



THE EFFECT OF DIFFERENT COOKING METHODS ON PALATABILITY ATTRIBUTES OF SELECTED VEGETABLES

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ABSTRACT

The present investigation was undertaken to study the effect of different cooking methods on palatability characteristics of French beans, Potato and Cabbage. Six cooking methods were selected viz., stir fry and boil (SFB), stir fry (SF), steaming (ST), pressure cooking (PR), microwave (MW) and solar cooking (SC). The methods of cooking were standardized for all the vegetables with respect to water and time required for cooking. SFB being the popular method was used as control and rest of the cooking methods as variables. MW required highest amount of water and SC least amount of water for cooking. SC however required the longest time and PR the least time to cook followed by MW. SFB was found to be most acceptable method followed by MW and SF for cooking all the three vegetables as judged by the palatability attributes.

Key words: Stir fry and boil, Stir fry, Steaming, Pressure cooking, Microwave, Solar cooking

Introduction

Cooking is the process of preparing food by applying heat, selecting, measuring, and combining of ingredients in an ordered procedure for producing safe and edible food. Deep coloured vegetables are known to be the best sources of phenolic including flavonoid, anthocyanin and carotenoids.

Studies have shown that various cooking methods affected content of phytochemicals, in particular, antioxidants present in the vegetables (Turkmen *et al.* 2006, Zhang and Haman, 2004, Podsedek 2007). Microwave cooking produce the lowest losses, while pressure cooking and boiling lead to greatest losses, frying occupies an intermediate position in the vegetable (Monreal *et al.*, 2009). Common cooking treatment can be used to enhance the nutritional value of vegetables, increasing bio accessibility of health promoting constituents (Rosalia Ferracane *et al.*, 2008). Cooking is not always a detrimental process when the Total Antioxidant Capacity (TAC) is used as an index to evaluate the nutritional characteristics of a vegetable (Nicoletta Pellegrini *et al.* 2010). All cooking treatments, except steaming, caused significant losses of chlorophyll and vitamin C and significant decrease of total soluble protein and soluble sugars (Yuan *et al.* 2009). Solar cooking retains more nutrient over the conventional methods and is emerges as the best choice for cooking food with ease and efficiency (Raka Srivastava and Aakanksha Nahar, 2015).

There are several methods of cooking vegetables; however few are very commonly

used methods. In India, in majority households irrespective of their traditions, stir frying and boiling and stir frying methods are used for cooking vegetables. In the present study vegetables were cooked by six different methods and their palatability characteristics were compared.

Methodology

For the present study the three vegetable, viz., French beans, Potatoes and Cabbage were selected and six common cooking methods were selected viz., Stir fry and boil (SFB), Stir fry (SF), Microwave (MW), Pressure cooking (PR), Steaming (ST), and Solar cooking (SC). Selected vegetables were washed. French beans and Potato were cut in to even pieces of 2cm length and Cabbage was shredded. The cooking procedure was standardized FOR all the vegetables.

Standardization of Cooking Methods:

Standard Recipe: Oil was heated in a container, to it pinch of asafoetida (0. 2gm), cumin seeds (1 gm), mustard seeds (1 gm) and chopped green chilli were added (1 gm). Chopped French beans/Potato/Cabbage (100gm) were added and cooked with measured amount of water. Salt (2.7 gm), *garam masala* (0.5 gm), turmeric powder (0.5gm), red chilli powder (0.5 gm), mango powder (0.5gm) and coriander powder (0.5gm) were added. The pan was covered and cooked till the vegetable turned tender and soft. The standard recipe was followed for stir fry and boiling method whereas for stir fry the recipe was followed without using water. For

pressure cooking and steaming, the vegetables were first pressure cooked and steamed in covered containers and then the standard recipe was followed without using water. For microwave, the oil was heated in glass container for 10 seconds; all masalas with vegetables were added and cooked till tender. For solar cooking, the oil was heated in a pan, all masalas and vegetables were added to it. The mixture was kept in solar cooker pan till the vegetables turned tender and soft.

Sensory evaluation

A trained panel of 6 judges from Post Graduate Teaching Department of Home Science, Rastrasant Tukadoji Maharaj Nagpur University, Nagpur evaluated the cooked vegetables in a series of palatability trials. A descriptive cum numerical score card was developed for each vegetable. Coded samples of the cooked vegetables were presented to the panel of judges for evaluation. The stir fried and boiled (SFB) French bean, potato and cabbage were used as control samples for their respective variations and evaluated by the judges for their palatability attributes.

Results and Discussion

Standardization of Cooking Methods

The amount of oil, water, cooking time and cooked weight of French beans; potato and cabbage have been presented in Tables 1, 2 and 3 respectively. The data shows that MW, ST and SC required the least (6.06 gm) amount of oil while SFB and SF required the highest (12.1 gm) amount of oil for cooking vegetables. MW required the maximum and SC required the minimum water. With respect to time, PR required the least cooking time (3-5 min) followed by MW (5-8min.). SC required the longest (60 min.) time to cook. SFB and ST required 15 to 20 minutes for cooking for all the three vegetables. The cooked weight of all the three vegetables showed higher weights in SC and MW followed by ST samples. SF samples gained least weight during cooking.

Palatability Characteristics of Cooked Vegetables:

The mean palatability scores of French beans, potatoes and cabbage cooked by different methods have been presented in Tables 4, 5 and 6 respectively. The results are discussed below.

Stir Fried and Boiled: All the three vegetables cooked by SFB were the most acceptable and palatable as compared to rest of the cooking methods.

Stir Fried: All the three vegetables cooked by SF were comparatively less acceptable than

their SFB samples, however the statistical analysis did not show any significant difference between the quality attributes except texture ($p < 0.05$) of potato.

Microwave: French bean cooked in MW showed significantly poor texture ($p < 0.01$), doneness ($p < 0.05$) and acceptability ($p < 0.01$) as compared to the control sample. Potato and cabbage were comparable to control samples, as they did not show significant difference as compared to control samples.

Pressure Cooking: Pressure cooked French beans showed significantly poor doneness ($p < 0.01$) and taste ($p < 0.05$) whereas potato showed poor color ($p < 0.01$) as compared to respective SFB samples. Cabbage samples were equally acceptable as SFB samples when PC.

Steaming: Steamed samples of French beans were significantly poor in terms of texture ($p < 0.01$), doneness ($p < 0.01$), taste ($p < 0.05$) as well as acceptability ($p < 0.01$) in comparison with SFB samples. Potato cooked by steaming method showed significantly poor color ($p < 0.01$) and texture ($p < 0.01$) in comparison with the standard. The overall acceptability of ST cabbage also showed significantly poor score ($p < 0.05$).

Solar Cooking: Cabbage and French bean showed significantly poor palatability characteristics than the control samples. However, SC potato showed insignificant palatability characteristic as SFB with respect to doneness, taste and acceptability.

CONCLUSION

The results of the study reflect slight variations with respect to the palatability and acceptability of three vegetables subjected to different methods of cooking. The overall acceptability of French beans is observed to be higher in SFB and MW as compared to the rest of the methods. Potatoes cooked by SFB and PR showed slightly higher scores in acceptability as compared to the rest of the methods. The overall acceptability of cabbage is higher in SFB followed by MW. The cooking time is least in PR followed by MW, ST and SF in that order for all the three vegetables. The least acceptable method of cooking with maximum cooking time is found to be solar cooking. All the palatability attributes for the three vegetables scores minimum in SC and hence rated unacceptable. Results thus throw light on the fact that PR is undoubtedly the best cooking method with respect to cooking time while SFB shows higher acceptability.

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Table 1: Results of Standardization of French Beans

Sr. No.	Cooking Method	Oil (ml)	Water (ml)	Time (mins)	Cooked Weight (gms)
1	SFB	12.1	130	15	107.3
2	SF	12.1	--	20	106
3	MW	6.06	150	8	120
4	PR	8.44	100	5	109.4
5	ST	6.06	100	15	115.4
6	SC	6.06	70	60	126.1

Table 2 Results of Standardization of Potatoes

Sr. No.	Cooking Method	Oil (ml)	Water (ml)	Time (mins)	Cooked Weight (gms)
1	SFB	12.1	70	15	113.7
2	SF	12.1	-	20	106
3	MW	6.06	90	6	123.5
4	PR	8.44	60	3	116.1
5	ST	6.06	80	15	129.8
6	SC	6.06	30	60	130.1

Table 3 Results of Standardization of French Cabbage

Sr. No.	Cooking Method	Oil (ml)	Water (ml)	Time (mins)	Cooked Weight (gms)
1	SFB	12.1	80	12	117.5
2	SF	12.1	-	15	110.2
3	MW	6.06	125	5	118.5

4	PR	8.44	70	3	113.6
5	ST	6.06	90	13	120.5
6	SC	6.06	30	60	118.5

Table 4: Mean Palatability Attributes of French Beans with Statistical Interpretation.

Sr. No.	Cooking Method	Colour		Texture		Doneness		Taste		Acceptability	
		Mean Score	t' Value	Mean Scores	t' Value	Mean Score	t' Value	Mean Score	t' Value	Mean Score	t' Value
1	SFB	9.08		10		10		9.8		9.7	
2	SF	8.08	0.75	8.8	0.84	8.8	2.52*	8.3	1.43	8.4	1.85
3	MW	8.6	0.33	9	4.03**	9.4	2.71*	9.08	1.60	8.9	2.58*
4	PR	8.3	0.67	7.9	2.20	8.8	3.05**	8.6	2.33*	8.4	1.91
5	ST	7.7	0.77	8.1	5.27**	8.9	3.58**	8.8	2.40*	8.5	2.21*
6	SC	6.7	1.63	6.3	7.37**	5.3	15.81**	5.3	9.62**	5.9	5.25**

*p < 0.05 , **p < 0.01

Table 5: Mean Palatability Attributes of Potatoes with Statistical Interpretation.

Sr. No.	Cooking Method	Colour		Texture		Doneness		Taste		Acceptability	
		Mean Score	t' Value	Mean Score	t' Value	Mean Score	t' Value	Mean Score	t' Value	Mean Score	t' Value
1	SFB	10		10		10		10		9.8	
2	SF	9.7	1.00	9.6	2.23*	9.8	1	9.8	1	9.4	1.09
3	MW	9.8	1.00	10	0.0	10	0.0	10	0.0	9.4	1.09
4	PR	9.5	3.16**	9.6	1.46	9.5	1.58	9.7	1.58	9.6	0.53
5	ST	9.5	1.58	9.4	1.54	9.3	1.95	9.5	1.0	9.3	1.00
6	SC	8.4	3.11**	8.1	3.11*	8.9	1.59	7.4	2.86	8.18	2.28

Table 6: Mean Palatability Attributes of Cabbage with Statistical Interpretation.

Sr. No.	Cooking Method	Colour		Texture		Doneness		Taste		Acceptability	
		Mean Score	t' Value	Mean Score	t' Value	Mean Score	t' Value	Mean Score	t' Value	Mean Score	t' Value
1	SFB	9.7		9.8		9.7		9.7		9.8	
2	SF	9	0.84	8.5	2.47	9.2	0.88	9.7	0.0	9.4	1.09
3	MW	9.5	0.30	9.3	1.29	9.4	0.64	9.7	0.0	9.6	0.53
4	PR	9.3	0.63	8.9	2.12	9.4	1.37	9.3	0.81	8.9	1.81
5	ST	9.4	0.41	8.9	1.82	8.7	2.41	8.5	2.0	8.3	2.97*
6	SC	7.6	2.40*	7	5.61**	6.7	7.02**	5.7	6.2**	5.7	8.34*

