

# IMPACT OF WESTERN LIFESTYLE ON CANCER PROGRESSION

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**Abstract:** Cancer is not a single disease; it is a cluster of many diseases with many possible causes. Under several stress conditions a normal cell fails to repair DNA damage and grows into cancer cell. Cancer disease placed at second number in worldwide mortality rate after cardiovascular disease. The worldwide cancer mortality rate is 8,201,030 deaths per year. Cancer is also counted as one of the diseases of civilization; lifestyle has an important contribution in increasing cancer rate. Lifestyle factors have contributed in 90-95% cancer cases, factors include tobacco use, alcohol consumption, obesity, diet, physical inactivity, psychological stress, emotional stress, etc. In this review, we focused on detailed study of contribution of lifestyle factors in cancer progression and we also provide evidence that prevention of cancer requires minor lifestyle changes.

**Keywords:** Cancer, Diet, Physical Activity, Obesity, Smoking, Tobacco.

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## 1. INTRODUCTION

Cancer diseases develop due to the abnormal growth of the cells, with the metastatic potential. The Human body is made up of trillions of cells; any of cells can develop into cancer cells under certain stress conditions. In the Normal process of human cell development, cell division takes place according to the needs of the body, when normal cells grow old or become damaged, they die, and new cells take their place, however In case of cancer this ordering process is not followed by the cells and damaged and old cells survive when they should target for apoptosis. This abnormal growth of cancer cells also support by formation of undesirable new cells and this entire process of abnormal cell growth leads to tumor development. (NCI report 2014)

People are afflicted with the cancer from the past time, throughout the world. In history record was found about the cancer that Human beings and other animals also suffered with cancer disease in past time. In history records earliest evidence of cancer is found among the human mummies, fossilized bone tumors in ancient Egypt, and ancient manuscripts. (Sudhakar et al. 2009) The term carcinos and carcinoma was used by Greek physician Hippocrates (460-370 BC), to describe non-ulcer forming and ulcer-forming tumors. In Greek, these words mean to a crab, most likely applied to the disease because the cancer also shows the finger-like spreading projections similar as the shape of a crab. Later this Greek term was turned into cancer by The Roman physician, Celsus (28-50 BC) (Bordet report 2011)

Cancer contributes in worldwide mortality rate of 8,201,030 deaths per year. According to accessible data for the year 2012, 8.2 million deaths were counted due to the cancer in the world: which accounts for 4.7 million (57%) in males and 3.5 million (43%) in females. (Globocan, IARC report 2008)

Recently it has been published in the World Cancer Report from the World Health Organization (WHO, The number of women in India is increased with newly diagnosed cancer annually. In India in 2012, against 4.77 lakh men, 5.37 lakh women were identified with cancer. In terms of cancer deaths, the mortality rate among men and women is nearly the same, as existing data expressed that 3.56 lakh men died of cancer while the corresponding number for women was 3.26 lakh. (Dikshit et al.2012) It is an assumption that annual cancer cases will rise from 14 million in 2012 to 22 within the next 2 decades.

Cancer deaths associated with the most cancers like lung, female breast, prostate and colorectal are declining in the United States and many other western countries, But the data were found figure of cancer cases are growing in less developed and economically transitioning countries, adoption of unhealthy western lifestyles such as consumption of calorie-dense food, smoking and physical inactivity, alcohol intake are the foremost reason of growing cancer risk. (Jemal et al. 2010)

Cancer is a disease initiated by some genetic mutations under certain circumstances. Many factors are accountable for this kind of genetic mutations, including internal factors (such as inherited mutations, immune conditions and hormone imbalance) and acquired factors (such as calorie dense diet, alcohol consumption, tobacco, radiation, environmental pollutants and infectious organisms).

It has been reported that some facets of Western lifestyle, primarily a high caloric intake and little physical activity, resulting in a positive energy balance, weight gain and, ultimately, obesity, are alleged to play a role in the aetiology of colorectal disease. (Le Marchand et al.1997) Current recommendations to reduce the cancer risk includes, maintaining a healthy weight, a diet rich in green vegetables, grains and fruits, intake of low calorie diet, with regular physical activity, It also includes limited in red meat and alcohol .

(Marmot et al. 2007)

In this study, we reviewed the indications linking lifestyle factors and cancer progression. We consider the lifestyle factors (diet, alcohol consumption, tobacco, physical inactivity, obesity.) are a major cause of cancer progression, requires minor lifestyle changes to slow down the progress rate of cancer.

## 2. DIETARY EFFECT ON CANCER PROGRESSION

In 1981, Doll and Peto estimated that dietary factors account for 35% of cancer deaths, might be avoidable by changes in dietary pattern. (Doll et al.1981) In developing countries diet accounts for 20% of the increasing cancer risk. (Greenwald et al.2001)

The American cancer society report has published about the top 10 cancer promoting foods in your diet are Hydrogenated oils, French fries/potato chips, microwave popcorn, processed meats, red meat, farmed salmon, refined sugar/soda, DIET foods(low-fat ,fat free or sugar –free ) Refined white flour ,GMOS/glyphosate ,associated with the incidence and progression of carcinomas in all populations. Recently In 2015 for the first time, the association between individual DI (dietary index) and cancer risk has been studied; the results showed that participants with higher DI values (corresponding to food choices of lower nutritional quality) were at higher risk of developing overall cancer. ( Donnenfeld et al.2015)

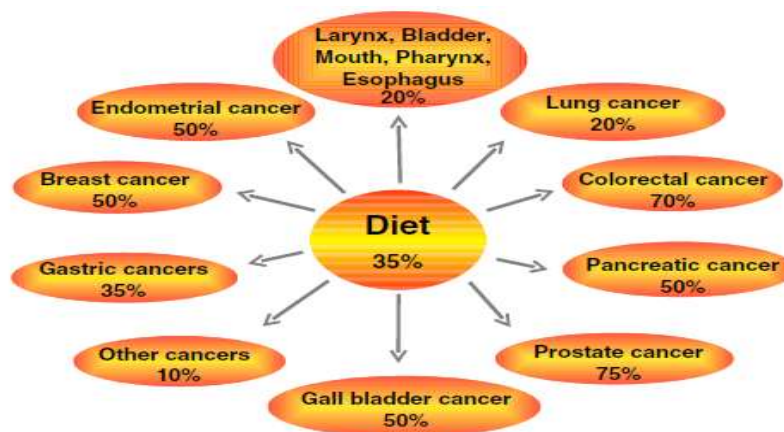


Fig.1. Cancer deaths (%) linked to diet, based on data from Willett et al.2000

According to studies high intake of red meat promotes inflammation and cancer progression, Red meat derived glycan's have potential to induce cancer. (Samraj et al. 2015) Overall, the augmented risk associated with processed meat intake was greater than that with unprocessed red meat. Processed meat cured with potential carcinogens which are nitrite contained high concentrations of preformed nitroso compounds and nitrosylated haem iron. There is experimental evidence that nitrite used for meat processing are the cause of oxidative DNA damage. (Joosen et al.2009) Numerous studies have been done in Greece that consumption of Olive Oil and Specific food Groups increases breast cancer risk. (Trichopoulou et al.1995) Fried food (high temperature cooking of food) produces a variety of chemicals which promotes cancer. (LYON et al.1988)

Studies have shown that dietary pattern which contains higher consumptions of fruits, vegetables, and whole-grain foods, and lower consumptions of processed and red meats and salt, are associated with the reduce risks of cancer. A potentially defensive effect of green vegetables and fruits against cancer was supported by the results from earlier case-control studies. (Riboli et al.2003, IARC report 2003) A pattern of inverse relationship between whole grain food intake and risk of cancer has been established. (Chatenoud et al.1998) A study has been done on the inverse association of olive oil and breast cancer risk. (Martin-Moreno et al.1994)

**Alcohol consumption and cancer progression:**

Alcohol consumption accounts for 3% of cancer deaths. Researchers have done multiple studies that alcohol contributes to the increasing risk of cancer, including: metabolizing ethanol in alcoholic drinks to acetaldehyde, which is a carcinogenic chemical, can damage DNA, proteins, and lipids through oxidation. Alcohol consumption counted as a cause of Colorectal, larynx, liver, breast, oesophagus, oral cavity, pharynx and pancreatic cancer. (Cogliano et al.2011)

A study has been done on relation of alcohol dose and cancer risk, Heavy alcohol consumption ( $\geq 4$  drinks/day) is significantly associated with an increased risk 50% for colorectal and breast cancers, and 30% for pancreatic cancer. A lower dose of alcohol consumption (i.e.,  $\leq 1$  drink/day) is also related to increased risk of cancer, about 20% for oral and pharyngeal cancer and 30% for esophageal squamous cell carcinoma. (Pelucchi et al.2011) Moderate alcohol consumption also linked with increased breast cancer risk.( Zhang et al.2007 )

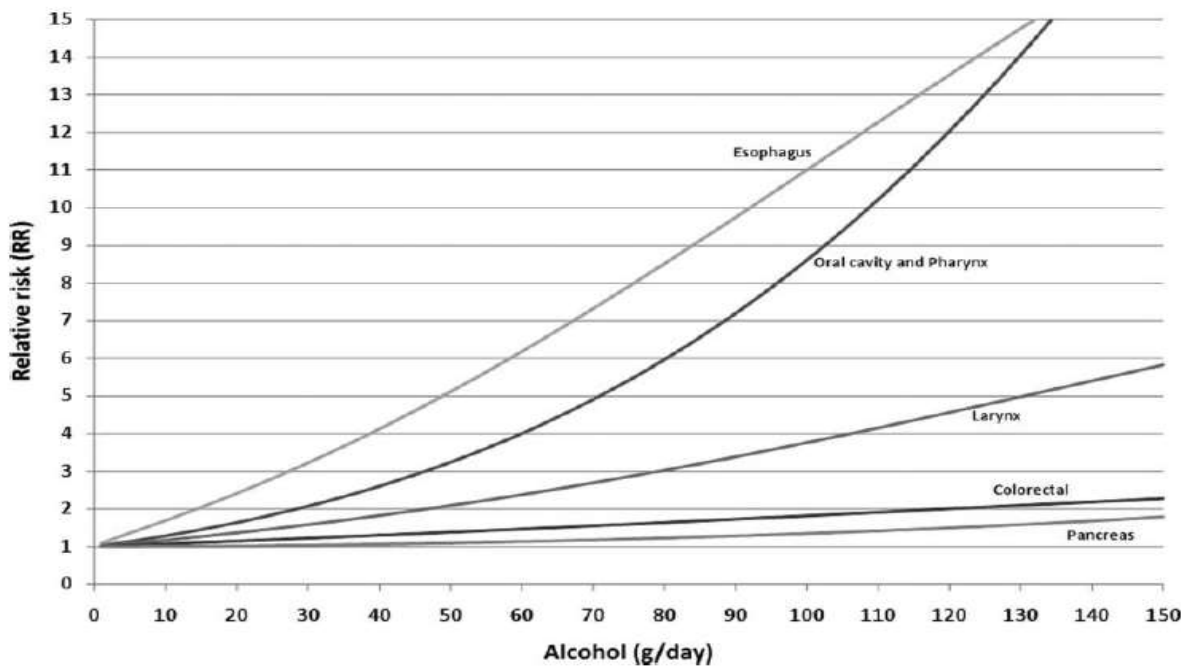


Fig.2. Dose-dependent effect of drinking alcohol on different types of cancer. (Pelucchi et al. 2011)

A case control study was carried out in an Italian area with high wine consumption and results found most frequently wine consumption significantly enhance the risk of cancer in upper digestive tract (oral cavity, pharynx and esophagus. (Barra et al.1990) According to evidences, risk of cancer decreases with lower level of alcohol consumption among the non-alcoholic peoples. The reduced risk of breast cancer is also associated with the low levels of alcohol intakes. (Chen et al. 2011)

**3. TOBACCO USE AND CANCER PROGRESSION**

Tobacco is available in the form of cigarette, cigar, and smokeless tobacco as well. Tobacco smoking is the main known cause of cancer-related death worldwide, which accounts for 30% of cancer deaths, approximately 25% of all cancers in males and 4% in females, and, in both sexes, roughly 16% of cancers in more urbanized countries and 10% in less advanced countries.( Stewart et al.2003) In 1985, an international Working Group of researchers elucidated a direct affiliation between tobacco smoking and different types of cancers like lung, larynx,pharynx, esophagus,oral cavity, pancreas, urinary bladder and renal pelvis .(IARC report 1985)

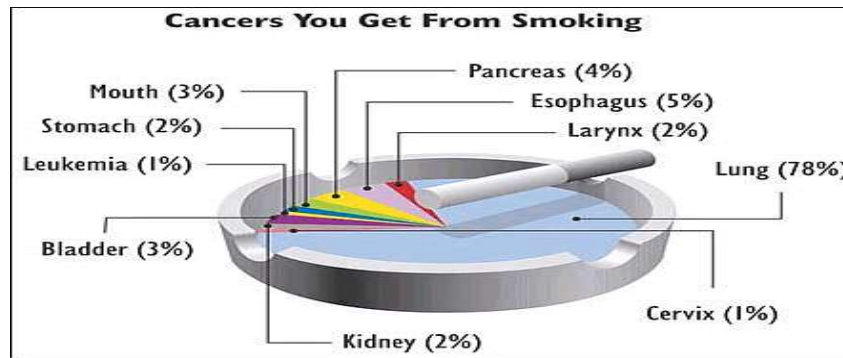


Fig.3 Different type of Cancers linked to smoking. (Shiels et al.1999)

Many epidemiologic studies have been done to investigate an association between cigarette smoking and the development of urinary tract cancer and considerable amount of evidences has found in support of a positive link between cigarette smoking and urinary tract cancer risk.(Zeegers et al.2000) A study was carried out in united states to find out the relation between cigarette smoking and risk of colorectal cancer and they found smoking in the prior 20 years has a robust relation to small colorectal adenomas and large adenomas is accompanying with the smoking at least 20 years in the past, and the induction period for colorectal cancers is at least 35 years.( Giovannucci et al. 1994) Smokeless tobacco is also carcinogenic, associated with increased risk of pancreas and other organ's cancer.( Boffetta et al.2005)

In summary, current research has allowed to investigate a causal association between tobacco smoking and cancer of the nasal cavities and Para nasal sinuses, nasopharynx, liver, stomach, kidney and uterine cervix, and for adenocarcinoma of the esophagus. Evidence from a comparable study explain that growing risk of cancer is allied with the smokers compared to non-smokers, an increased risk of cancer is related to the duration and intensity of smoking, and a reduction in risk with increasing figure of years since smoking cessation.

#### 4. PHYSICAL ACTIVITY, OBESITY AND CANCER PROGRESSION

Physical inactivity leads to obesity, plays vital role in the expansion of chronic disease like cancer. According to results of research physical activity for the peoples spotted with the cancer may be advantageous for improvement of health, energy balance and reducing fatigue. Many studies carried out in the United States and in other countries of the world have steadily found that increased physical activity, either in intensity, duration, or frequency, is associated with the reduction in the risk of colon cancer by 30 to 40 percent comparative to those who are inactive irrespective of body mass index, with the extreme risk reduction seen among those who are most active. (Slattery et al. 2004, Ballard-Barbash et al. 2006)

Research has clarified the shielding connection between physical activity and cancer include prostate, breast, lung, colon, endometrial. A study has been completed in relation of obesity, physical activity and pancreatic, colon cancer and found a noteworthy association between obesity and bigger risk of pancreatic cancer and colon cancer, but physical activity is related to the decline risk of pancreatic cancer and colon cancer especially among overweight peoples. (Michaud et al.2001, Giovannucci et al.1995). Among the African American women, obesity and weight gain is directly linked with the risk of ovarian cancer (Bandera et al.2016) and it is associated with breast cancer risk in the Hispanic women (Amadou et al 2014). Weight gain in adults has improved the colon cancer risk by 60 percent (Bisschop et al. 2014) From above studies we can accomplish obesity is directly linked with risk of cancer and there is an inverse relationship between physical activity and cancer risk.

#### 5. STRESS AND CANCER PROGRESSION

Adoption of western lifestyle is also connected with the increased stress level in the humans. This increased exposure to the stressful life also disturbs the human health and shows a positive association with increased risk of disease. Cancer is one of the diseases which associated with this stressful lifestyle. In a recent study it has been enlightened that parental bonding and sentimental relations are connected with the growing cancer incidence, this can be controlled through modulation of psycho-physiological stress pathways.( Renzi et al.2016) A current research study was elucidated the molecular pathway which connects the psychological stress and cancer risk.( Jin Shin et al.2016)A Social support also helpful in the improvement of life quality of the peoples who diagnosed with the prostate cancer.( Jan et al.2016) Cortisol level is associated with the stress condition, can be reduced by the emotional support in breast cancer patients(Webster et al.2016)

## 6. CONCLUSION

On the basis of the studies above describe we accomplished that numeral lifestyle factors has definitely been linked with an amplified risk of cancer in humans. Lifestyles and the environment of modern societies include many of factors which act as potential inducer of cancer and contribute to the progression of cancer. From above evidences we also can conclude that to control the progress rate of cancer, we need to make some changes in lifestyle. However, regardless of significant progress in the past decade, further research is needed in order to understand how lifestyle factors modulate the cellular microenvironment and leads to the cancer progression.

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