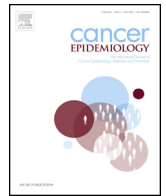




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Original research article

## Diet and the risk of head-and-neck cancer among never-smokers and smokers in a Chinese population



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### ABSTRACT

**Background:** Few studies have been conducted in China to investigate the association between diet and the risk of head-and-neck cancer (HNC). The aim of this study was to determine the relationship between diet and HNC risk in the Chinese population and to examine whether smoking status has any effect on the risk.

**Methods:** Our multicenter case-control study included 921 HNC cases and 806 controls. We obtained information on the frequency of both animal- and plant-based food consumption. Unconditional logistic regression was used to estimate the odds ratios (ORs) and 95% confidence intervals (95% CIs).

**Results:** The risk of HNC increased with more frequent consumption of processed meat and fermented foods but decreased with frequent consumption of fruits and vegetables. There was a significant increasing *P* for trend of 0.006 among smokers who consumed meat and an increased OR among smokers who consumed processed meat (OR 2.95, 95%CI 1.12–7.75). Protective odds ratios for vegetable consumption were observed among smokers only. We also observed protective odds ratios for higher egg consumption among never-smokers (*P* for trend = 0.0003).

**Conclusions:** Reduced HNC risks were observed for high fruit and vegetable intake, a finding consistent with the results of previous studies. Processed meat intake was associated with an increased risk. The role of dietary factors in HNC in the East Asian population is similar to that in European populations.

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## 1. Introduction

Over half a million cases of head-and-neck cancer (HNC) were diagnosed worldwide in 2012, resulting in a high burden of disease from both morbidity and mortality [1]. Tobacco and alcohol

consumption are known to be the strongest risk factors for developing HNC, contributing to as much as 70% of all HNC cases [2]. Other known factors include passive smoking and human papillomavirus for oropharyngeal cancer [1]. Although a large number of cases are diagnosed each year in China, the incidence rate is low. The world age-standardized rate is 8.0 per 100,000, while the age-standardized rate in China is 2.7 per 100,000, this despite the fact that one in every three cigarettes in the world is smoked in China [3].

Few studies have been conducted in China to investigate the association between diet and HNC risk. A study in Beijing which included 404 paired cases and controls reported an inverse association between fruit and vegetable consumption and risk for HNC, particularly in men (OR = 0.42 and *P* for trend < 0.05 with high consumption of “other dark green vegetables” for men, and OR = 0.66 and *P* for trend < 0.05 with high consumption of fruits for men). They also reported a decrease in risk with a high intake of

protein and fat. A population-based study in Shanghai involving 204 cases and 416 controls produced similar results and showed that, in particular, there was a decrease in risk with consumption of vitamin C, particularly oranges and tangerines (OR = 0.40 and *P* for trend < 0.05 for high consumption of oranges and tangerines) [2].

A pooled analysis including 14,200 cases and 22,737 controls showed protective odds ratios for higher intake of fruits (comparing the highest intake versus the lowest: OR = 0.52, 95%CI = 0.43–0.62) and vegetables (OR = 0.66, 95%CI = 0.49–0.90) [4]. The opposite was true with higher intake of red and processed meats (OR = 1.40, 95%CI = 1.13–1.74) and processed meats (OR = 1.37, 95%CI = 1.14–1.65). In fact the World Cancer Research Fund reported that there was enough evidence to suggest a causal relationship between consumption of fruits and non-starchy vegetables and decreased risk of HNC [1].

A more recent study was conducted in Japan on the effects of dietary antioxidants and the risk of HNC according to smoking and

**Table 1**  
Characteristics of head-and-neck cancer cases and controls.

		Cases (n = 921)		Controls (n = 806)		P-value for chi-square
		n	%	Nn	%	
Age	18–44	146	15.9	257	31.9	<0.0001
	45–54	273	29.7	215	26.7	
	55–64	297	32.2	222	27.5	
	65–85	205	22.2	112	13.9	
Education	Illiterate	59	6.4	24	3.0	<0.0001
	Primary school	228	24.8	129	16.0	
	Junior/middle school	261	28.3	150	18.6	
	Senior/high school	244	26.5	170	21.1	
	College/university and above	129	14.0	333	26.8	
Sex	Male	726	78.8	556	69.0	<0.0001
	Female	195	21.2	250	31.0	
Center	Beijing	54	5.9	52	6.5	<0.0001
	Jiangsu	63	6.8	77	9.6	
	Shanghai	55	6.0	56	7.0	
	Henan	26	2.8	44	5.5	
	Fujian	60	6.5	50	6.2	
	Liaoning	57	6.2	75	9.3	
	Sichuan	124	13.5	51	6.3	
	Taiwan	482	52.3	401	49.8	
Ethnicity	Han	556	60.4	407	50.5	<0.0001
	Other	365	39.6	399	44.2	
Subsite	Oral cavity	424	46.0			<0.0001
	Oropharynx	106	11.5			
	Hypopharynx	81	8.8			
	Larynx	85	9.2			
	Unspecified or overlapping	224	24.4			
Smoking status	Yes	600	65.3	343.0	42.6	
	No	319	34.7	462.0	57.4	
Drinking status	Yes	486	52.9	224	27.3	
	No	433	47.1	582	72.2	
Betel quid use	Yes	624	67.8	42	5.2	
	No	293	31.9	761	94.8	
BMI	Healthy weight	443	49.9	392	52.5	
	Underweight	27	3.0	30	4.0	
	Overweight	242	27.3	200	26.8	
	Obese	176	19.8	125	16.7	

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