

Research Paper :

Consumption pattern of dehydrated bottle gourd, brinjal and tomato in rural areas

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ABSTRACT

The present study is attempt to observe the level of acceptance of dehydrated vegetables among children and adults and to study the consumption pattern of dehydrated bottle guard, brinjal and tomato among rural people. To full these objectives, 100 families were selected from rural areas of Kashmir through random sampling technique, using interview schedule. The data were analyzed through percentage, chi-square analysis, degree of freedom and p-value. The study depicts that as compared to other foods, rural families consume dehydrated vegetables in larger quantity and higher frequency during winter seasons. The acceptance of dehydrated bottle gourd and tomato have shown significant impact on rural children and adults.

Key words : Dehydration, Bottle gourd, Brinjal, Tomato, Acceptability

The preservation of foods by drying is one of the oldest methods used by man. Drying is the method nature resorts to preserve foods. Grains in the field dry sufficiently on the stalk by exposure to for the sun, which requires no further drying for preservation. This is also true of legumes, innumerable seeds and some spices. The observation of natural drying adopted by early man to dry fruits, fish and meat by exposing them to the sun. Sun drying is still in use in many parts of the world for preserving certain foods, such as fruits and nuts. However, it is limited by the fact that it is feasible only under climatic conditions of high heat and low humidity. Drying of food involves complete removal of water under controlled conditions in such a way that the food is not altered and results in minimum changes by the drying process. Dried foods contain moisture to the extent 1-5 per cent, and they have storage stability at room temperature of a year or longer. On reconstitution with water dried foods are very close to and virtually indistinguishable from the original foods used in their preparation. Removal of moisture from a solid with minimum change in food material is not an easy problem. Removal of only a part of water of foods, perhaps 1/3 to 2/3 of the water as in the preparation of syrups, evaporated milk, tomato paste, condensed soups, etc. is not considered as drying. Partial removal of water is known as concentration (Manay and Shadaksharaswamy, 2001).

Drying, in addition to preservation, helps decrease the weight and bulk of food e.g. 237ml of orange juice on dehydration yields just 28 gm of solids. In some cases the drying process may be chosen to retain the original shape

and size. However, in such a case the volume may not be affected but there is reduction in weight. Drying thus results in great economy in storage, packaging and transport of food. Drying also results in the production of convenience foods, such as instant coffee, instant rice etc. In these cases cooking steps are completed before the products are dried (Manay and Shadaksharaswamy, 2001).

Dehydration reduces the moisture content of vegetables below the required level for the growth of micro-organisms and at the same time preserves the flavour, aroma and appearance. The dehydrated vegetable on the addition of water regains the original shape and appearance. Significant changes in the composition of nutrients occur due to dehydration. Concentration of proteins, carbohydrates and minerals occur along with some chemical changes. Fats are oxidatively degraded, accompanied with decrease of odour and flavour. Millard reaction is facilitated resulting in darker color and development of new aroma substances. Vitamin level decrease and original volatile flavour and aroma compounds is lost to a major extent.

Singh and Sager (2008) examined influence of packaging and storage leafy vegetables. Three leafy vegetables viz., amaranth (*Amaranthus* sp), fenugreek (*Trigonella foenum-graecum*) and palak (*Beta vulgaris* var. *bengalensis*) were dried in cabinet at $58\pm 2^{\circ}\text{C}$ and packed in Low Density Polyethylene (200 gauge and 400 gauge), high Density Polyethylene (HDPE 200 gauge) and Polyethylene (150 gauge) and stored at ambient ($25-35^{\circ}\text{C}$) and low temperature ($7\pm 1^{\circ}\text{C}$) for 3 months to

evaluate the best package and storage temperature for maximum retention of nutrients. HDPE (200 gauge) and storage at (7±1°C) was best for dehydration leafy vegetables for storage up to 3 months. The dehydrated leafy vegetables retained higher beta-carotene, ascorbic acid, total chlorophyll content, rehydration ratio, sensory score and had less moisture and non-enzymatic browning in the dried product.

Therefore, the present study was carried out with following specific objectives in view : to observe the level of acceptance of dehydrated vegetables among children and adults in rural areas and to study the consumption of dehydrated bottle gourd, brinjal and tomato in rural areas.

METHODOLOGY

The present study was carried out in rural areas in Kashmir Region of Jammu and Kashmir State in India in 2008-09. For the study, Simple random sampling technique was used. The sample of 100 families was used for the study. An Interview schedule was used to collect information from the respondents. The data obtained was carefully scrutinized, categorized, coded and statistically analyzed through software packages SPSS 10.0, computing χ^2 analysis, column percentage, t- test and levels of significance. The results were considered highly significant at the p-value of less than or equal to 0.01; while, significant results were obtained at p value equal to or less than 0.05. However, insignificant results were found at p-value greater than 0.05.

FINDINGS AND DISCUSSION

Table 1 reveals that 59 per cent rural families consume dehydrated bottle gourd thrice in a month during summer, while 34 per cent rural families consume dehydrated brinjal thrice in a month and 37 per cent families consume dehydrated tomato thrice in a month. Statistically, such differences in summer consumption of dehydrated bottle gourd, brinjal and tomato by rural families are found highly significant (p<0.01). Majority, i.e. 27 per cent rural families consume dehydrated bottle gourd thrice in a month during winter season, 34 per cent rural families consume dehydrated brinjal thrice in a month and 29 per cent families consume dehydrated tomato twice in a week during winter season. Statistically, such differences in winter consumption of dehydrated bottle gourd is found insignificant (p>0.05). However highly significant (p<0.01) differences are observed in winter consumption of dehydrated brinjal and tomato in many rural families.

Table 2 shows that 75 per cent rural children dislike to consume dehydrated bottle gourd, 81 per cent rural

children also dislike the consumption of dehydrated brinjal and also 60 per cent children dislike the consumption of dehydrated tomato. Statistically, such differences are found insignificant (p> 0.05) in bottle gourd and highly significant (p>0.01) in brinjal and tomato. Majority 73 per cent rural adults dislike consumption of dehydrated bottle gourd, 77 per cent adults dislike the consumption of dehydrated brinjal and 55 per cent rural adults also dislike to consume dehydrated tomato. Statistically, such differences are found highly significant (p<0.01) in bottle gourd and brinjal and are observed insignificant (p>0.05) in tomato. However, 60 per cent rural elders like to consume dehydrated bottle gourd, 73 per cent elders neither like nor dislike to consume dehydrated brinjal and 60 per cent rural elders neither like nor dislike the consumption of dehydrated tomato. Statistically, such differences are found highly significant (p<0.01) in bottle gourd, brinjal and tomato. Majority 45 per cent all family members like to consume dehydrated bottle gourd, 40 per cent all rural members dislike to consume dehydrated brinjal and 73 per cent all members neither like nor dislike the consumption of dehydrated tomato. Statistically, such differences are observed insignificant (p> 0.05) in bottle gourd and highly significant in brinjal and tomato.

Table 3 indicates that 42.43 per cent of nuclear families like to consume dehydrated bottle gourd, 50.00 per cent joint families dislike the consumption of

Table 1 : Consumption of dehydrated vegetables by rural families (n=100)						
Intake frequency	Bottle gourd		Brinjal		Tomato	
	F	%	F	%	F	%
Summer consumption						
Daily	10	10.00	10	10.00	10	10.00
Twice in week	25	25.00	17	17.00	19	19.00
Thrice in a week	1	1.00	14	14.00	2	2.00
Once in a month	5	5.00	25	25.00	32	32.00
Thrice in a month	59	59.00	34	34.00	37	37.00
Total	100	100.00	100	100.00	100	100.00
Chi-square	89.280		3.860		29.520	
DF	3		2		3	
p-value	0.000		0.000		0.000	
Winter consumption						
Daily	14	14.00	12	12.00	27	27.00
Twice in a week	24	24.00	16	16.00	29	29.00
Thrice in a week	10	10.00	21	21.00	6	6.00
Once in a month	25	25.00	17	17.00	22	22.00
Thrice in a month	27	27.00	34	34.00	16	16.00
Total	100	100.00	100	100.00	100	100.00
Chi-square	11.300		33.320		17.300	
DF	4		5		4	
p-value	0.230		0.000		0.002	

Table 2 : Acceptance of dehydrated vegetables by rural families (n=100)

Level of acceptance	Bottle gourd		Brinjal		Tomato	
	F	%	F	%	F	%
Children						
Like	10	10.00	5	5.00	14	14.00
Neither like nor Dislike	15	15.00	14	14.00	25	25.00
Dislike	75	75.00	81	81.00	60	60.00
Total	100	100.00	100	100.00	100	100.00
Chi-square	10.737		2.974		2.398	
DF	6		6		6	
P-value	0.097		0.000		0.000	
Adults						
Like	7	7.00	8	8.00	10	10.00
Neither like nor Dislike	20	20.00	15	15.00	35	35.00
Dislike	73	73.00	77	77.00	55	55.00
Total	100	100.00	100	100.00	100	100.00
Chi-square	6.007		7.392		8.688	
DF	6		6		6	
P-value	0.000		0.000		0.192	
Elders						
Like	60	60.00	8	8.00	10	10.00
Neither like nor Dislike	25	25.00	15	15.00	35	35.00
Dislike	15	15.00	77	77.00	55	55.00
Total	100	100.00	100	100.00	100	100.00
Chi-square	7.668		9.698		8.054	
DF	6		6		6	
P-value	0.000		0.000		0.000	
All members						
Like	45	45.00	28	28.00	20	20.00
Neither like nor Dislike	25	25.00	32	32.00	73	73.00
Dislike	30	30.00	40	40.00	7	7.00
Total	100	100.00	100	100.00	100	100.00
Chi-square	7.440		7.328		5.479	
DF	6		6		6	
P-value	0.282		0.000		0.000	

dehydrated bottle gourd and 21.62 per cent rural extended families neither like nor dislike dehydrated bottle gourd. Statistically, such differences in acceptance of dehydrated bottle gourd as per rural family type is found insignificant ($p>0.05$). About 46.15 per cent rural nuclear families like to consume dehydrated brinjal, 45.62 per cent rural joint families dislike to consume dehydrated brinjal and 23.08 per cent extended families neither like nor dislike to consume dehydrated brinjal. Statistically, such differences in consumption of dehydrated brinjal as per the type of rural family is found insignificant ($p>0.05$). Majority *i.e.*

46.67 per cent nuclear families dislike to consume dehydrated tomato, 47.72 per cent joint families like to consume dehydrated tomato and 24.39 per cent extended families neither like nor dislike to consume of dehydrated tomato. Statistically, such differences in acceptance of dehydrated tomato as per family type is found insignificant ($p>0.05$).

The Table 4 indicates that 67.57 per cent rural families having up to Rs 5000 income per month, neither like nor dislike to consume dehydrated bottle gourd, while 39.39 per cent rural families having Rs 5000-10,000 income per month, like to consume dehydrated bottle gourd and 20.00 per cent rural families having Rs 10,000-150,000 income per month, dislike the consumption of dehydrated bottle gourd, 9.09 per cent rural families having Rs greater than 15,000 income per month, like to consume dehydrated bottle gourd. Statistically, such difference as per income of Rs per month is found insignificant ($p>0.05$). About 57.89 per cent rural families having up to Rs 5000 income per month, dislike to consume dehydrated brinjal; 4.00 per cent rural families having Rs 5000 to 10,000 income per month, neither like nor dislike to consume dehydrated brinjal; 23.08 per cent rural families having Rs 10,000-15,000 income per month, like to consume dehydrated brinjal; 13.33 per cent rural families having Rs greater than 15,000 income per month, neither like nor dislike to consume dehydrated brinjal. Statistically, such differences as per income of Rs per month is found insignificant ($p>0.05$). Majority 60.00 per cent rural families having up to Rs 5000 income per month, dislike to consume dehydrated tomato; 39.02 per cent rural families having Rs 5000 to 10,000 income per month, neither like nor dislike to consume dehydrated tomato; 17.07 per cent families having Rs 10,000-15,000 income per month, neither like nor dislike to consume dehydrated tomato; 6.67 per cent rural families having Rs greater than 15,000 income per month, dislike the consumption of dehydrated tomato. Statistically, such differences as per income of Rs per month is found insignificant ($p>0.05$).

Dehydrated vegetables can cause nutrient deficiencies. A highly infected vegetable is the cause of intestinal cancer. Excessive intake of dried vegetables can cause so many diseases. It can decrease the level of cholesterol, blood pressure and combative power against infections caused by germs, bacteria which are the cause of illness. Dehydrated vegetables are less in vitamins and proteins which are necessary for the proper function of our body.

Summary, conclusion and recommendation :

Majority of rural people consume dehydrated

Table 3 : Acceptance of dehydrated vegetables as per rural family setup n=100

Family types	Acceptance of dehydrated vegetables							
	Like		Neither like nor dislike		Dislike		Total	
	F	%	F	%	F	%	F	%
Consumption of dehydrated bottle gourd								
Nuclear	14	42.43	13	35.14	11	36.67	38	38.00
Joint	12	36.36	16	43.24	15	50.00	43	43.00
Extended	7	21.21	8	21.62	4	13.33	19	19.00
Total	33	100.00	37	100.00	30	100.00	100	100.00
Chi-square analysis			$\chi^2 = 0.998;$		DF= 4 ;		p value=0.910	
Consumption of dehydrated brinjal								
Nuclear	6	46.15	11	36.67	21	36.84	38	38.00
Joint	4	30.77	13	43.33	26	45.62	43	43.00
Extended	3	23.08	6	20.00	10	17.54	19	19.00
Total	13	100.00	30	100.00	57	100.00	100	100.00
Chi-square analysis			$\chi^2 = 1.670;$		DF= 4 ;		p value=0.796	
Consumption of dehydrated tomato								
Nuclear	17	38.64	14	34.25	7	46.67	38	38.00
Joint	21	47.72	17	41.36	5	33.33	43	43.00
Extended	6	13.64	10	24.39	3	20.00	19	19.00
Total	44	100.00	41	100.00	15	100.00	100	100.00
Chi-square analysis			$\chi^2 = 2.340;$		DF= 4 ;		p value=0.674	

Table 4 : Acceptance of dehydrated vegetables by rural people as per their family income (n=100)

Income (Rs. per month)	Acceptance of dehydrated vegetables							
	Like		Neither like nor dislike		Dislike		Total	
	F	%	F	%	F	%	F	%
Consumption of dehydrated bottle gourd								
Up to 5000	15	45.46	25	67.57	11	36.67	51	51.00
5000-10,000	13	39.39	8	21.62	11	36.66	32	32.00
10,000-15,000	2	6.06	4	10.81	6	20.00	12	12.00
Greater than 15,000	3	9.09	0	0	2	6.67	5	5.00
Total	33	100.00	37	100.00	30	100.00	100	100
Chi-square analysis			$\chi^2 = 11.147;$		DF= 6 ;		P value=0.084	
Consumption of dehydrated brinjal								
Up to 5000	6	46.15	12	40.00	33	57.89	51	51.00
5000-10,000	4	30.77	12	40.00	16	28.07	32	32.00
10,000-15,000	3	23.08	2	6.67	7	12.29	12	12.00
Greater than 15,000	0	0.00	4	13.33	1	1.75	5	5.00
Total	13	100.00	30	100.00	57	100.00	100	100.00
Chi-square analysis			$\chi^2 = 10.246;$		DF= 4 ;		P value=0.731	
Consumption of dehydrated tomato								
Up to 5000	26	59.09	16	39.03	9	60.00	51	51.00
5000-10,000	12	27.27	16	39.02	4	26.66	32	32.00
10,000-15,000	4	9.09	7	17.07	1	6.67	12	12.00
Greater than 15,000	2	4.55	2	4.88	1	6.67	5	5.00
TOTAL	44	100.00	41	100.00	15	100.00	100	100.00
chi-square analysis			$\chi^2 = 4.677;$		DF= 6 ;		P value=0.496	

vegetables during winter season. Dehydrated bottle gourd, brinjal and tomato are consumed by rural people thrice in month during summer season. Dehydrated bottle gourd and brinjal are also consumed by rural people thrice in month; while as dehydrated tomato are consumed twice in week during winter season. Rural children dislike to consume dehydrated bottle gourd, brinjal and tomato. Majority of bottle gourd, brinjal and tomato are also disliked by adults. Rural elders like to consume dehydrated bottle gourd. Majority of joint families dislike to consume dehydrated bottle gourd but like to consume dehydrated tomatoes. Majority of nuclear families like the consumption of dehydrated brinjal. Further more, majority of literate people dislike dehydrated bottle gourd but like to consume dehydrated brinjal and neither like nor dislike to consume dehydrated tomato. Majority of rural families having up to Rs 5000 income per month neither like nor dislike the consumption of dehydrated bottle gourd. Majority of rural people having up to 5000 income per month dislike to consume dehydrated brinjal and tomato.

It is concluded that rural families consume dehydrated vegetables in larger quantity and higher frequency during winter season as compared to other foods. It is due to non availability of fresh vegetables during winter seasons. Highly significant relation is found in rural areas for consumption of dehydrated bottle gourd, brinjal and tomato during winter and summer seasons. The acceptance of dehydrated bottle gourd and tomato have shown significant impact on rural children and adults. However, the following points are recommended for dehydration of vegetables:

- Quality food material should be chosen.
- Chose the one which is resistant for long enough to retain its quality, taste and nutritional values.
- Vegetables should be chemically treated.
- Vegetables should be washed thoroughly in hot water.
- After washing it should be broken into small slices and pieces.
- There should be no possible environment problems, includes
 - Pesticide sprays.
 - Animal or bird droppings.
 - High level of moisture content.
 - The vegetables to be dried should be carefully

watched.

- Vegetables should be turned over once daily.
 - If there is likelihood of dew and precipitation at night they should be brought in.
 - In case of unfavorable conditions they should be kept in dry rooms.
 - Vegetables should not be infected by any sort of insecticides.
 - It should not be cover up by any sort of dust.
- Vegetable slices should be equally spaced to get properly dried.

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