Impact Of Lifestyle & Diet On Prevalence Of Oral Cancer

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INTRODUCTION:

A malignant neoplasia that develops on the lip or oral cavity is called oral cancer.It is typically referred to as a squamous cell carcinoma (OSCC) since 90% of malignancies in the dental region are histologically shown to have started in squamous cells. It has varying degrees of differentiation as well as a tendency to spread to lymph nodes (Lingen *et al*.,2008)**.**A subclass of neoplasms known as oral cancer, in particular, comprises those that develop in the lips, the front two-thirds of the tongue, the gingivae, the hard and soft palate, the oral mucosal

surfaces, and the floor of the mouth. Oral squamous cell carcinomas (OSCC) make up more than 90% of these oral malignancies (Scully *et al*.2009, Lambert*et al*.,2011 & Johnson *et al*.,2011).The main etiologic factors for the onset of oral cancer are widely acknowledged to be high alcohol intake and tobacco use, especially smokeless tobacco. Additionally, a number of putative risk factors, including genetic predispositions, chronic irritability, poor dental hygiene, viral infection, occupational exposure, malnutrition, and low fruit and vegetable diets, have been postulated for the development of oral cancer (Mehanna *et al*.,2011& Perry *et al.,*2015).Several minerals, micronutrients, and dietary components have the capacity to serve as defence mechanisms. Fruits, vegetables, certain vitamins, as well as other commonly consumed meals and items, can have this protective impact. Oral cancer risk has been found to rise with low fruit and vegetable consumption. Because of this, the prevalence of these cancer is higher in places where they are less accessible than it is in places where they are more prevalent. On the other hand, several minerals, micronutrients, and dietary components have the capacity to serve as defence mechanisms. Fruits, vegetables, certain vitamins, as well as other commonly consumed meals and items, can provide this protective impact. A higher risk has been linked to low fruit and vegetable consumption (Zain,2001).It is the sixth most prevalent malignant neoplasm worldwide, with Southeast Asia having the highest frequency (Warnaculasuriya, 2009).The incidence is greater in men than in women (5.8 per 100,000 vs 2.3 per 100,000), although there appears to be an upward tendency in women, perhaps as a result of their relatively recent exposure to risk factors like alcohol or cigarettes (Sarode *et al*.,2020).

MATERIAL & METHODS:

Theinformation for this review was found by searching PubMed, PubMed central, Google scholar, CDCfor published research works on Impact Of Diet And Lifestyle On Prevalence Of Oral Cancer. These review works took the data from the original studies from all over the world.

DISCUSSION:

IMPACT OF LIFESTYLE: Life style plays a very important role in oral cancer. Lifestyle include occupation, education, geographical location etc. Each one of these factors play very crucial role in the development of oral cancer. Mostly the uneducated parts of India are severely affected by oral cancer. A recent study shows that 55% of the manual labors are severely affected by oral cancer,whereas only 5% of the population who are into service are affected by oral cancer (Bhattacharjee et al.,2021).
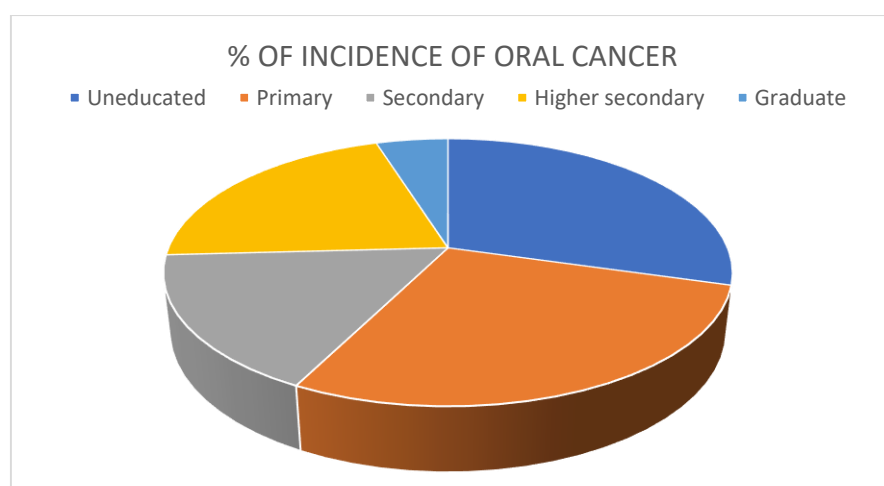

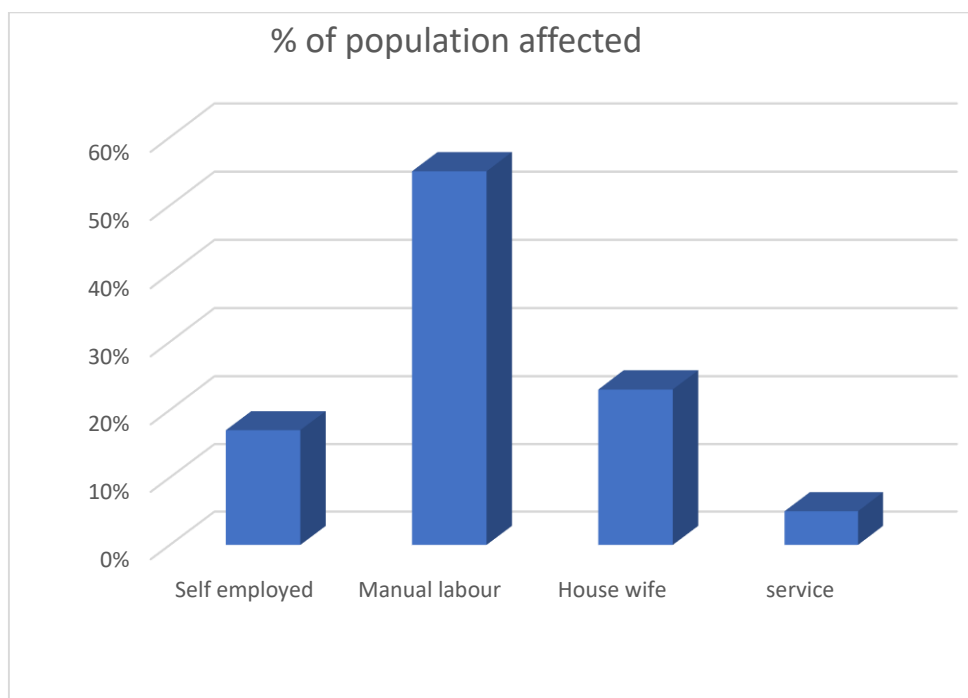**Fig 1:** Education wise distribution of oral cancer

Fig 2: Occupation wise distribution of oral cancer. (Ref:Bhattacharjee et al.,2021)

IMPACT OF DIET ON ORAL CANCER:

Diet is basically the total food a human can consume. Diet plays a very important role in the development of organism.Itcobines several micro nutrient,protein,fat, carbohydrate .It is an important factor in the growth of organism. It plays a very important role in the development of oral cancer.World Health Organisation (WHO), 35 to 55% of human malignancies and around 15% of oropharyngeal tumours can the result of dietary deficits or imbalances(Blackburn *et al* .2003 &Srewart*et al.*2003).Recent research has examined the relationship between dietary supplements and the risk of developing cancer. There appears to be a higher risk in association to particular meals or families, notably those rich in pro-inflammatory components, if studies reporting on alcohol and cigarettes are excluded. However, some minerals, micronutrients, and dietary components can serve as defence mechanisms. Fruits, vegetables, and certain vitamins, as well as other staples of our diet, can provide this protective impact. An increased risk of mouth cancer has been linked to low fruit and vegetable diet. As a result, locations where these items are commonly consumed are less prevalent than those where access to them is limited(Zain,2001).It is also seen in certain study that vegetarians has a lower probability of having cancer from non vegetarian. As they are consumed much more green vegetables than non vegetarian& they are far away from the consumption of rich and fried food (which are thought to be carcinogenic).They have a protective effect.(Nasim et al.,2007)
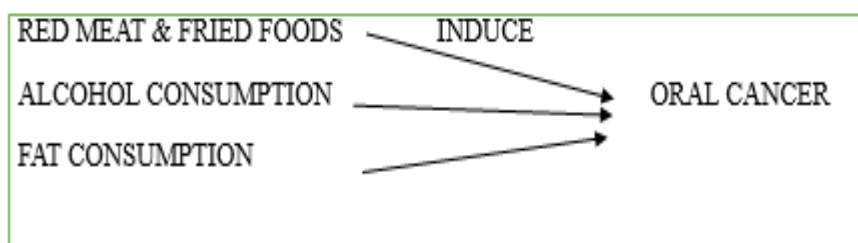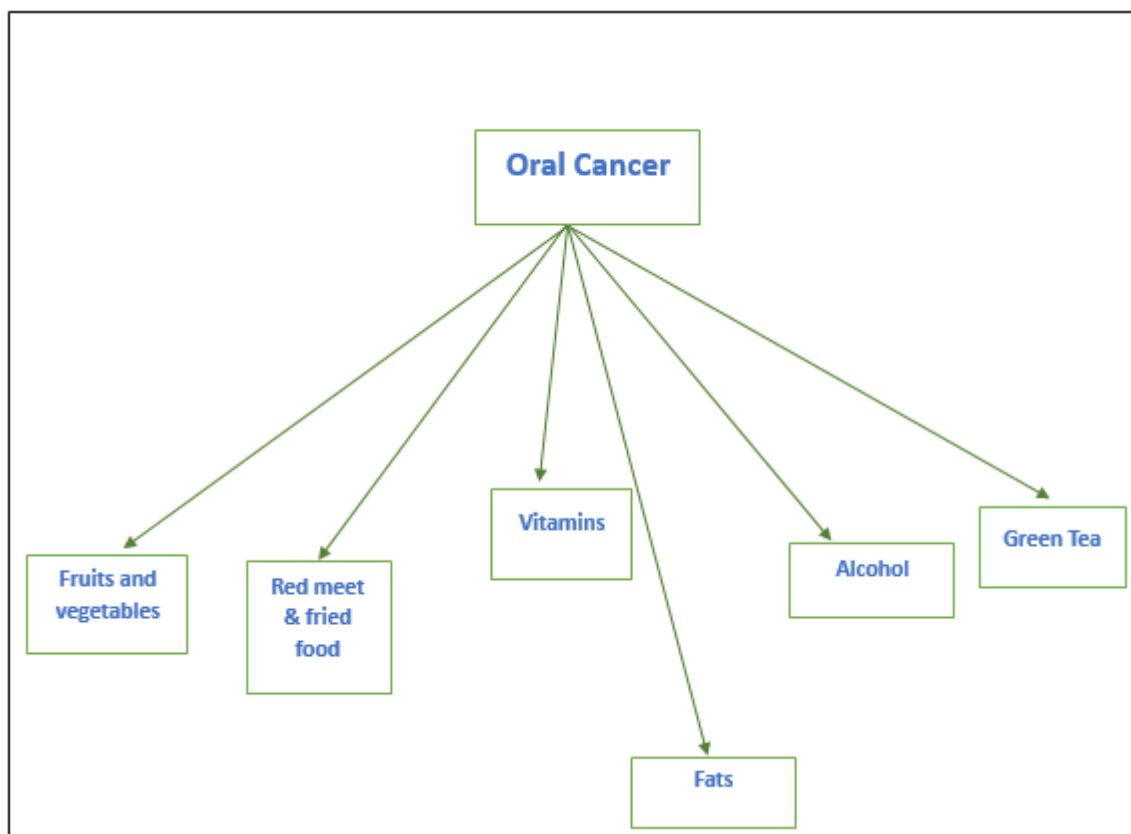

Fig 3: Schematic diagram of foods inducing oral cancer

DIFFERENT FACTORS AFFECTING ORAL CANCERS ARE:

Fig 4: Different Dietary Factors Affecting Oral Cancer

1.FRUITS AND VEGETABLES:

No correlation between the consumption of dark yellow fruits with a reduced incidence of oral, pharyngeal, or esophageal cancer has been shown (Chainani ,2002). Examples of such fruits are oranges, lemons, and apricots. However, banana consumption lowered the incidence of head and neck cancer detection by 77%, according to a research conducted in Brazil, according to the authors.This fruit has antioxidant-producing biogenic amines, phenolic acids, carotenoids, and vitamins (De galvao*et al.,*2019). There are significant amounts of polyphenols like resveratrol in red fruits including grapes, blackberries, and redberries (Lopez *et al*.,2012). This substance possesses qualities that are anti-inflammatory, antioxidant, and anti-cancerous. Resveratrol regulates apoptosis and angiogenesis as well as cell proliferation, migration, adhesion, and invasion.Vegetables include large concentrations of micronutrients with anti-cancerous characteristics, including beta-carotene, alpha-carotene, lycopene, vitamins A, C, and E **(**Chainani,2002). In certain situations, the combination of many molecules improves these benefits.A naturally occurring pigment called lycopene is produced by certain microbes and plants (Story *et al*.,2010**).** Lycopene may be found in ripe tomatoes, but it also occurs in fruits like watermelons and grapefruits. It has been researched for the prevention and treatment of chronic diseases such cardiovascular diseases, bone problems, and degenerative diseases because of its potent antioxidant capabilities . Due to the management of lipid peroxidation and reduced glutathione (GSH), it may thus be helpful in the treatment of potentially cancerous oral disorders (Rao *et al.,*1999) and function as a preventative measure against mouth cancer (Bhuvaneswari *et al*.,2004). Despite being used as a condiment, some plants, including garlic from the liliaceae family ("allium vegetables"), are also widely known for their medicinal characteristics, such as antioxidant, anti-carcinogenic, anti-inflammatory properties (Molinero *et al.,*2021).

RED MEAT AND FRIED FOODS:

Colon, rectal, and stomach cancer have all been directly related to fried meals. There has been a moderately higher risk of oropharyngeal carcinoma is shown in males who consume a diet high in fried foods, according to research that has been done to clarify if this also applies to oral cancer.Because heterocyclic amines are produced when fried foods, meat cooked at a high temperature, especially in a microwave, can be

carcinogenic(Tatiana *et al*,2004 ,Nagao,1994& Sugimura,1995).Along with iron, natural red meat also includes nitrates and nitrites, which have been linked to the emergence of mouth cancer.(Molinero *et al*.,2021)

VITAMINS: Numerous food items contain vitamins, which have antioxidant and anti-enhancement Consuming vitamin C, which is present in citrus fruits, lowers the chance of getting primary cancers, yet no conclusive data has been documented in regards to secondary cancers.The risk decrease is obvious, but there is no recognised optimal dosage (Day *et al*.,1994).In cells, vitamin C has a lowering impact. Vitamins C and E, which are responsible for removing free radicals from cell membranes, appear to work in concert.(Molinero *etal*,2021).
Through a variety of ways, vitamin C reduces the chance of getting cancer by preventing the synthesis of nitrosamine and the interaction of some carcinogens with DNA that results in chromosomal damage (Gridley *et al.,*1992&Edefonti *et al*.,2015&De Munter *et al.,*2015).

FATS: Studies looking into the function of dietary lipids have shown a link between eating fat and the development of cancer.32 On the other hand, it has been demonstrated that lipid consumption, both its quantity and composition, is directly associated to the occurrence or prevention of tumours.(Actis *et al.*2000**).**
SATURATED FAT**:** SFA consumption was found to affect the risk of oral cancer through a number of pathways, including fatty acylation, insulin resistance, and chronic inflammation, all of which were linked to the development of cancer. First off, reactive oxygen species (ROS) produced in vivo (Huang *et al*.,2002).As well as dietary SFA, in particular lauric and palmitic acids, have been shown to increase inflammation through the toll-like receptor 4 (TLR4). Numerous chronic illnesses, including cancer, included inflammation as a major contributing factor to their onset and progression (Agarwal *et al*. 2006). Additionally, the SFA-induced production of inflammatory cytokines such tumour necrosis factor (TNF)-a may affect insulin sensitivity (Calder *et al*.,2015) which promoted the development of a pro-tumorigenic environment.(Chiefari*et al.,*2021.). Another possible cancer-causing mechanism of SFA is fatty acylation.The consumption of red meat and dairy products was shown to be considerably greater in those with higher "SFA" pattern scores, which was in line with earlier research on the association between different dietary components and oral cancer. According to an Italian research, eating foods originating from animals, such as dairy and red meat, may make you more likely to get mouth cancer (Barasch et al.,2012). Greek epidemiological data also suggested that meat consumption was positively correlated with the incidence of mouth cancer.

UNSATURATED FAT:
Essential fatty acids, which have a preventive impact against cancer and must be included in the diet, include fish oil and plants high in n-3 polyunsaturated fatty acids. An increase in the synthesis of antiproliferative metabolites would be responsible for this impact. On the other hand, monounsaturated fatty acids, such as n-9 oleic acid, which are the major source of fat, act as a tumour promoter in cases of breast, colon, oral, and salivary gland cancer.(Clark,2000-Cay *et al,*1995). Patients with OSCC have also been connected to omega 6 acid. Arachidonic acid, which produces Omega 6 acids, is metabolised to produce pro-inflammatory prostaglandins and lipoxins by oxidation. Oral cancer risk can be reduced by regulating the activity of carcinogenic agents and maintaining a balance between Omega 6 and Omega 3 acids (Wountersen*et al.,*1999)

ALCOHOL CONSUMPTION:
Alcohol has been implicated within the development of most oral cancers. Alcoholic drinks have been considered carcinogenic to human beings inflicting mainly, tumors of the oral hollow space, pharynx, larynx, esophagus, and liver; even though ethanol consistent with in nature not been established carcinogenic in animal research.Alcohol intake has been shown to act synergistically with tobacco inside the increased chance of development of oral most cancers. Few studies have controlled to do evaluation with sufferers who drink alcohol but are nonsmokers and in sufferers who smoke however are nondrinkers.In a single such have a look at, alcohol has been found to be an independent danger issue for oral leukoplakia in an Indian population.The systemic outcomes of alcohol are especially due to the hepatic harm. Alcohol dependancy leading to cirrhosis and different illnesses (e.G., cardiomyopathy, stroke, and dementia) inhibits the detoxification of carcinogenic compounds consisting of N-nitrosodiethylamine.(Murthi *et al* .,1985).Persistent alcoholics generally tend to have decreased consumption of vitamins because of the metabolic tactics being occupied inside the

transformation of ethanol and the proper metabolism of nutrients is altered. This enhances nutritional deficiencies thereby growing the threat of most cancers. Continual alcohol intake additionally results in suppression of immune systemby affecting liver and nutritional reputation.(Hashibe*et al.,*2000).

GREEN TEA: One of the most popular drinks consumed worldwide is tea. It comes from the Camellia sinensis plant; the black and green variants are the most well-liked.

High levels of catechins and flavins may be seen in saliva an hour after consuming green tea, which speeds up their sluggish release into the oral cavity. As a result, it may be successful in reducing periodontal disease and tooth decay (Wang et al.,2014& Kato et al.,2008)

It has been observed that drinking tea, particularly green tea, has a negative correlation with mouth cancer. Several theories have been put up to explain this connection:

In oral cancer, green tea causes tumour cells to die, and epigallocatechin-3-gallate (EGCG) prevents tumour cells from growing and invading.

Other foods and drinks with a high glycemic index, including sweets and soft drinks, spike blood sugar levels, which raises the level of the hormone insulin, which is linked to tumour growth, however there is no concrete evidence for this association.(Molinero *et al*.,2021)

DIETARY FACTORS ASSOCIATED WITH INCREASED RISK OF ORAL CANCER

TERMS	FREQUENCY
Fried food	**≥Four per week**
Alcoholic beverages	**≥Seven per weak**
Red meat	**≥Five per weak**

DIETARY FACTORS ASSOCIATED WITH DECREASED RISK OF ORAL CANCER

TERMS	FREQUENCY
Herbal tea	**≥Twice per week**
Milk	**≥Seven per week**
Citrus fruits or juices	**≥Thrice per week**

Table 1: Table showing list of food items and their intake frequency related to oral cancer(*Ref:Archives ofIranian medicine*)

Characteristics	Cases N (%)	Controls N (%)	Adjusted OR[a](95%CI)	P-value
Diet				
Vegetarian	47 (25.1)	70 (29.2)	1.00	0.354
Non-vegetarian	140 (74.9)	170 (70.8)	0.94 (0.56-1.56	
Green vegetables				
Less than once a week	55 (29.4)	42 (17.5)	1.00	0.004
More than once a week	132 (70.6)	198 (82.5)	0.40 (0.24-0.69)	
Cruciferous vegetables				
Less than once a week	83 (44.4)	63 (26.3)	1.00	<0.001
More than once a week	104 (55.6)	177 (73.8)	0.37 (0.23-0.60)	
Citrus fruits				
Less than once a week	127 (67.9)	101 (42.1)	1.00	<0.001
More than once a week	60 (32.1)	139 (57.9)		0.49 (0.30–0.80
Chicken				
Never	87 (36.3)	69 (36.9)	1.00	0.075
Less than once a week	53 (28.3)	90 (37.5)	0.57 (0.34-0.98)	
More than once a week	65 (34.8)	63 (26.3)		0.98 (0.55–1.72)
Red meat				
Never	50 (26.7)	89 (37.1)	1.00	<0.001
Less than once a week	52 (27.8)	90 (37.5)	0.87 (0.50-1.50)	
More than once a week	85 (45.5)	61 (25.4)	2.34 (1.34-4.09)	

Table2: Odds ratios (ORs) and 95% confidence intervals (CIs) of oral cancer association with diet.(*Ref:B.Gupta et al.Cancer Epidemiology*)

CONCLUSION:

From the above we can get the information that if the cancer is detected earlier then the survival rate is much higher.So, the cancer needs to be detected earlier. Also, people need to be aware of the effects of using tobacco,

betelsquid, bidi and we need to change our lifestyle and diet if we continue to live like these cancer will be our biggest threat.We should incorporate vegetables, fruits,fish in our diet . And together, these substances may have synergistic antioxidant, anti-inflammatory, anti-angiogenic, and anti-proliferative effects since they each have distinct modes of action. And also we need to stop eating fast foods .Screenings programs should be arranged more in order to lower the risk of oral cancer.

FUTURE SCOPE:

Oral cancer rates have risen globally as a result of longer life expectancies and lifestyle modifications. Mainly in India, still now there is not enough awareness about oral cancer, for these reason such irresponsible behaviours are coming from them.So,Screening programs should be arranged more where more emphasis should be given on self mouth examination .Less well-known risk factors including the human papillomavirus (HPV), impaired immune system, genetic vulnerability they should also be given much more importance.And lastly if the detection is fast then recovery will also be much more easier,

Conflict of Interest: There is no conflict of interest declared by the authors.

Author Contributions: Acquisition and interpretation of data is done by Sudipta Chakraborty. Conception, design and revising of the article are done by Dr. Pritha Pal.

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