

Research Paper :

Effect of conventional, microwave and solar processing on vitamin C content and bacterial load of some foods

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ABSTRACT

Foods are composed of “nutrients”, which when consumed in adequate amounts, fulfill all the functions of the body. Vitamins are the “accessory nutrients” involved in small quantities in the regulation of body processes. Vitamins are found in plant and animal tissues. Vegetables and fruits are good sources of vitamins. Cooking of food is the use of heat to bring about desirable changes in foods being consumed. Most foods are cooked before they are accepted. Cooking by different methods affects the nutritional quality as well as microbial population of food. A study on effect of conventional, microwave and solar cooking on three recipes namely sweet corn (*Zea mays*), potato (*Solanum tuberosum*) sabji and Spinach (*Spinacia oleracea*) sabji on vitamin C and bacterial load study showed that while conventional and microwave cooking retained more vitamin C compared to solar cooked foods, bacterial survival rate was higher in the former two methods.

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Ascorbic acid is the most unstable of all known vitamins. It easily gets oxidized, especially on exposure to heat. Oxidation is accelerated in the presence of copper and alkaline pH. Since ascorbic acid is soluble in water and easily oxidized, it is susceptible to loss during cooking and processing of food. It is readily lost via leaching from cut or bruised surface of food. Prolonged cooking at high temperature and undue exposure to oxygen, copper and iron result in loss of the vitamin. Nutritive value of most foods is affected by cooking irrespective of methods either in commercial establishment or at households.

Conventional methods of cooking have been in use since ages. Microwave cooking, a recent trend has transformed the lifestyle of people all over the world by dramatically reducing the hours spent by housewives in the kitchen. The solar cooker an ideal kitchen appliance that offers multipurpose uses, is ecologically and economically beneficial. With all these sources of energy, and different methods available for cooking, it becomes necessary to select the best ones in terms of nutrient retention.

The changes in reduced and total ascorbic acid contents in four potato cultivars after cooking by different methods were studied by Shirsat and Thomas (1998). Cooking of tubers in boiling water showed maximum loss in vitamin C content, whereas pressure and microwave cooking recorded least losses. Greater retention of vitamin B₆ in chicken (Wing and Alexander, 1972), thiamine in pork (Kylen *et al.*, 1964), and ascorbic acid in vegetables

(Gordon and Noble, 1959) was reported in foods cooked electronically. Destruction of microorganisms by thermal means is dependent not only on the temperature but also on the length of time the food is heated. A greater bacterial survival in meat cooked electronically had been reported. The quick rise in lethal temperature and maintenance of that temperature for only short periods of time allows more bacteria to survive. Riboflavin and vitamin C are sensitive to cooking. Solar cooking, which is a slow process at low cooking temperatures, retains these nutrients in selected vegetables to a much higher extent than those cooked by absorption method (Chandrasekhar and Kowsalya, 1997).

The present study was undertaken to compare the effect of different cooking methods, *viz.*, conventional, microwave and solar on vitamin C and bacterial load of sweet corn, spinach sabji and potato sabji.

METHODOLOGY

Three recipes namely, sweet corn, potato sabji and spinach sabji were prepared by conventional method, microwave and solar cooking.

Sweet corn:

Two and half kilogram sweet corn cobs (8 no.) were deseeded. 200 g sample was taken for four different cooking methods (two conventional *viz.*, pressure cooking and broiling, one microwave, one solar), and one for analysis of raw corn. Lower portion of all 8 cobs was left without deseeding and was used for making broiled corn.