

A Review on Association of Food and Drink with Colorectal Cancer

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Abstract: Cancer is a mass of tissue formed as a result of purposeless proliferation of cells even after the removal of growth stimulus which caused it. Cancer is caused due to many reasons like ultraviolet radiation, asbestos, arsenic, virus, bacteria, and parasites. A cancer which is caused to colon and rectum is known as colorectal cancer. It is the third most occurring cancer in men and second most cancer occurring in women. It is caused due to many reasons like medical conditions, genetic conditions, and lifestyle choices. Colorectal cancer is also caused due to food which results in inflammation and increasing the risk of colorectal cancer. When these foods are avoided, it decreases the risk of colorectal cancer.

Keywords: Cancer, Colorectal cancer, Food, Inflammation, Tumor, Genetics, Lifestyle

I. INTRODUCTION

Cancer refers to any one of a large number of diseases characterized by the development of abnormal cells that divide uncontrollably and have the ability to infiltrate and destroy normal body tissue. Cancer often has the ability to spread throughout your body (1). Cancer causes symptoms which include unexplained weight loss, chronic tiredness, persistent pain, fever that occurs mostly at night, changes in bowel or bladder habits (2).

Types of Cancers:

Classification of cancer by body locations or system is as follows:

- Breast cancer – affecting breast tissue
- Digestive or gastrointestinal cancer – affecting the digestive system or gastrointestinal tract.
- Endocrine and neuro endocrine cancer – affecting the endocrine system
- Eye cancers – affecting the eye
- Genitourinary cancer – affecting the genitourinary tract
- Germ cell cancer - affecting the germ cells
- Gynecologic cancer – affecting the Female Reproductive System
- Head and neck cancer – affecting the head and neck
- Hematologic or blood cancer – affecting the blood cells
- Musculo skeletal cancers – Affecting the Musculo-Skeletal System
- Neurologic cancer – Affecting the Nervous System
- Respiratory or thoracic cancer – affecting the respiratory system
- Skin cancer – affecting the skin
- AIDS related cancer (3)

General classification of cancer:

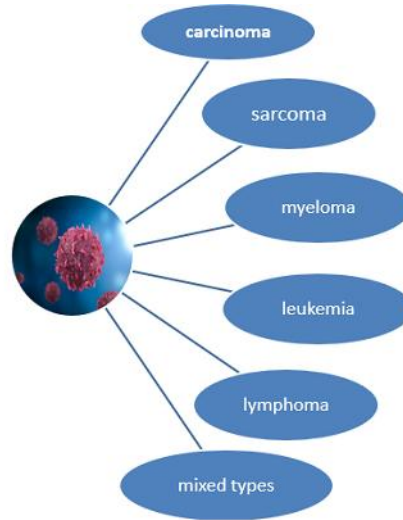


Figure- 1 Cancer Classification (4)

Epidemiology of cancer:

Epidemiology of cancer offers their techniques and instruments to comprehend the issue in any particular population ranging from local to global level. The most used metrics for assessing the burden of cancer are incidence [estimation of number of new cancer diagnoses], prevalence [the burden of cases] and mortality [deaths due to cancer]. Numerous causes of cancer have been identified by the study of cancer from an epidemiological perspective, which has led the path for early identification and prevention(5). According to recent estimates of the global cancer burden brought on by certain viruses, bacteria, and parasites, recognized infections are thought to be responsible for around 20% of all malignancies globally (6).

Agent	Organism	Cancer	Percentage caused by organism	
			% of this cancer	% of global cancer burden
Helicobacter pylori	Bacterium	Stomach	63	5.5
Human papillomaviruses [HPV]	Virus	Cervix	100	4.5
		Other	56	0.5
		Anogenital Mouth, pharynx	4	0.1
Hepatitis B and C virus [HBV,HCV]	Virus	Liver	85	4.9
Epstein – Barr virus [EBV]	Virus	Nasopharynx	98	0.7
		Hodgkin	46	0.3
		Lymphoma	82	0.1
		Burkitt’s Lymphoma		
Human immunodeficiency virus/ Herpes virus 8 [HIV/HHV8]	Virus	Kaposi sarcoma	100	0.6
		Non – Hodgkin	12	0.3
		Lymphoma		
schistosomes	Parasite	Bladder	3.0	0.1
Human T – cell lymphotropic	Virus	Leukemia	1.1	0.03

virus I [HTLV – 1]				
Liver flukes	Parasite	Liver	0.4	0.02
Total				17.8

Table 1: Infectious causing Carcinogenic agents and the percentage of the global cancer (6)

Etiology of Cancer:

There are numerous possible causes of cancer. Cancer arises from the conversion of normal cells into tumor cells in a multi-stage process that generally progresses from a pre-cancerous lesion into a malignant tumor. These modifications are the outcome of interactions between a person's genetic factors and three different types of outside forces, such as: (7).

Types of causative agent	Example
Physical Carcinogen	Ultraviolet and ionizing radiation
Chemical Carcinogen	Asbestos, components of tobacco smoke, alcohol, and arsenic (a drinking water contaminant).
Biological Carcinogen	Viruses, bacteria, or parasites.

Table 2: Causative agents of cancer with their examples. (7)

II. COLORECTAL CANCER

A cancer of the colon or rectum, which may begin as non -cancerous polyps. Colorectal cancer is the growth of cells that forms in the lower end of digestive tract (8). Colorectal cancer is also known as bowel cancer. Common signs include diarrhea, blood in stool, constipation (9).

Epidemiology of Colorectal Cancer:

Colorectal Cancer is the third most popularly occurring cancer in men and the second most commonly occurring cancer in women. It is a cancer which is the second most common cause of death which resulted in 9,35,000 deaths. Colorectal cancer year by year showing increased tendency in terms of both morbidity and mortality. Globally it is one of the cancers whose incidence is increasing comprising 11% of all cancer diagnosis. It has been observed that the most significant increase in colorectal cancer incidence and mortality occurs in medium and high Human Development Index [HDI] countries that are adapting “western” way of lifestyle. Even though the frequency of cases remains higher in highly developed countries, it has been recently stabilized simultaneously increasing incidence has been observed in some low and middle income countries because of adapting the western lifestyle. The risk of colorectal cancer increases along with the ageing. The median age at diagnosis is 72 in women and 68 in men. The age standardized rate increases by over 10 – fold before the age of 50 up to 85 years (10).

III. ETIOLOGY OF COLORECTAL CANCER

Colorectal cancer occurs when there is DNA mutation in the cells of colon or rectum which leads to uncontrolled growth and division. The mutated cells may die or they may be attacked by immune system. But in some cases, these mutated cells may escape the immune system, undergo abnormal proliferation, and causes tumor in the rectal or colon region (11). The exact cause of colorectal cancer is unknown but it is seen that risk factors like medical conditions, genetic conditions and lifestyle choices increase the chances of developing colorectal cancer (12)

IV. FOODS CAUSING COLORECTAL CANCER

It is not that colorectal cancer is caused due to foods directly but it is seen that certain foods lead to inflammation in the body which leads to higher risk of developing colon cancer. It includes.

1. Red meat
2. White bread
3. Sugary beverages
4. Fibers

5. Processed foods

Red meat:



Fig: 2 – Red meat (16)

Consumption of red meat may affect the risk of colorectal cancer directly or indirectly because diet with high meat includes less vegetables, fruits, and fibers. The incidence of developing colon and rectal cancer is about twice as high in people who ate this more regularly. On the other side it is seen that frequent consumption of tomatoes reduced the risk of colorectal cancer between 50% to 60%. The connection between red meat and colorectal cancer has been theorized to be due to the carcinogenic effect of heterocyclic amines formed during the cooking of red meat. To reduce the risk of colorectal cancer it is suggested to replace red meat with poultry and fish.

White bread:



Fig: 3 - White Bread (17)

White breads and other foods made with white flour may contain refined carbohydrates that raise blood sugar levels and cause insulin resistance. This results in a raise in risk of colorectal cancer as well as other cancers like kidney cancer. Another major source of fibers in people's diet is grains. White flour foods do not contain as much fibers as whole grain food since they are processed. Processed grains are also a reason for increase in the risk of colorectal cancer. So, to prevent the risk of colorectal cancer whole grain bread, pasta and oats can be taken instead of white flour foods.

Sugary beverages:

Sugar drinks are available everywhere. It is easy to find a sugar drink than a bottle of water. Studies have already confirmed that there is a connection between sugar drinks and obesity, this is also a reason for cancer. It is seen that sugars in drinks can cause inflammation and the inflammation can lead through different cancers throughout the body like colon cancer. It is better to replace sugar drinks with water and other low calories and low sugar alternatives.



Fig: 4 – Sugary beverages (18)

Fibers:

Although dietary fiber has a wide range of chemical and physical characteristics, it can be categorized based on how well it dissolves in water. This influences how it acts in the body and may be important when discussing the risk of colon rectal cancer



Fig: 5 – Fibers (19)

Fruit and vegetable fiber tends to be more soluble than bran fiber, which is insoluble. While high intake of cereal fiber did not lower risk of colon rectal cancer, high fruit consumption was linked to a 32% reduction in colon rectal cancer risk. The integrity of colonic cells may be impacted by a diet that is heavy in fat and meat but low in dietary fiber, according to some researchers.²² others have proposed that suberin and lignin, two components of plant cell walls, adsorb heterocyclic amines and prevent colon rectal cancer by doing so. (13),(14),(15)

Processed foods:



Fig: 6 - Processed foods (20)

Cooking components including sugars, oils, and starches are examples of processed culinary ingredients. Processed foods are created by combining minimally processed or unprocessed ingredients with sugars, oils, or salt. Examples

include sugar -sweetened canned fruit, seasoned canned vegetables, and various canned meats and meat products. Foods that are mass-produced and require industrial formulations are considered ultra-processed. Examples include sugar-sweetened beverages, packaged baked goods and snacks, sugary cereals, and ready-to-eat or -heat foods that frequently have high levels of added sugar, fat, and salt but few nutrients like vitamins and fiber (21).

V. CONCLUSION

Foods such as meat, white bread, sugary beverages, fibers and processed food when frequently consumed has shown to increase the risk of colorectal cancer.

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