



Yoga And Effective Cancer Management – A Review

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Abstract - Cancer is a disease where abnormal cells divide uncontrollably and destroy body tissue. There are more than 120 known types of cancer. The basis of conventional cancer treatment lies in eliminating tumor cells by external methods – surgery, chemotherapy, radiation. Recent research in the field of cancer is in the area of immunotherapy, where a patient’s own immune system is used to fight the disease. Another area of research is epigenetic therapy, rather than destroying cancer cells, these therapies seek to set the cells on the path of normal growth. These recent trends indicate that the medical world is now waking up to the fact that harnessing the innate capability of the body to heal itself is the best way to combat disease. Researches on the causes of cancer, new drugs in cancer therapy, rehabilitation and support for cancer survivors – all these fields seem to acknowledge that there is more to cancer than just being a physical disease. This review article aims to explore the outcomes of integrating yoga in cancer prevention and therapy. Modern trends in cancer prevention and treatment are now beginning to be based on more and more on the mind-body connection. In this light, Yoga, the ancient science of mind-body union, can be supplemental to existing treatment methodologies. Benefits of yoga and meditation techniques can be harnessed to achieve results similar and complementary to those achieved by conventional modes of treatment and at the same time, reduce their ill effects.

Index Terms— Cancer, epigenetic therapy, Yoga, Chemotherapy, immunotherapy

INTRODUCTION

Effective management of cancer continues to remain a challenge to modern medical science, dominated by

western understanding and treatment methods. In spite of fast technological advancement, most patients continue to suffer a less productive, impaired lifestyle post conventional cancer therapy. In this light, complementary and alternative methods of managing cancer are gaining widespread relevance. Though surgery, radiation and chemotherapy remain the mainstay methods of cancer treatment, integrated methodologies that include yoga, meditation and pranayama are becoming increasingly popular. Practice of yoga is often considered beneficial in controlling lifestyle diseases like obesity and diabetes. Recent research has shown that increased cancer risk is also associated with obesity, type II diabetes, high cholesterol, and atherosclerosis, which are components of a disease state known as metabolic syndrome and that drugs used to treat diabetes and cardiovascular disease inhibit tumor growth [3]. This evidence suggests that yoga could be beneficial in cancer management in a manner similar to how yoga is a potential solution in case of metabolic syndrome [4].

The aim of this review is to present a perspective that practice of yoga not only helps in maintaining a healthy lifestyle, but is also beneficial in case of cancer, helping in prevention, suppression, increasing the efficiency of conventional treatment and improving the quality of life of cancer patients.

Cause Of Cancer:

Cancer is defined as a group of diseases involving abnormal cell growth which could invade or spread



to other parts of the body. Normally, the cells in our body are programmed to grow and divide to a certain extent, perform certain functions, and once done, they are programmed to be killed – called as apoptosis. This “normal” behavior of cells is activated by certain substances produced in the body which act as switches, signaling the cell to perform a certain activity. Cancer cells in the body display some unique characteristics which distinguish them from normal cells [1]:

1. Cell division and growth in the absence of proper “signals”
2. Evading signals which limit their activity
3. Avoiding cell death – apoptosis
4. Limitless number of cell divisions
5. Blood vessel construction promoting their sustenance
6. Invasion of other tissues, even without direct contact

Though the exact cause of cancer continues to elude medical scientists, there is growing evidence that the major primary cause of cancer is DNA damage [2].

DNA damage, an abnormality in the structure and composition of DNA, can arise from both endogenous and exogenous sources. Normally our body is capable of healing DNA damage caused by endogenous sources that occur naturally inside the body, through DNA repair. This self healing mechanism is what protects us from the frequent DNA damage that happens all the time inside our bodies. The exogenous sources, normally referred as carcinogens (tobacco smoke, for example), which bring about DNA damage can overwhelm the DNA repair mechanism by causing higher levels of damage. In addition to this, the DNAs responsible for DNA repair may themselves undergo damage or mutation thereby rendering the DNA repair mechanism deficient.

Thus, it is apparent that all of us carry the likelihood of cancer within our bodies all the time in the form of frequent DNA damage. But the risk of cancer initiation and progression presents when the natural

defense mechanism of the body becomes disturbed or inefficient.

Stress and cancer

Stress is the typical response when the body is under physical or emotional pressure. The body responds to stress by releasing stress hormones that increase blood pressure, speed heart rate, and raise blood sugar levels. For a short duration of time, this typical stress response puts the body in a “fight or flight mode” to act with greater strength and speed to escape a perceived threat.

Studies have shown that long exposure to these stress hormones can cause DNA damage, impair immune function, hinder DNA repair and promote tumor growth thereby increasing the risk of cancer [5]. Stress activates the Sympathetic Nervous System. Another study studying the effect of SNS activation on breast cancer cells has shown that SNS activation causes metastasis [6]. This in vivo study involving mice has shown that chronic stress increased the metastasis of primary breast tumor cells to distant tissues 38 times more than in case of absence of stress. In a similar study, stress is shown to limit the effect of anti cancer drugs. A group of mice implanted with cancer cells kept under stress and induced with anti cancer drug did not show tumor inhibition in contrast to another group with infected mice which showed slower tumor growth when kept calm. Though the linkage between stress and cancer is not very well defined, there is substantial evidence to treat stress as a major factor in cancer management [7].

CONCEPT OF DISEASE IN YOGA IN RELATION TO STRESS:

In yogic literature, diseases or Vyadhi are classified as Adhija or Anadhija. Anadhija vyadhis are non-stress borne diseases such as infections or injuries. Adhija are the diseases which are a result of Adhi, mental disturbances at the Manomayakosha – the mental sheath - which can be termed as stress. Modern lifestyle diseases like anxiety, hypertension, diabetes etc. come under this category. Overtime, as stress builds up, the effects start to appear at the



Pranamaya Kosha – the vital energy sheath - and noticeable changes start to occur to the breath. Finally, the Adhija vyadhi manifests at the Annamaya Kosha - the gross physical body - as disease[8]. Since the Adhija vyadhis are multidimensional, it is important to approach them holistically and not by mere symptomatic treatment. As many studies warrant the link between cancer and stress, a holistic approach to cancer with an emphasis on stress reduction becomes extremely relevant.

Stress hormones and cancer:

Cortisol is an important hormone secreted by the adrenal gland. It is produced when the body detects low blood glucose levels or during times of stress. Its function is to increase blood sugar and suppress the immune system. It also plays a major role in the metabolism of carbohydrates, proteins and fat.

Human body exhibits a diurnal or daily cortisol rhythm where cortisol level is highest at waking time, gradually drops during the day and is lowest at sleep time. There have been many studies which show that disturbed, flattened, abnormal cortisol rhythm can be linked to occurrence and recurrence of cancer [10]. One study has shown that patients with an abnormal cortisol rhythm had a higher mortality rate due to weakened immune system activity [9]. There have been multiple studies which show that stressful life events increase the risk of cancer progression and relapse.

The physical and psychological stress of having cancer contributes to further damage of the body's ability to cope with cancer. Psychiatric disorders like anxiety and depression are prevalent among cancer patients and they are usually left undiagnosed. Yoga intervention among cancer patients is proven to decrease anxiety, depression and stress [12]. In one study, after a 6-week integrated yoga intervention, the cancer patients showed an improved cortisol rhythm and a reduction in perceived stress. It is possible that a continued, prolonged yoga intervention may further enhance the quality of life of cancer patients.

Another study on yoga practitioners has found that practice of yoga and pranayama decreases the cortisol levels and improves the activity of the parasympathetic nervous system [17]. In this study, many physiological and brain wave changes have been observed during and after the period of yoga practice which are beneficial to the immune system. Another stress hormone that has been linked to cancer is leptin. Leptin is a hormone linked to obesity. Studies have shown that high levels of leptin increases the risk of cancer[18]. In vitro studies of the effect of leptin on tumor cells have shown that leptin increases cell proliferation of different types of tumor cells is also an angiogenic factor.

Consequently, several studies have been undertaken to understand ways to inhibit leptin levels. A study on expert yoga practitioners has shown a decrease in leptin level when compared to novices. As yoga is proven to have positive effects in case of depression and anxiety, where leptin level is high, the study extrapolates the effect of intensive/long-term practice of yoga as a regulator of leptin.

Cancer and hypoxia:

There have been several theories about the cause of cancer and one of them was proposed by Dr Otto Heinrich Warburg who won a Nobel Prize for his work. The Warburg hypothesis describes cancer as a result of hypoxia, or low oxygenation at cellular level. "Cancer, above all other diseases, has countless secondary causes. But even for cancer. There is only one prime cause. Summarized in a few words, the prime cause of cancer is the replacement of respiration of oxygen in normal body cells by fermentation of sugar" – Dr Warburg. This theory was based on several observations at tumor locations where oxygen concentrations were low. Another observation is that, for studying tumor cells in in-vitro conditions, oxygen levels are lowered to boost tumor cell growth. A normal cell respire oxygen and converts blood glucose into energy. In the absence of oxygen, fermentation of glucose takes place to produce energy. It is this difference in glucose metabolism that differentiates cancer cells from



normal cells. Normal cell function relies on the energy generated by oxidation of the nutrients whereas cancer cells rely on fermentation which is a less efficient process that produces less energy for utilizations. Scientists have hypothesized that the reason for this could be that cancer cells are programmed to grow and proliferate, so the way they utilize the available nutrients is markedly different from that of normal cells [11]. Low oxygen level at the tumor site has also been attributed to structural and functional abnormalities of the tumor, presence of toxins etc. While it is debatable whether hypoxia is a cause or effect of tumor, studies have shown that hypoxia is a causative factor in the progression of cancer. On the other hand, tumor cells prefer a low oxygen environment[13] in contrast to healthy cells that thrive in an oxygen rich environment. Thus, an optimum oxygen level is key to prevent tumor proliferation. Several studies also have shown that an increased concentration of oxygen in the tissue during the time of irradiation has increased the effect of radiation therapy. Dr Stephen Levine, a molecular biologist has this to say about hypoxia –“In all serious disease states, we find a concomitant low oxygen state. Low oxygen in the body tissue is a sure indicator for disease. Hypoxia or lack of oxygen is the fundamental cause for all degenerative disease.”Researchers have also found that the response of a tumor to chemotherapy or radiation is directly related to hypoxia. More hypoxia translates to greater resistance to treatment and greater tendency to metastasize [14]. Thus less oxygen seems to be the most important factor contributing to cancer initiation and progression. Maintaining an optimum oxygen saturation in the body is key to reduce the risk of cancer.

There is empirical evidence that establishes the fact that regular practice of yoga (asanas and pranayama) increases the oxygen level in our blood and maintains higher oxygen saturation. Yogic postures focus on airflow in the lungs and increase lung capacity and efficiency. Ancient yoga and pranayama practices are designed to achieve a multifold efficiency in ensuring

that the body tissues receive the needed oxygen – regular practice helps to deliver more oxygen into the blood stream, improve blood flow to various organs of the body, and at the cellular level, helps to achieve the right pressure gradient to remove toxins and CO₂ from the cells and at the same time, ensure absorption and utilization of oxygen in the cells.

Cancer progression and yoga:

Angiogenesis or formation of blood vessels is a phenomenon observed at tumor locations once a tumor measures a few millimeters in size. This is a major factor which is necessary for tumor growth, sustenance and proliferation. Angiogenesis can lead to tumor metastasis - spread of tumor cells to distant tissues can occur through blood vessels. Metastatic tumor cells interact with the inner lining of blood vessels and cause adhesion which promotes metastasis and proliferation. Statistically, metastatic spread and not the primary tumor is the leading cause of cancer death. Tumor metastases are responsible for almost 90% of all cancer-related deaths. Several cancer therapies are being developed to inhibit angiogenesis. Many of these therapies recommend the use of antioxidants as potential anti angiogenic substances[17]. An antioxidant is a substance that removes potentially damaging oxidizing agents in the body.

Studies have shown that yoga practitioners exhibit higher levels of antioxidants in the blood [15]. Practice of yoga causes a rise in the total antioxidant status of the body and could lead to the effect on tumor cells similar to what is caused by the use of natural antioxidants – most importantly inhibition of angiogenesis.

DISCUSSION:

Hypoxia can also cause a reduction in the production of lymph since normal oxygenation of blood glucose is necessary for lymph production. This causes weakening of the immune system. More and more evidences suggest that cancer is actually a result of an impaired immune system. Proper flow of lymphatic fluid is key to maintain a healthy immune system. But unlike the circulatory system where the heart

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pumps blood, there is no mechanism to pump lymph in and out of the system. This can be achieved only by muscular movement. Specific asanas like suryanamaskara are designed to provide the required muscular movements necessary to maintain lymph flow.

Yoga also boosts the activity of the immune system, especially the Natural Killer cells which are responsible for attacking tumor cells. Specific studies have been carried out to establish an increased concentration of NK cells after regular practice of pranayama [16].

Conventional treatment methods for cancer carry the risk of heavily impairing the immune system in addition to increasing physical and psychological stress in patients. Anxiety, fatigue, sleep disturbances, impaired quality of life are the common side effects of cancer therapy. Though there are medications prescribed to overcome these effects, they are relatively expensive, ineffective and have their own side effects.

Yoga and pranayama, on the other hand, are inexpensive alternatives. These techniques not only provide symptomatic relief but they contribute holistically to the overall well being of the individual. [20]

CONCLUSION:

The fundamental truth that mind is above matter forms the basis of the ancient Indian way of life. This philosophy extends to medicine too. The World Health Organization adopted a broader, definition of health as recently as 1948 which defines health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity". The ancient science of Ayurveda has stated a much deeper and comprehensive definition:

“Samadosha samagnishcha samadhatumala kriyaha |
prasannaatmendriyamanaaha swastha
ityabhidheeyate||”

“A person with balanced doshas (Vata, Pitta, Kapha), balanced digestive power, balanced dhatus (Rasa, Rakta, Mamsa, Medas, Asthi, Majja and Shukra),

balanced excretions, balanced self, sense organs and mind, is a healthy person”.

In recent times, cancer has become the most aggressive factor in limiting the capability of the body to attain health. As per the Indian Council for Medical Research, cancer is the major cause of death due to lifestyle diseases even with advancing treatment methodologies. One in 8 Indians is likely to develop cancer in their lifetime. With such dismal figures staring us in the face, there is an urgent need to enhance our capacity in combating this dreaded disease.

Yoga, the science of the union of body and mind, is the ultimate tool for enhancing human capabilities and enriching life. Our ancient seers knew about the intricate connections between body and mind. It is from this deep knowledge that they were able to devise methodologies to heal the body through healing of the mind.

The emerging fields in medical science such as psychoneuroimmunology and psycho-oncology seem to acknowledge this fact. As with other diseases faced by modern man, cancer too, needs to be addressed not just as a disease of the body alone. More research and trials need to be undertaken to prove the effectiveness of incorporating yoga in cancer treatment. An interdisciplinary approach between cutting-edge technology available to medical science and the healing power of yoga and meditation could help unravel the secrets of cancer and other life threatening diseases and propel us towards better health and ultimately, towards our goal of realizing the full human potential.

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