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## Nutritional status among male smokers and non-smokers: A comparative study

**Shreya Vilas Dhavle and Dr. Rekha Battalwar**

### Abstract

**Background:** India has become one of the countries most affected by tobacco-related mortality. According to the International Agency for Research on Cancer (IARC) monograph, there is sufficient evidence in humans that tobacco smoking causes cancer of the lung, oral cavity, naso-, oro- and hypo-pharynx, nasal cavity and paranasal sinuses, larynx, esophagus, stomach, pancreas, liver, kidney (body and pelvis), ureter, urinary bladder, uterine cervix and bone marrow (myeloid leukemia).

**Purpose:** Purpose of the study was to compare and study the nutritional status among male smokers and non-smokers.

**Methods:** A cross sectional sample of 50 smokers and 50 non-smokers aged between 20 to 50 years were selected for the study. Purposive sampling technique was used. The data was collected regarding anthropometry parameters like height, weight and body Mass Index, 24 hour 3-day diet recall. Information on smoking status was collected from smoker participants. Statistical package of social sciences (SPSS, version 23) was used to analyze the data.

**Results and Discussion:** Most of the participants were aged between 22 to 38 years. 65% followed a sedentary lifestyle, 55% had moderate stress level, 48% of the participants worked for 8 to 10 hours, 30% of the participants smoked for their comfort, 42% participants started smoking between the age of 16 and 19 years, the number of cigarettes smoked per day ranged from 0 to 15 cigarettes. Non-smokers consumed energy ( $p \leq 0.01$ ), carbohydrates ( $p \leq 0.01$ ), Vitamin C ( $p \leq 0.01$ ), Vitamin E ( $p \leq 0.01$ ) and fibre ( $p \leq 0.01$ ) highly significantly lesser and proteins ( $p \leq 0.05$ ), fats ( $p \leq 0.05$ ) was lesser, however folate was the only nutrient which they consumed more as compared with RDA. In smokers, energy, carbohydrate, fats, vitamin C, vitamin E was highly significantly lesser, however proteins, folate and fibre was lesser when compared with RDA.

**Conclusion:** Macronutrient consumption was observed more in non-smokers than that of smokers. Antioxidants like Vitamin C & Vitamin E and Fibre were observed more in smokers than that of non-smokers. Folate consumption was high in non-smokers than smokers. But overall the dietary intake among both smokers and non-smokers was less than Recommended Dietary Allowance (RDA) for Indians. So, it can be concluded that balanced diet along with good micronutrient intake helps in maintaining good health.

**Keywords:** Smoking, tobacco, smokers, non-smokers, vitamin C, vitamin E

### Introduction

India now has become one of the countries which is most affected by tobacco-related mortality. It is predicted that nearly 1 million Indians will die annually due to smoking by 2010, with 70% of deaths prematurely occurring among people between the ages of 30 and 69 years [1]. A recent national survey discovered that in India more than 25% of adolescents aged 13 to 15 years had used tobacco, and 17% reported current use [2]. Smoking is a practice in which a substance is burned and the resulting smoke breathed in to be tasted and absorbed into the bloodstream. [3]. According to the International Agency for Research on Cancer (IARC) monograph, there is sufficient indication in humans that tobacco smoking causes cancer of the lung, oral cavity, naso-, oro- and hypo-pharynx, nasal cavity and paranasal sinuses, larynx, esophagus, stomach, pancreas, liver, kidney (Body and pelvis), ureter, urinary bladder, uterine cervix and bone marrow (Myeloid leukemia) [4]. According to WHO, India now is home to 12% of the world's smokers. More than 1 million people die every year due to tobacco related illnesses. About 90% of children under the age of 16 years (10th class) have used some or other form of tobacco in the past, and 70% are still using tobacco products. Smokeless tobacco

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is more predominant than cigarettes or bidis in India [5]. According to GATS (Fact Sheet: India, 2009-10), current tobacco uses in any form: 34.6% in adults out of which 47.9% of male and 20.3% of female [6]. The World Health Organization predicts that tobacco deaths in India may exceed 1.5 million annually by 2020 prevalence rate of tobacco consumption of any form of tobacco consumption at 51.3% for men and 10.3% for women 15 years and older which was lower than that estimated by WHO and other small studies based on special population groups in small geographical areas [7]. Cigarette smoking has been proven to play a role in emergence of various components of metabolic syndrome and hence could lead to occurrence and progression of the disease through multiple mechanisms [8]. Smoking impairs immune function, resulting in an increased risk of pulmonary infections and rheumatoid arthritis. It also affects the gastrointestinal tract, increasing the risk of peptic ulcer disease [9]. Blood folate concentration is decreased by tobacco smoking and presumably secondhand smoke [10]. Adolescents are the most vulnerable population to initiate tobacco use. It is important to understand various factors that influence and encourage young teenagers to start smoking or to use other tobacco products. The age at first use of tobacco has been reduced considerably. However, law enforcing agencies have also taken some punitive measures in recent years to curtail the use of tobacco products [11].

### Purpose

Purpose of the study was to compare and study the nutritional status among male smokers and non-smokers.

### Methods

Participants for this study were selected from Mumbai city. The data was collected regarding general information like their age, marital status, religion, occupation etc. along with their medical history, past medical history, family history etc. Anthropometry parameters like height, weight and B.M.I was also collected. Information was also taken for their day to day dietary pattern, 24 hour 3-day diet recall, lifestyle pattern, their physical activity status, alcohol consumption. Information on smoking status was also collected from

smoker participants. Statistical package of social sciences (SPSS, version 23) was used to analyze the data. Univariate chi-square test was used to analyze the representation of cases across the values of single variable and bivariate chi-square test to analyze the representation of cases across the two proportions, one sample t/Z test was used for comparing with reference standards. Pearson's correlation coefficient was used to examine the relationships between two quantitative variables. Findings were considered to be significant when  $p \leq 0.05$  and were considered highly significant when  $p \leq 0.01$ . The research proposal entitled "To study the nutritional status among male smokers and non-smokers" under the guidance of Dr. Rekha Battalwar was presented before the Ethical Committee on 11th August 2018. The study has been approved and passed by the ethical committee members of SEVA Mandal Education Society of Matunga. The samples were selected for the study based on their willingness to participate. Participants were informed about the study design and purpose of the study. The consent of participant was also taken.

## Results and Discussion

### Smoking pattern among smokers

Thirty percent of the participants smoked for their comfort, 42% participants started smoking between the age of 16 and 19 years, the number of cigarettes smoked per day by study participants ranged from 0 to 15 cigarettes. 60% were not habitual to any tobacco or nicotine products, out of 40% who consumed tobacco or nicotine products, majority of them (59%) consumed Hookah. Twenty two percent of the smoker participants experienced dry cough due to smoking, 30% observed mood swings after initiating smoking, 60% of smoker participants did not have a habit of smoking during midnight, 43% did not smoke during illness, 28% participants smoked for time pass, family members of 62% participants did not smoke, 90% of participants were aware of harmful effects of smoking, 54% of them think that smoking did not affect their eating habit, 46% participants gets craving for smoking if not smoked even for a day. 60% did not consume any food item while smoking, 72% of the participants were not advised by doctors to give up smoking, 88% agreed to get rid of smoking in future.

**Table 1:** Nutrient intake among non-smokers and smokers

Nutrient	Smoking Status	Mean $\pm$ Standard Deviation (SD)	Mean Difference	Reference Value	Test Score (Z Value)	Significance level (p value)	% Adequacy
Energy (kcal)	Non-smokers	1556.34 $\pm$ 604.09	-763.66	2320	-8.93	0.00**	67.08
	Smokers	1420.95 $\pm$ 537.84	-899.04	2320	-11.70	0.00**	61.24
Protein (g)	Non-smokers	48.17 $\pm$ 68.19	-11.82	60	-1.22	0.22	80.28
	Smokers	42.50 $\pm$ 54.10	-17.49	60	-2.28	0.02*	70.84
CHO(g)	Non-smokers	192.05 $\pm$ 78.73	-184.94	377	-16.61	0.00**	50.94
	Smokers	163.04 $\pm$ 66.61	-213.95	377	-22.71	0.00**	43.24
Fats (g)	Non-smokers	59.42 $\pm$ 35.56	-4.57	64	-0.90	0.36	92.85
	Smokers	50.55 $\pm$ 20.63	-13.44	64	-4.60	0.00**	78.98
Vitamin C (mg)	Non-smokers	22.04 $\pm$ 15.17	-17.95	40	-8.37	0.00**	55.10
	Smokers	25.50 $\pm$ 21.82	-14.49	40	-4.69	0.00**	63.77
Vitamin E (mg)	Non-smokers	2.19 $\pm$ 1.92	-6.80	9	-24.97	0.00**	24.42
	Smokers	2.37 $\pm$ 1.91	-6.62	9	-24.48	0.00**	26.42
Folate (mg)	Non-smokers	282.29 $\pm$ 775.14	82.29	200	0.75	0.45	141.14
	Smokers	150.95 $\pm$ 220.79	-49.04	200	-1.57	0.12	75.47
Fibre (mg)	Non-smokers	29.52 $\pm$ 15.67	-10.47	40	-4.72	0.00**	73.81
	Smokers	29.76 $\pm$ 41.42	-10.23	40	-1.74	0.08	74.42

\*\* Highly Significant where  $p$  value  $\leq 0.01$ , \* Significant where  $p$  value  $\leq 0.05$

According to Table no. 1, the energy consumption among non-smokers was highly significantly lesser by 763.66 kcal (one sample Z = - 8.93, p ≤ 0.01) and for smokers was highly significantly lesser by 899.04 kcal (one sample Z = -11.70, p ≤ 0.01). Protein consumption among non-smokers was non significantly lesser by 11.82 g (one sample Z = -1.22, p ≥ 0.05) and for smokers was non significantly lesser by 17.49 g (one sample Z = 2.28, p ≥ 0.05). Carbohydrate consumption among non-smokers was highly significantly lesser by 184.94g (one sample Z = -16.61, p ≤ 0.01) and for smokers was highly significantly lesser by 213.95g (one sample Z = - 22.71, p ≤ 0.01).

A study reported that there were statistically significant differences in total energy and macronutrient intakes. Current smokers had higher total caloric intake and consumed more carbohydrates and proteins than their non-smoking counterparts. However, most of the micronutrient intakes were not statistically different when stratified by smoking status [12].

Fats consumption for non-smokers was non significantly lesser by 4.57 g (one sample Z = -4.57, p ≥ 0.05) and for smokers was highly significantly lesser by 13.44 g (one sample Z = -13.44, p ≤ 0.01).

A study reported that smokers had higher consumption of animal (p=0.0034), and total fat (p=0.0315), cholesterol (p=0.005), and lower intake of vitamin E (p=0.004) than non-smokers. No other differences were found. The differences between past smokers and other groups were insignificant [13]. Vitamin C consumption for non-smokers was highly significantly lesser by 17.95 mg (One sample Z = -17.95, p ≤ 0.01) and for smokers was also highly significantly lesser by 14.49 mg (one sample Z = -14.49, p ≤ 0.01). A study reported that smoking group showed significantly lower consumption of dietary fiber, calcium, carotene and vitamin C (P < 0.001, P = 0.002, P = 0.001, and P < 0.001, on the other hand, total energy intake was significantly higher (P = 0.002). [14]. Vitamin E consumption for non-smokers was highly

significantly lesser by 6.80 by (one sample Z = -24.97, p ≤ 0.01) and for smokers was highly significantly lesser by 6.62 mg (one sample Z = -24.48, p ≤ 0.01). Folate consumption for non-smokers was non significantly greater by 82.29 mg (one sample Z = 82.29, p ≥ 0.05) and for smokers was non significantly lesser by 49.04 mg (one sample Z = -49.04, p ≥ 0.05). Fibre consumption for non-smokers was highly significantly lesser by 10.47 mg (one sample Z = -10.47, p ≤ 0.01) and for smokers was non significantly lesser by 10.23 mg (one sample Z = -10.23, p ≥ 0.05).

When compared with RDA Energy and carbohydrate consumption among smokers and non-smokers was highly significantly lesser, however for smokers was even lesser. Proteins consumption among both the group was non significantly lesser. Fats consumption for non-smokers was non significantly lesser and among smokers was highly significantly lesser. Micronutrient comparison revealed highly significantly lesser intake of Vitamin C and Vitamin E for both the groups. Folate consumption was non significantly greater for non-smokers in contrast to smokers who had a lesser intake. Fibre intake was lesser for both the groups but for non-smokers it was highly significantly lesser.

Non-smoker participants met upto 67% of energy, 80% of proteins, 51% of carbohydrate, 93% of fats, 55% of Vitamin C, 24% of Vitamin E, 141% of folate and 74% of fibre of RDA.

Smoker participants met upto 61% of energy, 71% of proteins, 43% of carbohydrates, 79% of fats, 64% of Vitamin C, 26% of Vitamin E, 75% of folate and, 74% of fibre of RDA.

Non-smokers consumed energy, carbohydrates, Vitamin C, Vitamin E and fibre highly significantly lesser and proteins, fats was lesser, however folate was the only nutrient which they consumed more as compared with RDA. In smokers, energy, carbohydrate, fats, vitamin C, vitamin E was highly significantly lesser however proteins, folate and fibre was lesser when compared with RDA.

**Table 2:** Correlations between fibre, folate, Vitamin C, Vitamin E among non-smokers and smokers

Groups		Fibre	Folate	VitE	VitC	No. ofcigar	OH	
1.	Non-smoker Fibre	Pearson Correlation	1	.207	.076	.349*	. <sup>b</sup>	.085
		Sig. (2-tailed)		.150	.602	.013	.	.771
		N	50	50	50	50	0	14
	Folate	Pearson Correlation	.207	1	.399**	-.173	. <sup>b</sup>	-.151
		Sig. (2-tailed)	.150		.004	.231	.	.606
		N	50	50	50	50	0	14
	VitE	Pearson Correlation	.076	.399**	1	-.100	. <sup>b</sup>	-.054
		Sig. (2-tailed)	.602	.004		.489	.	.856
		N	50	50	50	50	0	14
	VitC	Pearson Correlation	.349*	-.173	-.100	1	. <sup>b</sup>	-.242
		Sig. (2-tailed)	.013	.231	.489		.	.404
		N	50	50	50	50	0	14
	No. ofcigar	Pearson Correlation	. <sup>b</sup>					
		Sig. (2-tailed)	.	.	.	.	.	.
		N	0	0	0	0	0	0
OH	Pearson Correlation	.085	-.151	-.054	-.242	. <sup>b</sup>	1	
	Sig. (2-tailed)	.771	.606	.856	.404	.		
	N	14	14	14	14	0	14	
2.	Smokers Fibre	Pearson Correlation	1	-.030	-.008	.076	.012	.063
		Sig. (2-tailed)		.834	.957	.599	.935	.742
		N	50	50	50	50	50	30
	Folate	Pearson Correlation	-.030	1	-.126	.381**	.118	.078
		Sig. (2-tailed)	.834		.384	.006	.414	.680
		N	50	50	50	50	50	30
	VitE	Pearson Correlation	-.008	-.126	1	-.193	.025	-.216
		Sig. (2-tailed)	.957	.384		.179	.863	.253

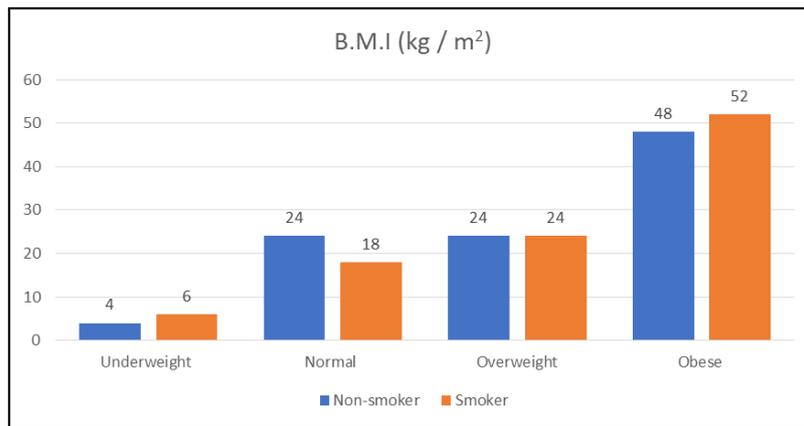
		N	50	50	50	50	50	30
VitC	Pearson Correlation		.076	.381**	-.193	1	.137	.240
	Sig. (2-tailed)		.599	.006	.179		.344	.202
	N		50	50	50	50	50	30
No. of cigar	Pearson Correlation		.012	.118	.025	.137	1	-.183
	Sig. (2-tailed)		.935	.414	.863	.344		.332
	N		50	50	50	50	50	30
OH	Pearson Correlation		.063	.078	-.216	.240	-.183	1
	Sig. (2-tailed)		.742	.680	.253	.202	.332	
	N		30	30	30	30	30	30

According to Table no. 2, among non-smokers participant there was a significant moderate positive relationship between fibre and vitamin C levels ( $r= 0.349$ ,  $p \leq 0.05$ ) however among smokers it was found to be non-significant. Among non-smoker participants there was highly significant moderate positive relationship between folate and vitamin E levels ( $r=0.399$ ,  $p \leq 0.01$ ) however among smokers was found to be non-significant. With respect to folate and Vitamin C relationship it was highly significant moderate positive relationship among smokers. ( $r=0.399$ ,  $p \leq 0.01$ ) and among non-smokers was non-significant. There was no relationship

found between micronutrients with Number of cigarette and Alcohol intake in smokers and non-smokers participants. There is a significant moderate positive relationship between fibre and Vitamin C observed in Non-smoker participants and highly significant moderate positive relationship between Folate and Vitamin E in non-smokers, with respect to folate and vitamin C it was highly significantly moderate positive relationship among smokers. Thus, as one micronutrient decreases other micronutrients also decreased in both non-smokers and smokers.

**Table 3:** B.M.I among non-smoker and smoker participant

Anthropometry parameters	Smoking Status	Mean $\pm$ Standard Deviation (SD)	Mean Difference	Reference Value	Test Score (Z Value)	Significance level (p value)
B.M.I	Non-smokers	25.39 $\pm$ 3.93	2.49	22.9	4.48	0.00**
	Smokers	25.00 $\pm$ 3.43	2.10	22.9	4.33	0.00**



(Reference: Ramachandran A *et al.*, 2001)

**Fig 1:** B.M.I categories among participants

According to Table no. 3, among 50 non-smoker participants, the minimum BMI observed was 16.50 kg/m<sup>2</sup> and the maximum was observed to be 33.30 kg/m<sup>2</sup> with the mean of 25.39 kg/m<sup>2</sup> and standard deviation of 3.93 kg/m<sup>2</sup>. Among 50 smoker participants, the minimum BMI observed was 16.60 kg/m<sup>2</sup> and maximum was 31 kg/m<sup>2</sup> with the mean of 25 kg/m<sup>2</sup> and standard deviation of 3.43 kg/m<sup>2</sup>. A study revealed that there was no significant ( $p>0.05$ ) difference between the mean age, weight, height and body mass index of smokers and non-smokers [15]. Forty eight percent of non-smokers and fifty two percent of smokers were into obese category, 24% of non-smokers and 18% of smokers fall into normal BMI category, 24% of non-smokers and 24% of smokers fall into overweight BMI category and rest 4% of non-smokers and 6% of smokers fall into underweight BMI category as shown in figure no.1. BMI among non-smokers and smokers was highly significantly greater by 2.49 kg/m<sup>2</sup> (One sample  $Z= 4.48$ ,  $p \leq 0.01$ ) and for smokers was also highly significantly greater by 2.10 kg/m<sup>2</sup> (One sample  $Z =$

4.33,  $p \leq 0.01$ ) Out of 50 non-smoker participants 48% of the participant were observed to be in obese category, and out of 50 smoker participants 52% were also observed to be in obese category. Thus, BMI among both the groups was highly significantly greater than the reference value.

**Conclusion**

Macronutrient consumption was observed more in non-smokers than that of smokers. Antioxidant like Vitamin C, Vitamin E and Fibre were observed more in smokers than that of non-smokers. Folate consumption was high in non-smokers than smokers. But overall the dietary intake among both smokers and non-smokers were less than Recommended Dietary Allowance (RDA) for Indians. So it can be concluded that balanced diet along with good micronutrient intake helps in maintaining good health.

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#### Declaration of interest statement

I do not have any conflict of interest to declare.

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