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DIETARY FACTORS AND RISK OF CANCER: A REVIEW

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Carmelaram Post, Varthur Hobli, Bangalore-560035, India**Abstract**

Dietary factors are renowned as having a considerable consequence on the risk of cancers. The main momentous dietary cause of cancer is over nutrition. Various particular foods are allied to definite cancers. The differences in dietary practices moderately elucidate differences in cancer incidence in diverse countries. Research about the effects of diet on risk of cancer has revealed little specific effects and left much ambiguity. A numeral of diets and diet-based regimes are projected to be valuable against cancer. No one of these diets has been found to be valuable, and a few of them have been found to be unsafe. In this paper, we summarize the recent status of familiarity on diet and cancer. Person with cancer wishes admirable nutrition in order to improve with the physical hassle of the illness and the rigours of medical treatment.

Keywords: Cancers, Dietary factors, Diets, Methionine metabolic pathway, Nutrition.

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Introduction

Dietary factors are renowned as having a considerable consequence on the risk of cancers. Diet and obesity might be related to up to 30–35% of cancer deaths.¹ The main momentous dietary cause of cancer is over nutrition. Although many dietary recommendations have been projected to lessen the risk of cancer, only some have considerable precise evidence.² Various particular foods are allied to definite cancers. Research have connected eating red meat to an augmented risk of colon cancer, breast cancer, pancreatic cancer and prostate cancer due to occurrence of carcinogens in foods cooked at elevated temperatures.³

The differences in dietary practices moderately elucidate differences in cancer incidence in diverse countries. Stomach Cancer is more frequent in Japan owing to its high-salt diet.⁴ Dietary recommendations for cancer prevention usually

comprise eating primarily vegetables, fruit, whole grains and fish, and a reduced intake of red meat, animal fat, and refined sugar.⁵

Research about the effects of diet on risk of cancer has revealed little specific effects and left much ambiguity. In this paper, we summarize the recent status of familiarity on diet and cancer. A numeral of diets and diet-based regimes are projected to be valuable against cancer. No one of these diets has been found to be valuable, and a few of them have been found to be unsafe.⁶ The well-studied dietary pattern is the mediterranean diet.⁷

Mechanisms of action

While several cellular mechanisms are implicated in food intake, numerous investigations have pointed out defects in the methionine metabolic pathway as cause of carcinogenesis. Deficiencies of the key dietary sources of methionine,

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methionine and choline lead to the development of liver cancer. Assimilated methionine is altered in S-adenosyl methionine (SAM), key metabolite for cysteine and spermidine formation. A close characteristic of cancer is a maladaptation of the

methionine metabolic pathway in response to environmental or genetic conditions ensuing in diminution of S-adenosyl methionine and/or SAM-dependent methylation.^{8,9}

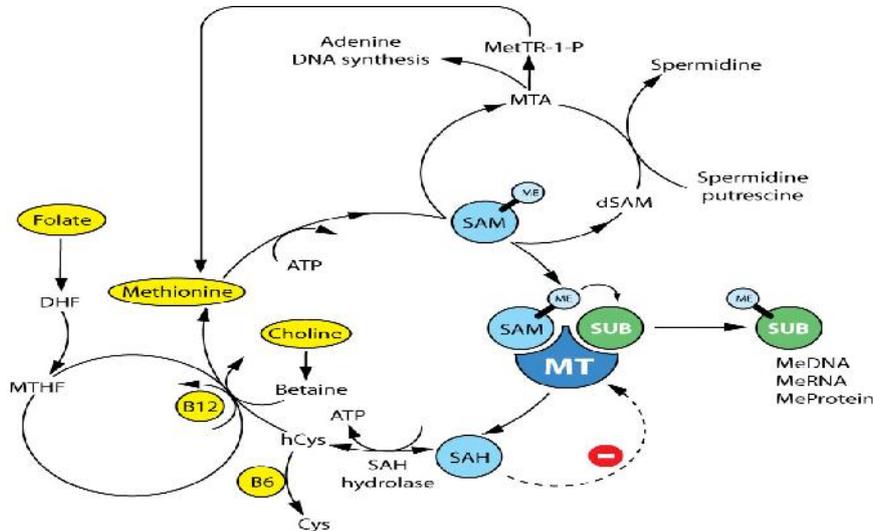


Fig. No. 01: Methionine metabolism pathway

DHF, dihydrofolate; dSAM, decarboxylated S-adenosylmethionine; hCys, homocysteine; ME, methyl group; MetTR-1-P, 5-methylthioribose-1-phosphate; MT, methyltransferase; MTA, methylthioadenosine; MTHF, methylenetetrahydrofolate; SAH, S-adenosyl-L-homocysteine; SAM, S-adenosyl methionine; SUB, substrate.

Facts for diet as a risk factor for cancer

It was renowned that people in various western countries had diets high in fat and sugar, animal products and elevated rates of cancers of the breast, prostate, colorectum, endometrium, and lung; by disparity, those in developing countries generally had diets with one or two starchy staple foods, with little intakes of fat and sugar, animal products and squat rates of these cancers.¹⁰ Extra aspects of everyday life also altered, especially, huge reductions in physical activity and great increases in the occurrence of obesity. Global variations in

diet and cancer rates persist to recommend that diet is a vital risk factor for several cancers, and as a result moderately avertable by dietary changes. Many research studies have been reported about the relationship between the diets and the risk of cancer. Baseline dietary intake is considered during adult life. Body mass index and alcohol represent special cases. The link between diet and other cancers desires to take impending perplexing factors (Human papillomavirus for cervical cancer, Helicobacter pylori for stomach cancer and physical activity for colorectal cancer).

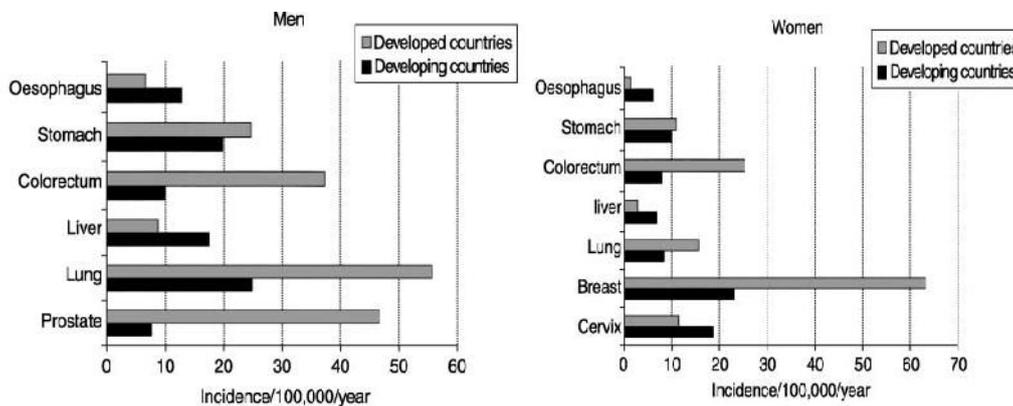


Fig. No. 02: Incidence rates of cancers among men and women in developed and developing countries

Table No. 01: Dietary risk factors, protective factors, and other risk factors for the common cancers

Cancer	Dietary and diet-related risk factors	Dietary protective factors	Other major risk factors
Oral cavity, pharynx and esophagus	Alcohol Very hot drinks Obesity	Probably fruit and vegetables	Smoking
Stomach	Probably high intake of salt Preserved foods and salt Obesity	Probably fruit and vegetables	Infection by <i>Helicobacter pylori</i>
Colorectum	Possibly red and processed meat	Probably fruit, vegetables, and other plant foods rich in fibre	Sedentary lifestyle
Liver	High alcohol intake Foods contaminated with aflatoxins	None established	Hepatitis viruses
Pancreas	None established	None established	Smoking
Larynx	Alcohol	None established	Smoking
Lung	None established	Possibly fruit and vegetables	Smoking
Breast	Obesity after menopause Alcohol	None established	Reproductive and hormonal factors
Endometrium	Obesity	None established	Low parity
Cervix	None established	None established	Human papillomavirus
Prostate	None established	None established	None established
Kidney	Obesity	None established	None established

Review of the role of diet

Ingestion of extensive array of foods from each of the five food groups, in the quantity suggested promotes good health and lessens the risk of disease.

The five food groups are:

- Fruit
- Vegetables, legumes/beans
- Lean meats and poultry, fish, eggs, nuts and seeds, legumes/beans
- Cereal foods
- Milk, yoghurt, cheese and alternatives

Diet is one of the everyday life factors that persuade the possibility of developing cancer. Smoking, alcohol, sun exposure, obesity and physical activity levels are moreover imperative. Even though several foods can influence cancer risk but there is no confirmation about definite foods can cause or cure cancer.^{11, 12}

Seven grains a day afford defending benefits

Eating seven arrays of grains, legumes, grain products, roots and tubers will present defending benefits against cancer. Corn, rye, oats, brown rice, kidney beans and lentils are good foods to consume. Diets high in refined sugar and refined starch may enhance the risk of bowel cancer and stomach cancer.

Meat

Currently believable precise evidence that eating processed meat increases risk of bowel cancer. People have recommended avoiding processed meat. It is suggested that children are not given processed meats. Fish, lean meats or low-fat cheese are suggested for children. The World Cancer Research Fund recommends restrictive the quantity of fresh red meat to less than 700 gm uncooked or 500 g of cooked red meat a week. Research suggests that eating charred or burnt meat may enhance cancer risk, but the evidence is uncertain.¹³⁻¹⁵

Fats and cancer

Recent data does not specify a straight link between fat intake and exacting types of cancer. Conversely, a high-fat diet may cause obesity, which is a cause for cancers of the gallbladder, colon, breast, oesophagus, endometrium and kidney.¹⁶⁻¹⁸

Fruits, vegetables and cancer

Eating fruit and vegetables has provided numerous health benefits. Fruits and vegetables have several vitamins, minerals and antioxidants, which decrease cancer risk in the areas of stomach and mouth. Until now fruits and vegetables are important part of diet and eating is related with a healthier weight.^{19, 20}

Food and common cancers

Lung cancer

It is the foremost cause of death from cancer and smoking is generally accountable. It is considered that vitamin E; carotenoids sourced from foods are possibly accountable for this effect. New data suggests broccoli, cabbage and cauliflower are outstanding vegetable choices.^{21, 22}

Breast cancer

In world, the widespread type of cancer among women is breast cancer. Augmented risk of breast cancer with greater adult height, weight gain and rapid early growth in middle age. A lot of the risk of breast cancer with oestrogen levels during age of menarche, late menopause, number of pregnancies and breastfeeding practices. Carrying over weight in postmenopausal women has twice the average risk of breast cancer. Alcohol consumption enhances the risk. Foods containing mono-unsaturated fat like canola oil, olive oil, some nuts and seeds may lessen the risk.^{23, 24}

Prostate cancer

Prostate cancer is the frequent cancer in men. Men around the age of 50 are at superior risk. High-fat diet comprises fatty meats and dairy products may increase the risk while vegetables reduce the risk. Lycopene is an effective antioxidant found in watermelon, strawberries, tomato-based products and tomatoes may lesser the risk of prostate cancer. Data suggests that consuming one to two serves of tomatoes per day reduced risk of prostate cancer.^{25, 26}

Colorectal cancer

The second most common cause of cancer-related death is colorectal cancer. Healthy lifestyle can prevent about 70 per cent of cases. Consuming a huge quantity of processed meat, red meat, and alcohol may enhance the risk while physically active, maintenance of healthy weight, diet high in fibre and vegetables are protective.^{27, 28}

Drinks and foods to limit

Drinks and foods to limit in diet or have less of comprise:

- Alcohol
- A lot salted and pickled foods
- Highly processed foods that are squat in fibre
- Processed meats and fatty red meats

Foods to eat more

The defending anti-cancer effect has been revealed with:

- Tomatoes
- Foods high in dietary fibre (grains and cereals)
- Leafy green vegetables and carrots
- Citrus fruits
- Cabbage

Supplements

Results of studies demonstrate that when isolated and taken as supplements, will present the similar benefits for cancer prevention. Increased risk of cancer in individuals who take nutrient supplements at doses privileged than the normal amount of that nutrient generally eaten in foods.

The use of vitamin E supplements and beta-carotene has not been verified to be valuable in avoidance of lung cancer.²⁹⁻³¹

Foods increases cancer risk

Though a low fibre diet, high-energy may enhance a person's risk of developing cancer, some foods (carcinogenic) potentially causing cancer. These comprise:

- Artificial sweeteners (aspartame, saccharin and cyclamate)
- Pickled or salty foods – pickled meats enclose a substance (nitrate), has the potential to cause cancer when eaten in large doses.
- Burnt foods – a set of carcinogenic substances (polycyclic aromatic hydrocarbons) formed if foods are burnt.
- Peanuts – develop cancer after eating peanuts that are tainted with toxin-producing moulds.
- Alcohol – consuming alcohol enhances the risk of cancers of the mouth, pharynx, larynx, oesophagus, liver, bowel and breast

Nutrition for the individual with cancer is significant for several reasons, including:

- The immune system desires bolstering to wrestle at complete potency.
- The diet may accustom to manage with constipation, diarrhea or nausea.
- Increased metabolism or loss of appetite requires high-energy foods which are incorporated in the everyday diet.
- Extra protein may require preventing loss of muscle from weight loss.³²⁻³⁴

Conclusion

Food plays a significant function in preventing several cancers but the remedial importance of food in treating existing cancer is less obvious. Person with cancer wishes admirable nutrition in order to improve with the physical hassle of the illness and the rigours of medical treatment. Up to now, slight methodical evidence that a food or supplement can destroy cancer cells or cure cancer.

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