

Short Communication

VITAMIN C INTAKE IN SMOKERS

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ABSTRACT

Nicotine is the primary component of cigarette smoke which, in sufficient quantities, can affect certain physiological functions of the body. These include euphoria, relaxation, improvement of attention etc. These attributes are probably responsible for the smoking habit of smokers. However, nicotine also produces many undesirable direct and side effects, notably on the central and autonomic nervous systems, including psychic dependence. Cigarette smoke also contains many toxic substances collectively called “free radicals” which cause oxidative stress which leads to damage of cellular functions and serves as a risk factor for atherosclerosis and carcinogenesis. The free radicals are scavenged by “antioxidants”, and vitamin C is one of the readily available antioxidants. The present study has revealed that smokers consume relatively less amount of vitamin C from diet and food supplements, compared to non-smokers. Possible reasons for the finding are discussed.

1.0 Introduction

A smoker may be defined as a person who smokes, or inhales burnt tobacco – in particular, cigarettes – on a regular basis. The primary component of cigarette smoke is nicotine which, in sufficient quantities, can affect certain physiological functions of the body. Nicotine receptors exist at a number of sites in the central nervous system (CNS) which participate in the stimulant attributes of the drug. In low doses nicotine produces some degree of euphoria and arousal as well as relaxation; it improves attention, learning, problem solving and reaction time (Lippincott’s Illustrated Reviews – Pharmacology, 4th Edition). These attributes may be responsible for the smoking habit which is wide-spread in the world. It has become a major problem among the youth in Malaysia (Naing *et al*, 2004).

However, nicotine produces many undesirable direct and side effects. Depending on the concentration in the body, nicotine acts as a stimulant or depressant of the autonomic ganglia, both sympathetic and parasympathetic. The former action produces increased blood pressure and cardiac rate, peristalsis and secretions; it also produces vasoconstriction which can decrease coronary blood flow and adversely affect patients with angina. The latter action causes decreased activity of the gastrointestinal tract and urinary bladder. With high doses, adverse effects of nicotine include irritability, tremors, intestinal cramps, and diarrhoea. Nicotine is also addictive. It can produce physical dependence; and abrupt cessation after prolonged heavy smoking can produce withdrawal symptoms such as irritability, anxiety, restlessness, difficulty in concentrating, headache and insomnia; there maybe intestinal pain.

In addition to nicotine cigarette smoke also contains many toxic substances collectively called “free radicals” which cause oxidative stress. A single puff of cigarette smoke will expose the smoker to more than 10^{15} free radicals (Varvadas *et al*, 2008). Oxidative stress causes damage to cellular functions, and serves as the risk factor for atherosclerosis and carcinogenesis, among others.

Antioxidants scavenge the free radicals from cigarette smoke, and play a protective role against oxidative stress (Palaniappan *et al*, 2001). Antioxidants may decrease the risk of disease by modulating DNA damage; lipoprotein oxidation, platelet aggregation, leucocyte adhesion and vascular function in atheroma formation (Naing *et al*, 2004).

Vitamin C (ascorbic acid) is an antioxidant found mainly in fruits and vegetables. It is also available as food supplement either alone or in combination with other food supplements (vitamins and minerals), in the form of tablets, capsules, syrup, etc. In addition to antioxidant action, vitamin C is also claimed to produce many beneficial effects which include:

- Production of collagen, a protein needed to develop and maintain healthy teeth, bones, gums, cartilage, vertebral discs, joint linings, skin and blood vessels
- Promoting healing of cuts, abrasions and wounds
- Fighting infections
- Inhibiting conversion of irritants in smog, tobacco smoke and certain foods into cancer-causing substances
- Dilation of blood vessels
- Regulation of cholesterol levels
- Lowering risk of developing cataracts
- Protecting diabetics against deterioration of nerves, eyes and kidneys
- Aiding absorption of iron, and reducing levels of lead in blood (Micronutrient Information Centre).

It can be seen that vitamin C would be particularly beneficial to smokers who are at several risks health-wise, as explained above. And vitamin C is readily available: from fruits and vegetables that we consume daily, or as food supplements (tablets, capsules, syrup). It is to be noted that vitamin C can be destroyed in foods as a result of exposure to high temperature, oxidation or cooking in large amounts of water. Hence, it should be recognized that actual ingested levels may vary according to food handling and cooking practices (ShenHongbing *et al*, 2003).

To find out if smokers are taking sufficient vitamin C, a study was done by a group of first year medical students of SEGi University College, Kota Damansara, Selangor, as part of a Mini-research Programme.

2.0 The Study

Forty individuals of either sex who smoke 10 cigarettes or more per day were chosen as test subjects (smokers). The cut-off point of smoking 10 cigarettes per day to be considered as a smoker was chosen arbitrarily on the assumption that this amount of smoking would provide enough chemicals to manifestly produce their biochemical/physical effects in the

smoker; thereby providing a discernable contrast, if there were any, from non-smokers. Forty individuals who had never smoked were chosen as controls. Selection of subjects was done according to standard inclusion and exclusion criteria.

The survey instrument for collection of data was a questionnaire comprising four (4) parts:

1. Socio-demographic profile, e.g. age, body weight, etc.
2. Smoking status (for smokers) e.g. number of cigarettes smoked per day
3. Dietary habit, e.g. quantity of food consumed in a week, portion size of food, fruits and vegetables intake in a week
4. Consumption of food supplements that contain vitamin C

The amount of vitamin C in the consumed fruits and vegetables was calculated using the Food Chart attached below (Micronutrient Information Centre).

Food Chart (Micronutrient Information Centre)

Fruits	Amount Vita. C (mg/100g)
Apple	6
Pear	4
Banana	9
Grapes	10
Guava	150
Lemon	50
Lychee	8
Mango	30
Pineapple	25

Vegetables	Amount Vita. C (mg/100g)
Cauliflower	60
Garlic	5
Spinach	25
Chili Pepper	144
Cabbage	60
Potato	8
Cucumber	8
Beans	5
Carrot	6
Onion	10
Mushroom	3
Lettuce	15
Tomato	23
Peas	8
Pumpkin	5

Collection of data was done through one-to-one interview between subjects and researchers. Oral consent to participate in the research project was obtained prior to the interview; and the data was kept strictly confidential, i.e. subjects were unidentified. Statistical analysis of the data was done:

- (i) To compare the mean intake of vitamin C between test and control subjects
- (ii) If the means were significantly different, to explore the possible reasons

3.0 Results

The mean calculated amount of vitamin C intake per week was significantly different between smokers and non-smokers: smokers were found to take less vitamin C.

Smokers	237.78 ± 159.716 mg/week
Non-smokers	458.55 ± 296.267 mg/week (p < 0.001)

The recommended amount of vitamin C to be taken per week is 500 mg (Micronutrient Information Centre).

Results of analysis show that a greater number of smokers (37 out of 40) were taking less than 500 mg/week of vitamin C, compared to non-smokers (5 out of 40). Conversely, a greater number of non-smokers (35 out of 40) were taking 500 mg/week or more of vitamin C than smokers (3 out of 40) (Table 1). This may account for the finding that smokers were seen to be taking less vitamin C than non-smokers.

Smokers were also found to be taking a smaller number of meals per day, compared to non-smokers (Table 1).

4.0 Discussions

One possible reason for smokers consuming less vitamin C than non-smokers is because they consume less food, as evidenced by the number of meals taken per day, and the portion size of meals. This is supported by the finding that smokers tend to have lower average body (56.8 kg) versus 63.54 kg for non-smokers. An action of nicotine on CNS is suppression of appetite: presumably the reason to use smoking to control diet, by some. The implication may be that even if vitamin C-containing fruits and vegetables were included in meals, consuming less food would mean less consumption of the vitamin.

Another reason may be the choice of food preferred by smokers. The present study found that the majority of smokers preferred fried foods over fruits and vegetables, and they were more likely to consume carbonated beverages, coffee and tea. This agrees with findings of another study which showed that smokers preferred foods with fats, oils and sweet, but tend to ignore foods that are higher in beneficial micronutrient content. This phenomenon may be attributed to another action of nicotine on the CNS: where it is shown to reduce the activity of the enzyme monoamine oxidase (MAO) that is associated with mood function (Varvadas *et al*, 2008).

In the present context, another remote possibility is that the majority of subjects of the present study have limited, albeit small, living allowances, being students from the districts. At about RM 10 per packet of 20, cigarettes are relatively quite expensive. To sustain their smoking habit, smokers may have to opt for less expensive foods which are more likely to contain less nutrients such as vitamin C.

5.0 Conclusion

The present study revealed that smokers consume significantly less vitamin C than non-smokers. According to literature smokers need to consume more of the vitamin. The main reason is that cigarette smoke contains many oxidants which are harmful to the body, and

vitamin C is a proven anti-oxidant which counteracts the oxidants; and is readily available from food, or in the form of food supplement widely available in the market. Hence, this study serves to educate the smokers who cannot forego their habit. However, the best course would be to stop smoking.

Table 1: Consumption of Vitamin C and Number of Meals per Day

Total Consumption of Vitamin C	Smoker	Non-smoker	Total	P value (2 tailed)
< 500 mg/week	37 (88.1%)	5 (11.9%)	42 (100%)	< 0.001
500 mg/week and above	3 (7.9%)	35 (92.1%)	38 (100%)	
Total	40 (50%)	40 (50%)	80 (100%)	
Meals				
Once a day	9 (81.8%)	2 (18.2%)	11 (100%)	
2 – 3 times/day	27 (48.2%)	29 (51.8%)	56 (100%)	0.04
More than 3 times	4 (30.8%)	9 (69.2%)	13 (100%)	
Total	40 (50%)	40 (50%)	80 (100%)	

6.0 Acknowledgement

The authors would like to thank the Dean and staff members of the Faculty of Medicine, SEGi University College, for encouraging this research and providing the facilities.

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