an open randomized controlled trial and the results showed reduction in anorexia, stomatitis, diarrhea, constipation, vomiting, leucopenia, alopecia tumor response and improvement in general well being. Patients on MAK suffer less chemotoxicity, so they were able to adhere to cancer treatment as compared to control group without MAK.^[23]

ANTIOXIDANT RESEARCH

Antioxidant properties of Ayurvedic herbal preparation MAK-4 and MAK-5 was studied and the study revealed that ethanol and aqueous extracts of MAK-4 and MAK-5 were able to quench generation of reactive oxygen species in vitro within an isolated cerebrocortical fraction enriched in mitochondria and nerve endings. These herbally-derived mixtures possess distinctive qualities, which may be of utility in the design of preventive or therapeutic approaches related to the mitigation of excess oxidative events.^[22]

MAK-4 and 5 have shown inhibitory effects on microsomal lipid peroxidation. This effect was shown by alcoholic or aqueous extracts of MAK-4 or MAK-5, when added to rat liver microsomes incubated with a system to stimulate lipid peroxidation, inhibited hepatic microsomal lipid peroxidation in a concentration dependent manner. These findings suggest that MAK-4 and MAK-5, by virtue of their antioxidant properties, may be useful in the treatment of free radical-linked drug toxicities and disease states.^[24]

The empirical effectiveness of MAK-4 and MAK-5 in a variety of diseases may be due to their suppressive effect on inflammatory mediators, especially on potent reactive oxygen species (ROS).^[25] Studies show that both aqueous and alcoholic extracts of MAK-4, MAK-5, MA-631 and Maharishi Coffee Substitute showed more antioxidant potency in preventing LDL oxidation than ascorbic acid, alpha-tocopherol, or probucol. The alcoholic extracts of MAK-4, MAK-5 and MA-631 were at least 1,000 times more potent than the comparison antioxidants.^[26]

Cardiotoxicity of the chemotherapeutic agent Adriamycin may be linked with free radical-mediated Peroxidation of microsomal lipids. When Alcoholic or aqueous extracts of MAK-4 and MAK-5 were added to lipid peroxidation incubation systems it inhibited hepatic microsomal lipid peroxidation in a concentration-dependent manner.^[20] MAK-4 shows in vivo effect as studied in Watanabe Heritable Hyperlipidemic rabbits. MAK-4 may yield increased antioxidant protection in the brain, and may therefore be useful in preventing or treating free radical-induced neurological disorders.^[27] MAK-4 and MAK-5 protect LDL from oxidation and may be useful in the prevention and treatment of atherosclerosis. MAK-4 and MAK-5 increased resistance of LDL to oxidation by Cu²⁺ and endothelial cells in hyperlipidemic patients.^[28] The same kind of study was done with ten hyperlipidemic patients. They were treated with MAK-4 and MAK-5 for 18 weeks. After 12 weeks of treatment, a time-dependent increase in the lag phase and delay in the propagation phase of oxidation of LDL by Cu²⁺ and endothelial cells was seen. Therefore, MAK-4 and MAK-5 may be useful in the prevention and treatment of atherosclerosis.^[29]

The study conducted with Watanabe Heritable Hyperlipidemic (WHHL) rabbits suggests that MAK-4 reduces atheroma formation through its antioxidant activity. (Atheroma refers to the fatty degeneration or thickening of the walls of the arteries in atherosclerosis). This study shows antioxidant and antiatherogenic effects of MAK-4 in WHHL rabbits.^[30] MAK-4 may yield increased antioxidant protection in the brain and may therefore be useful in preventing or treating free radical-induced neurological disorders.

Maharishi Amrit Kalash [MAK-4 and MAK-5] rejuvenates ageing central nervous system's antioxidant defense system. An In Vivo study demonstrated in guinea pigs, the treatment of MAK 500 mg/kg body wt for two months could augment the activities of antioxidant enzymes. Therefore, MAK could be used in compensating the decline in the activities of antioxidant enzymes in the CNS, thereby reducing the risks of lipid peroxidation.^[31] Treating

guinea pigs with MAK at a dose of 500 mg/kg body weight daily for two months reduced lipid peroxidation in brain regions and helped restore normal oxygen consumption in older animals.^[32]

MAK-4 and MAK-5 (10 mg/ml prior to centrifugation) inhibited the reduction of nitrobluetetrazolium 98% and 96%, respectively. The results contribute to an understanding of previously reported antineoplastic, antioxidant and anti-aging properties of MAK-4 and MAK-5.^[33]

Aqueous extracts of MAK added at various dilutions to suspensions of human neutrophils (PMNs) were able to completely scavenge superoxide and did not compromise the viability or respiration of PMNs. Thus, the anti-oxidant properties of MAK may contribute to its anti-carcinogenic properties.^[34] Maharishi Amrit Kalash shows Oxygen Free Radical (OFR) Scavenging effect and anti –aging effect. Studies have been conducted in animals and in vitro demonstrating the antioxidant properties and anticarcinogenic properties of MAK, which may contribute to its anti-aging properties.^[35]

MAK-4 shows antioxidant and antiplatelet properties. This study was done in hypercholesterolemic rabbits. MAK4 supplementation reduced plasma and hepatic lipid peroxidation and platelet aggregation induced by collagen and ADP in hypercholesterolemic rabbits.^[36] MAK significantly lowers lipid peroxide, which has been implicated in atherogenesis and significantly lowers the incidence of myocardial ischemia.^[37]

IMMUNITY RESEARCH

Immunomodulatory Effects of Maharishi Amrit Kalash [MAK-4 and MAK-5] was demonstrated in mice. MAK-4 enhances lymphocyte responsiveness, and MAK-5 enhances not only lymphocyte responsiveness, but also macrophage function. It also is suggested that MAK-4 and MAK-5 have mitogenic effects on lymphocytes.^[38]

MAK-4 and MAK-5 shows immunomodulation in mice. MAK-4 and MAK-5 once a day at the dose of 10mg/kg and 50mg/kg enhanced not only macrophage function but also lymphocyte responsiveness.^[39-40]

After ingestion of MAK-5 there was enhanced Lymph proliferative response, Macrophage-Mediated Tumor Cell Killing and Nitric Oxide Production. As tested in splenic lymphocytes and peritoneal macrophages isolated from mice fed MAK-5 for six weeks, MAK-5 seems to

contain ingredients that can induce in vivo priming of both T-cells and macrophages for enhanced functions.^[41] An Evidence for an Immunomodulatory Effect of MAK-5 is priming of splenic lymphocytes. MAK-5 enhances lymphocyte responsiveness to mitogens without affecting spontaneous proliferation in mice.^[42]

The results described here may support the hypothesis that MAK5 directly activates macrophage activities in aged mice, whereas it only primes lymphocytes to display a greater immune response following interaction of splenic lymphocytes with another stimulus, such as Con A. Our findings suggest that MAK5 may contribute to the prevention of the immunosenescence.^[43]

CONCLUSION

Life today is extremely stressful, whether you are a student, a professional or a parent, so the combination of energy enhancing herbs, herbs that boost mental ability and herbs that help withstand day-to-day stress is what make Maharishi Amrit Kalash such an outstanding formulation for maintaining health for the greatest number of people. The research study reveals that MAK-4 and MAK-5 have significant results in anticancer and antioxidant activity. The study also reveals that there is reduction in chemical toxicity as well as chemotherapy toxicity. It shows enhancement in immunity and also shows antiaging property.

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