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Diet And Lifestyle In Renal Carcinoma- A Possible Relation

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Abstract

The most lethal malignancy of the urinary system, renal cell carcinoma (RCC), makes up around 3% of all adult malignancies. Developed nations have a greater amount of RCC. Multiple investigations have demonstrated that food and RCC carcinogenesis are closely connected. The research on the connections between several dietary components, such red meat, vegetables, and vitamin B6, and the risk of RCC has been compiled. Furthermore, results from previously published meta-analyses linking a particular dietary component with the prevalence of RCC have been inconclusive. Three main dietary patterns have been identified in the cohort: Healthy (vegetables, tomato, fish, fruits, poultry, whole grains), Western (sweets, processed meat, refined grains, margarine/butter, high-fat dairy products, fried potatoes, soft drinks, meat), and Drinker (wine, hard liquor, beer, snacks). The use of cigarettes, body mass index, nutrition, diet and a history of hypertension and chronic renal disease are all recognized risk factors. Targeting modifiable risk factors, such as smoking cessation and body weight management, as well as treatments throughout the diagnostic process to promote early detection, are opportunities to prevent kidney cancer. RCC prevalence rises with age and is greater in males than in women. Obesity and hypertension are two recognized risk factors for RCC; a causal link between RCC and cigarette use is well established. The review deals with the probable effects of dietary and lifestyle factors on the incidence of renal carcinoma.

Keywords: Lethal, malignancy, dietary components, putative risk factors, renal cell carcinoma.

Introduction:

Diet, cigarette smoking, and employment are three main ways that people are exposed to renal cancer. (Moore et al. 2005). A number of additional risk variables have been examined, such as diet, meat, diabetes, liver illness, renal disease, alcohol, etc., but their findings are inconsistent or have not been investigated prospectively. (Macleod et al. 2013). Large regional and temporal variability in incidence rates are the primary epidemiologic features of kidney cancer. The only known risk factors include smoking, having a large physique, having had hypertension in the past, and having chronic renal disease. (Scelo et al. 2018).

Approximately 70 percent of adult instances of renal cancer are clear cell renal cell carcinomas. There is a dearth of information on histologic subtypes of kidney cancer, and most epidemiologic knowledge focuses on kidney cancer as a whole. (Scelo et al. 2018). But there are fewer cases of RCC in Asia, notably in India, which is presumably because there are less reports of these cases. In the US, there are around 1.8 times as many males with RCC as females. Comparatively, the male to female ratio in India is 4:1. (Jalan et al. 2023). Obesity, smoking, and hypertension are cited risk factors, but few others have been verified in planned research. We evaluated additional arguable risk variables for incident kidney cancer using a prospective group in addition to confirming known risk factors for the disease. (Macleod et al. 2013). Men are more likely than women to get RCC, and incidence rises with age. Obesity and hypertension are two known risk factors for RCC, and there is clear evidence between smoking with the disease's development. Uncertainty exists on the impact that alcohol use plays in RCC. (Bellocco et al. 2012).

Materials And Methods:

The right information for this review article was found by searching in Pubmed, Pubmed Central, CDC, and Google for published research works on food habit and lifestyle factors for causing renal cancer. These research works took the form of original studies and review articles from all over the world. Only data that have been published were considered, and vague descriptions of exposure were excluded. Information acquired from reputable sources of publications on the subject is one of the inclusion criteria. Other languages were not included in the study.

Results And Discussion:

In the future, data from the Pooling Project of Prospective Studies of Diet and Cancer will surely aid scientists and doctors in coming to more firm conclusions about the matter of whether drinking alcohol protects against RCC. (Aviner 2007). This theory may also explain the contributions of other risk factors like as smoking, diabetes, diabetes risk factors, hormone status, and other risk factors, as well as protective factors such dietary antioxidants for Renal Cell Carcinoma. Despite being an intriguing theory, this potential causative mechanism has not yet been put to the test in vivo. (Moore et al. 2005). Although the link between diet and renal cell carcinoma is still up for debate, heavy drinkers frequently have a poor diet, and certain characteristics of a poor diet have been linked to an elevated risk of RCC. Any negative impact that a poor diet would have had on the incidence of renal cell carcinoma would have resulted in a lessening of the inverse correlation seen, at least for heavy drinkers. This might, at least in part, explain why there isn't a dose-risk relationship for alcohol use. (Bellocco et al. 2012).

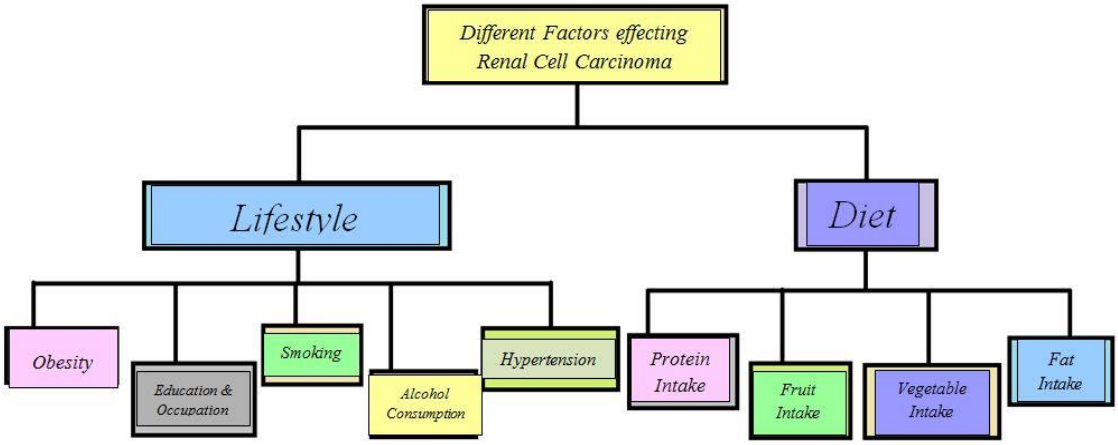

Fig 1: *Showing different factors effecting renal cell carcinoma*

Lifestyle: Changes in lifestyle have been demonstrated to increase cancer-specific survival as well as lower the incidence of a number of malignancies. As a result, lifestyle interventions may have an impact on results and can be a low-cost preventive and adjunctive programme that is customised for each patient. We present a comprehensive review of the literature on the following particular modifiable lifestyle risk factors: physical

activity, smoking, alcohol use, diet, obesity, and hypertension in order to better comprehend the body of research addressing modifiable connections with RCC. (Al-Bayati et al. 2019).

- **Obesity:** More than a billion people worldwide suffer from being overweight, and more than 300 million of them are deemed obese. Numerous malignancies, including those of the breast, endometrial, oesophagus (adenocarcinoma), kidney, colon, and rectum, have obesity as a known cause. (Al-Bayati et al. 2019). Obesity and RCC among both men and women are significantly correlated, according to a 20-year prospective research on a Korean population. (Al-Bayati et al. 2019). The evaluation of abdominal adiposity is more accurate than BMI, according to a study on postmenopausal women, and when BMI and WC were corrected for each other, WC revealed a greater correlation than BMI. The majority of the 15 case-control studies found connections between rising BMI and obesity and the development of RCC. (Al-Bayati et al. 2019).

Factor	Study(Author/Year)	Country(place of study)	Total No. of Cases	No of Cases (Positive results)	No of Cohorts (Negative results)
Obesity	Xu et al., 2023	China	25,340	17,442	7543
	Rhee et al., 2021	USA	42514	26396	16 118
	Jalan et al., 2023	Kolkata, India	25	7	18
	Macleod et al., 2013	Washington	5852	28	5,824
	Hsu et al., 2007	Europe	613	288	325

Table 1: *Tabular Representation of factor Obesity causing Renal Cancer: the positive and negative cases*

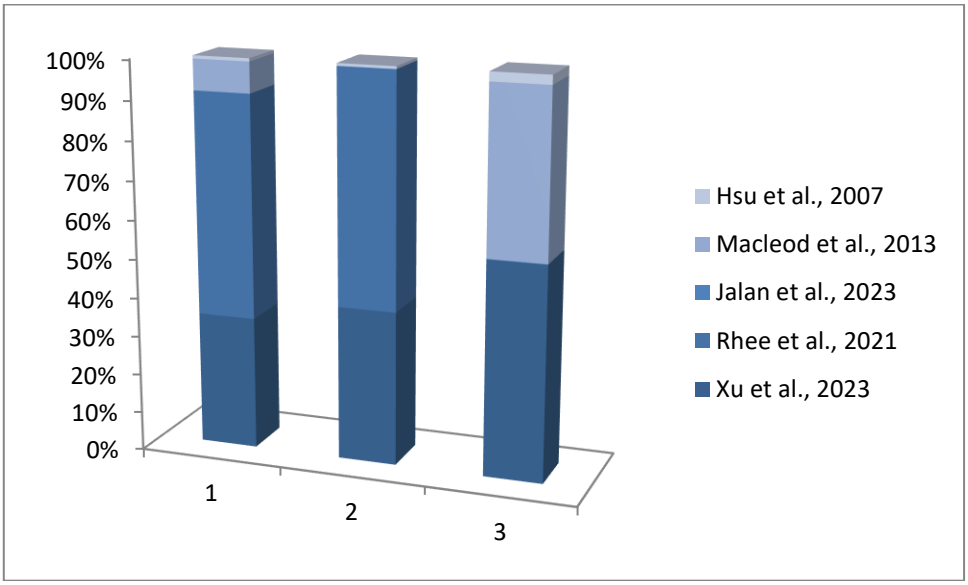

Fig 2: *Graphical Representation of Obesity causing Renal Cancer*

- **Hypertension:** In the United States, hypertension is more common, especially among women and people of colour, which may partially account for the current demographic trends of rising RCC incidence in these populations. (Al-Bayati et al. 2019). Through the questionnaire, the status of hypertension was determined by the history of antihypertensive drug usage. (Hsu et al. 2007). In several large, prospective cohorts, hypertension was a substantial RCC risk factor in a dose-dependent way. (Macleod et al. 2013). In the majority of studies, hypertension has been linked to RCC, with increased risks ranging from 20% to three times higher. It's still not apparent whether is the primary risk factor—hypertension or hypertension medication. After adjusting for antihypertensive drugs, some research reported that risks remained high, while others discovered that risks had decreased to negligible levels. Other studies did not account for medications because their usage is strongly connected with the condition. (Moore et al. 2005).

Factor	Study (Author/Year)	Country (place of study)	Total No. of Cases	No of Cases (Positive results)	No of Cohorts (Negative results)
Hypertension	Xu et al., 2023	China	25,340	16,734	8471
	Hsu et al., 2007	Europe	1000	451	548

Table 2: *Tabular Representation of factor Hypertension causing Renal Cancer: the positive and negative cases*

- **Education and Occupation:** Primary education was divided into secondary education and apprenticeships, as well as higher education (high school, university, or higher) (Hsu et al. 2007). It enables people to get medical help when they need it, which may result in an earlier diagnosis and better treatment outcomes. Furthermore, patients who are well-informed are more likely to undertake lifestyle decisions that lower their chance of acquiring kidney cancer. RCC is not a common occupational condition, however some exposures may raise the chance of developing RCC. The International Agency for Research on Cancer (IARC) has identified the solvent trichloroethylene (TCE) as a potential human carcinogen despite its widespread usage as a chemical additive and metal cleaner. Although epidemiologic research on TCE exposure as a risk factor for RCC has shown mixed results, overall findings point to a tenuous connection. (Wu and Shu 2017). Despite the fact that population-based RCC case-control studies have been conducted, occupational risk estimates are typically adjusted for the effects of confounders like smoking and frequently BMI. Occupational cohort studies make up the majority of epidemiological research on employment-related kidney cancer risk. Several occupationally derived exposures, including asbestos, petrol fumes, chlorinated solvents, diesel exhaust, polycyclic aromatic hydrocarbons (PAHs), printing and dyes, cadmium, and lead, have been linked to RCC, despite the fact that RCC has not traditionally been considered an occupational cancer. (Moore et al. 2005).

Factor	Study (Author/Year)	Country (place of study)	Total No. of Cases		No of Cases (Positive results)	No of Cohorts (Negative results)
Education	Hsu et al., 2007	Europe	Primary	242	116	126
			Secondary	1635	614	1,021
			Higher education	697	335	362
	Shivappa et al., 2018	USA	Primary	35	15	20
			Secondary	84	38	46
			Higher education	79	46	33
	Talamini et al., 1990	Italy	Primary	551	146	405
			Secondary	178	48	130
			Higher education	174	46	128
Occupation	Talamini et al., 1990	Italy	896		239	657
	Pesch et al., 2000	Germany	97		64	33

Table 3: *Tabular Representation of factor Education and Occupation causing Renal Cancer: the positive and negative cases*

- **Alcohol Consumption:** There have been several meta-analyses and sizable prospective cohort studies investigating the link between drinking alcohol and the risk of developing kidney cancer. In comparison to nondrinkers or light drinkers, drinkers were shown to have lower risk, according to all studies. Compared to nondrinkers and light drinkers, drinkers usually experience a 20% reduction in risk. (Scelo et al. 2018). Kidney cancer risk has been linked to insulin resistance and hyperinsulinemia in general. (Scelo et al. 2018).

- **Smoking:** Renal cell carcinoma (RCC) has a well-established risk factor: smoking.More over 20% of Americans still smoke frequently today, despite the number of smokers steadily declining over the past 50 years. Smoking gene-induced genetic mutation may contribute to an elevated chance of developing RCC (Hsu et al. 2007). The lack of an impact among smokers may be due to smoking's residual confounding, which is positively correlated with both coffee consumption and coffee consumption rates. (Rhee et al. 2021). According to estimates, smoking contributes to 6% of kidney cancer fatalities in wealthy nations. (Scelo et al. 2018).

Factor	Study (Author/Year)	Country (place of study)	Total No. of Cases	No of Cases (Positive results)	No of Cohorts (Negative results)
Smoking	Shivappa et al., 2018	USA	263	78	185
	Xu et al., 2023	China	21238	11,166	10,072
	Jalan et al., 2023	India	25	17	8
	Macleod et al., 2013	Washington	9164	45	9119
	Hsu et al., 2007	Europe	841	319	522
Alcohol Consumption	Jalan et al., 2023	India	25	3	22
	Macleod et al., 2013	Washington	8570	23	8547
	Hsu et al., 2007	Europe	688	310	378

Table 4: *Tabular Representation of factor Smoking and Alcohol Consumption causing Renal Cancer: the positive and negative cases*

Diet: There is a dearth of conclusive epidemiologic data in the literature on food and the risk of kidney cancer. Results on fruit and vegetable consumption from prospective cohorts showed a majority of null or nonsignificant relationships or a moderate reduction in risk in the categories with the greatest fruit and vegetable intake. Data on connections between certain nutrients are few. Furthermore, studies that examined the relationship between protein and fat intake and the risk of kidney cancer generally found no correlation. (Scelo et al. 2018).

- **Protein Intake:** Diet has been studied, and excessive dangers have been seen with the eating of several meats. Fried meats were linked to a higher incidence of RCC. Frequent use of fried or sautéed meat or poultry is associated with an elevated risk, but there is also a strong preventive impact on RCC risk (Moore et al. 2005). High consumption of red meat was associated with higher risks, but not with white meat. (Hsu et al. 2007). When particular forms of meat were evaluated, it was found that non-processed red meats (beef, pork, and lamb) showed strong tendencies of heightened hazards with increasing consumption, with the risk being increased fourfold for those in the highest category of consumption (Hsu et al. 2007).

Factor	Study (Author/Year)	Country (place of study)	Specification	Total No. of Cases	No of Cases (Positive results)	No of Cohorts (Negative results)
Protein	Hsu et al., 2007	Europe	All meats	796	331	465
			All red meats	683	307	376
			All white meats	899	375	524
			Nonprocessed red meat (beef, pork, lamb)	263	90	173
			Ham, salami, sausages	281	109	172
			Poultry	677	327	350
			Fish	956	422	534
	Talamini et al., 1990	Italy	Meat	356	102	254
			Fish	209	52	157
			Liver	182	43	139
			Salami	300	90	210
			Egg	296	86	210

Table 5: *Tabular Representation of factor Protein Intake causing Renal Cancer: the positive and negative cases*

- **Vegetable Intake:** With rising levels of intake, the incidence of kidney cancer was found to be inversely correlated with overall vegetable consumption. For intake of all vegetables, cruciferous vegetables (cabbage, broccoli, and Brussels sprouts), and yellow-orange vegetables (tomatoes, pumpkin, and carrots), the inverse dose-response patterns were significant. The unfavourable correlation for cruciferous vegetables was only seen for intake of cabbage, not broccoli or brussels sprouts. Although eating cabbage regularly was uncommon, it was linked to a 0.18 lower chances ratio for kidney cancer. It should be noted that eating pickled or preserved vegetables increased risk at both moderate and high intakes (Hsu et al. 2007)

Factor	Study (Author/Year)	Country (place of study)	Specification	Total No. of Cases	No of Cases (Positive results)	No of Cohorts (Negative results)
Vegetables	Macleod et al., 2013	Washington	-	23383	85	23298
	Talamini et al., 1990	Italy	Carrots	249	53	196
			Green Vegetables	380	104	276
	Hsu et al., 2007	Europe	All Vegetables	995	426	569
			Cruciferous vegetables	850	347	503
			Yellow-orange vegetables	1259	563	696
			Preserved (pickled) vegetables	796	406	390
			Cabbage	974	438	536
			Broccoli, brussels sprouts	261	109	152
			Spinach	763	322	441

Table 6: *Tabular Representation of factor Vegetables Intake causing Renal Cancer: the positive and negative cases*

- **Fruit Intake:** Increased fruit consumption, especially of citrus fruits, was found to have a substantial protective effect on RCC risk (Moore et al. 2005). About 85% of the lycopene consumed by humans comes from tomato fruit or tomato-based foods such juice, ketchup, soup, pizza, and pasta sauces. Watermelon, pink grapefruit, guava, and papaya are further sources (Al-Bayati et al. 2019). Fruit consumption was linked to a decreased risk of RCC, according to a pooled analysis of 13 cohort studies, although vitamins, minerals, or other elements present in fruits have not consistently had positive effects (Wu and Shu 2017).

Factor	Study (Author/Year)	Country (place of study)	Total No. of Cases	No of Cases (Positive results)	No of Cohorts (Negative results)
Fruits	Macleod et al., 2013	Washington	23383	77	23,306
	Talamini et al., 1990	Italy	337	92	245

Table 7: *Tabular Representation of factor Fruit Intake causing Renal Cancer: the positive and negative cases*

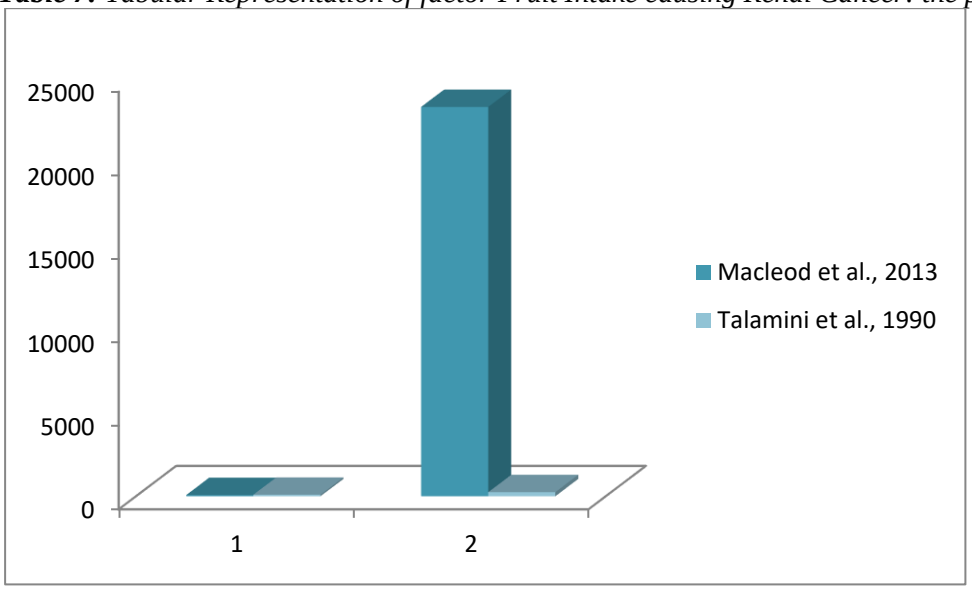

Fig 3: *Graphical Representation of Fruit Intake causing Renal Cancer*

- **Fat Intake:** The majority of research that examined the relationship between fat intake and the risk of kidney cancer found no correlation (Scelo et al. 2018). High-fat dairy products like oils, milk, butter, and margarine. Although one Swedish cohort study revealed a decreased risk of RCC among women who consumed high levels of fatty fish, research on particular types of fish intake is insufficient to draw any firm conclusion (Wu and Shu 2017). There was no connection between kidney cancer and any dairy items when we looked at them all together. Milk drinkers, however, had a markedly increased risk as compared to those who did not consume milk. The risk was also considerably higher for yoghurt consumers compared to non-consumers. The hazards across tertiles of consumption for milk or yoghurt, however, did not follow a consistent dose-response pattern. Risks for those who drink low, medium, or a lot of milk are different from those for those who don't (Hsu et al. 2007).

Factor	Study (Author/Year)	Country (place of study)	Specification	Total No. of Cases	No of Cases (Positive results)	No of Cohorts (Negative results)
Fat	Hsu et al., 2007	Europe	Consumption of all dairy products	874	371	503
			Milk	359	149	210
			Yogurt	451	201	250
			Cheese	893	394	499
	Talamini et al., 1990	Italy	Milk	303	87	216
			Cheese	248	65	183
			Butter	106	30	76
			Margarine	141	49	92
			Oils	140	38	102

Table 8: *Tabular Representation of factor Fat Intake causing Renal Cancer: the positive and negative cases*

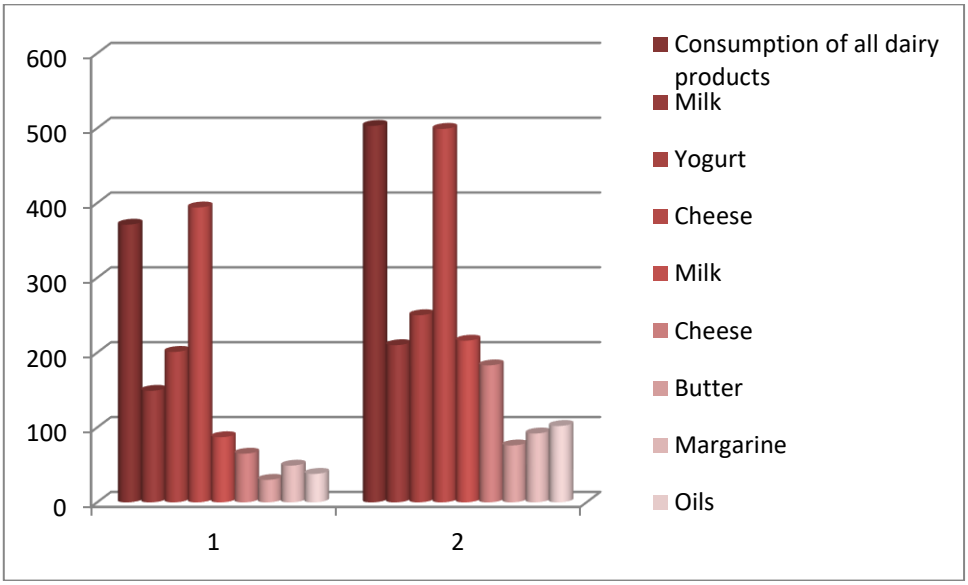

Fig 4: *Graphical Representation of Fat Intake causing Renal Cancer*

Conclusion:

Throughout the review, we have highlighted the significant association between certain lifestyle habits, such as smoking, sedentary behavior, and obesity, and an increased risk of renal cancer. Moreover, the consumption of certain dietary components, such as processed meats, high sodium, and sugar intake, has been found to be correlated with higher renal cancer incidence. Conversely, a diet rich in fruits, vegetables, and whole grains has shown promising protective effects against this malignancy.

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Conflict Of Interest:

There is no conflict of interest related to the study**.**

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