Oxidative Stress in Subjects with Gynecological Malignancies

SHRADHA BISHT[*], R. BALRAMAN, RANJIT KAUR, S.P RATHOD, P.DESAI[1],S.GANDHI[1]
[*] Kota College of pharmacy, SP- I, RIICO Industrial Area, Ranpur Road Kota-324 007
Pharmacy Department, M.S.University, Vadodara, Gujrat-390 002
[1] Obstetric and Gynecological Department, S.S.G.Hospital, Vadodara, Gujrat- 390 002

ABSTRACT

The role of reactive oxygen species in various disease of the female reproductive tract has been investigated. Reactive oxygen species can affect a variety of physiological functions in the reproductive tract, and excessive levels can result in precipitous pathologies affecting female reproduction. Studies on the implication of oxidative stress in gynecological malignancy have not received adequate attention and literature on the molecular mechanism underlying this disease is sporadic. The aim of the present clinical study was to evaluate the extent of oxidative stress in women suffering from gynecological malignancy and women undergoing chemotherapy and radiotherapy and to compare our finding with age matched controls. Establishing any correlation between oxidative stress and gynecological malignancy would subsequently help in development of treatment modalities to prevent or treat a process of malignancy. Results suggest, increased reactive oxygen species and reactive nitrogen species during gynecological malignancy but body compensate against these reactive species by increasing level of antioxidant enzymes. However, these compensatory mechanism or radiation therapy or chemotherapy never showed improvement comparable to control group, suggesting imbalance in the oxidative status during gynecological malignancy and after radiotherapy or chemotherapy.

Key words- Gynecological malignancy**,** Oxidative stress, Prooxidant, Antioxidant

INTRODUCTION

The extent of free radical induced oxidative stress can be exacerbated by the decreased efficiency of antioxidant defense mechanism. There is growing literature on the effects of Oxidative stress in female reproduction with involvement in the pathophysiology of preeclampsia, hydatidiform mole [1], free radical-induced birth defects[2] , and other situations such as abortions[3]. Numerous studies have shown that Oxidative stress plays a role in the pathophysiology of infertility and assisted fertility. There is also evidence of its role in endometriosis, tubal and peritoneal factor infertility and unexplained infertility.

Although the role of the free radicals in carcinogenesis is cleared out, it is still controversial, whether malignant tumors promote an oxidative stress in vivo. The proposal that reactive oxygen species (ROS) such as superoxide radicals ($O_2^{\bullet}$), hydroxyl radicals ($OH^{\bullet}$) and hydrogen peroxide (H_2O_2) play a key role in human cancer development has gained much support recently. They have been shown to possess several characteristics of carcinogens[4]. Free radical induced lipid peroxidation has been implicated in neoplastic transformation. Low level of essential antioxidants in the circulation has been found to be associated with an increased risk of cancer. ROS can cause DNA base alterations, strand breaks, damage to tumor suppressor genes and enhanced expression of protooncogenes[5]. A study indicated an association between decreased activities of antioxidant enzymes and increased levels of DNA lesion in lung cancer tissue suggesting that free radical reactions may be increased in malignant cells in vivo.

The burst of ROS has been implicated in the development of cancer. ROS has carcinogenic, teratogenic and genotoxic effects and is positively correlated with accumulation of DNA damage. It is therefore believed to directly induce cellular DNA damages. Oxidative modification of nucleic acids by ROS could result in the transformation of normal cells into malignant cells. ROS induced lipid peroxidation has been implicated in malignant transformation. The levels of these lipid peroxides indicate the extent of lipid peroxidation in general and serve as markers of cellular damages due to free radicals. Antioxidant defense systems work cooperatively to alleviate the oxidative stress caused by enhanced free radical production. Any changes in one of these systems may break this equilibrium and cause cellular damages and ultimately malignant transformation.

Gynecological Cancer includes cervical cancer, endometrial/uterine cancer, ovarian cancer, vaginal cancer, vulvar cancer and peritoneal cancer. Studies on the implication of oxidative stress in gynecological disorders have not received adequate attention and literature on the molecular mechanism underlying this disease is sporadic.

The aim of the present clinical study was to evaluate the extent of oxidative stress in women suffering from gynecological malignancies and women undergoing chemotherapy and radiotherapy. Evaluation of role of oxidative stress and gynecological malignancies would subsequently help in effective treatment modalities which may either prevent or treat a process of malignancy.