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Review on Anticancerous Activity of Gamma Oryzanol

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ABSTRACT

Cancer refers to a disease specified by the abnormal growth of cells which divides uncontrollably and have the ability to pervade and demolish normal body tissue. In India & overall world Cancer is the main reason of death. Due to improvements in cancer screening, its treatment and prevention survival rates of cancer are increasing day by day. Gamma-oryzanol is a growth-promoting substance found in grains and isolated from rice bran oil Gamma-Oryzanol and its components have been assigning for their anticancerous properties. Administration of γ-oryzanol resulted in a dose-dependent reduction of the tumor growth by 44% without affecting the weight of other organs.

KEYWORDS: Cancer, Oryzanol, Disease

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INTRODUCTION

CANCER

Cancer is a metabolic disease in which cell is abnormally proliferates and demolish other body tissue. It is one of the leading causes of death in overall world and the number of cases is constantly increasing estimated to be 22 million by 2030. It is estimated that in 2017, the United States alone will have approximately 1688780 new cancer diagnoses cases and 600920 cancer deaths. This uncontrolled growth of a normal cell which produces genetic instabilities and changes accumulates within cells and tissues which transforms normal cell into a malignant cell. These genetic instabilities include mutations in DNA repair genes, tumors suppressor genes (NF1, NF2, RB and biological breaks), oncogenes, RAS and genes involve in cell growth metabolism. Both external factors (radiations, smoking, tobacco, and pollutants in drinking water, food, air, chemicals, certain metals and infectious agents) and internal factors (genetic mutations, body immune system and hormonal disorders) can cause cancer. There are different types of cancer found in human being among which the lung cancer is commonly found in males while breast cancer in females is top listed. Detailed information about several forms of cancer is given in Table 1.1. It is a major public health burden in both developing and developed countries being treated by medicinal plants as a whole or by their Photochemical very frequently.

Table 1.1. Detailed information about several forms of cancer

S. No.	Cancer type	Estimated new cases in 2017	Estimated deaths in 2017
1	Bladder cancer	79030	16870
2	Lung cancer	222500	155870
3	Larynx cancer	13360	3660
4	Non-Hodgkin lymphoma	72240	20140
5	Oral cavity cancer	49 670	9700
6	Liver cancer	40710	28920

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S. No.	Cancer type	Estimated new cases in 2017	Estimated deaths in 2017
7	Cervical cancer	12820	4210
8	Kidney cancer	63990	14400
9	Ovary cancer	22440	14080
10	Endometrial cancer	61380	19920
11	Colon and rectum cancer	135430	50260
12	Anal cancer	8200	1100
13	Brain & nervous system cancer	23800	16700
14	Testis cancer	8850	410
15	Melanoma (Skin)	87110	9730
16	Testis cancer	8850	410
17	Leukemia	62130	25500
18	Stomach cancer	28000	10960
19	Prostate cancer	161360	26730
20	Bone and joint	3260	1550
21	Breast cancer	252710	40610
22	Oral cavity & pharynx	49670	9700
23	Thyroid cancer	56870	2010
24	Pancreas cancer	53670	43090
25	Small intestine	10190	1390
26	Hodgkin lymphoma	8260	1070
27	Esophagus cancer	16940	15690
28	Myeloma	30280	12590

Worldwide per year approx 10.9 million new cancer cases, 24.6 million persons living with cancer, 6.7 million deaths reported. Based on World Health Organization data, above 14.1 million new cancer cases and 8.2 million deaths were mentioned globally in the year 2012 and over 70% new cancer cases has been estimated during the next twenty years. Nearly, 80% of the world's population depend on traditional medicines and more than 60% of clinically approved anticancer drugs are derivatives of this medicinal plant.

DRUG FOR CANCER TREATMENT AND THEIR LIMITATIONS

There are several methods have been made to decrease the harmful side effectsof drug through the process of cancer therapy for preventing the side effects on the adjacent cells and tissues, increasing drug accumulation and efficacy in the lesion, developing novel drug delivery and targeting systems. There are so many other methods for the treatment of cancer like they involve surgery of tumor, radiotherapy, immunotherapy, chemotherapy, cancer vaccinations, photodynamic therapy, stem cell transformation or combination thereof often accompanied by severe side effects. Such side effects include limited bioavailability, toxicity, non specificity, fast clearance and restriction in metastasis. Treatment methods of cancer mainly depend upon the type, stage and location of cancer. Chemotherapeutic agents involve cytostatic and cytotoxic drugs which have shown promising results alone or in combination with other cancer therapies. These chemotherapeutic agents involve alkylating agents *e.g.* oxaliplatin, cyclophosphamide, topoisomerase inhibitors *e.g.* irinotecan and doxorubicin, microtubules acting agent *e.g.* vincristine, vinblastine. The above

mentioned drugs are highly effective against a wide range of cancers, but these drugs are also having some limitations (side effects, expensive, very complex, not eco-friendly and toxic). There are cells in our body which multiply rapidly under normal physiological conditions like hair follicle cells, bone marrow cells and digestive tract cells *etc*. A harmful side effect arises due to targeting of anticancerous drug on uncontrobaly dividing normal cells. There are many disorders arises such as less blood production , hair loss, immunosuppression, heart disease etc due to long term use of anticancerous drug. As they go through mutations these cancer cells resist to these drugs. *e.g.*, Drug resistant genes (ABCA4 and ABCA12) were over-expressed in human MCF-7 breast cancer cells respectively when docetaxel was applied. However, when phytochmeical curcumin was applied in association with docetaxel down regulation of drug resistance genes was observed. Thus, treating cancer cells by employing mono-target chemical agent is not an effective method. Therefore, based on extensive research findings, phytochemicals and their derived analogues possess most promising option for the better and less toxic cancer treatment.

GAMMA ORYZANOL

Gamma-oryzanol, a phytosterol extract from rice bran, which contains - mixture of plant sterols esterified to the phenol, ferulic acid. Rice bran oil is the abundant source of gamma-oryzanol, but it is also found in com, barley and other food oils, and in rye and wheat bran. Phytosterols play a number of roles in plants, including in growth and development, for membrane fluidity and as antioxidants. Rice bran oil also contains tocotrienols, members of the vitamin E family. The gamma-oryzanol concentration of rice bran oil is variable. High gamma-oryzanol rice bran oil contains about I% or 10 mg per gram. Crude rice bran oil contains about 1.5%.

EXTRACTION OF GAMMA ORYZANOL

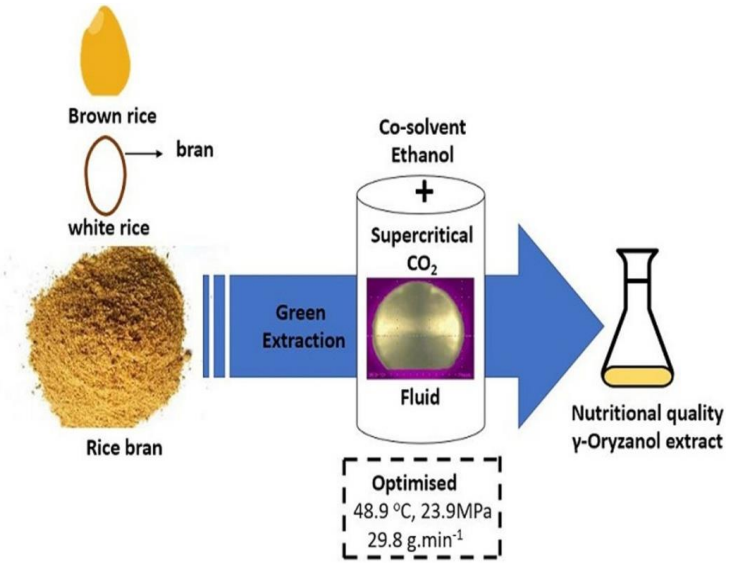

Fig.1 Extraction of gamma oryzanol from rice bran

ANTICANCEROUS ACTIVITY OF GAMMA ORYZANOL

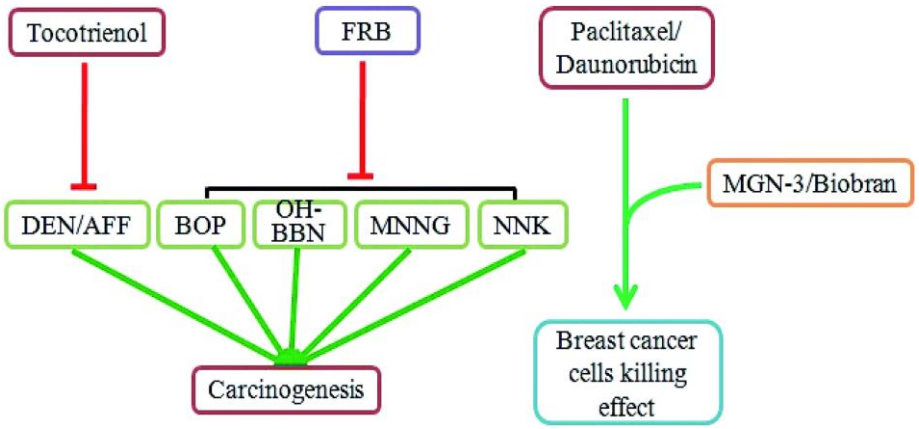

Fig. 2. Rice bran extracts and FRB have chemopreventive effects. Tocotrienol treatment reduced DEN/AFF-induced liver carcinogenesis. A diet of FRB effectively inhibited BOP-induced pancreatic cancer, OH-BBN-induced bladder cancer, MNNG-induced gastric cancer, and NNK-induced lung cancer. MGN-3/Biobran supplementation enhanced the susceptibility of breast cancer cells to paclitaxel and daunorubicin

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CONCLUSION

From several studies it was found that a large number of plant materials have anti cancerous activities. For the prevention and therapy of cancer, rice bran extracts and FRB are promising adjuvant therapeutic agents. They also play a major role in suppressing local inflammation, arresting the cancer cell cycle, assisting cancer cell apoptosis, and increasing the chemo preventive effects. OZ is a mixture of ferulate esters of different sterols. Cyclo artenyl ferulate, 24–methylene cycloartanyl ferulate and campesteryl ferulate are the important component of OZ. It can be concluded that gamma oryzanol is showing anti-cancer activity with higher doses.

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