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Consumption pattern of exotic vegetable consumers: A comparative study between Dharwad and Hyderabad of Karnataka and Telangana states of India

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Abstract
The word exotic connotes that which is not native to our country. The common exotic vegetables in India are Lettuce, Broccoli, Bok Choy, Brussels sprouts, Asparagus, Parsley, Leek, Zucchini, Kale, Cherry Tomato, Celery, Chinese cabbage, Red Cabbage, Coloured Capsicum, Chives etc. The main objective of the study was to evaluate the consumption pattern of consumers who consume exotic vegetables. The present study was carried out in Dharwad (Karnataka) and Hyderabad cities (Telangana) with a sample of 120 consumers. The data was collected through pre tested structured interview schedule. The results were analyzed using frequency, correlation, and t- test. The data showed that most of the consumers consume broccoli, lettuce, coloured capsicum and cherry tomato as salads, on pizza toppings, curries and pulav forms. Respondents cook these vegetables mostly by boiling and sauting method. There was a significant difference in their consumption pattern between UAS staff (Dharwad) & PJTSAU staff (Hyderabad) and PJTSAU staff (Hyderabad) & Hyderabad outliers. Source of information and source of motivation were positively significant in consumption of these vegetables.

Keywords: exotic vegetables, consumption pattern, Hyderabad, Dharwad, consumers

Introduction
Fruits and vegetables are universally promoted as healthy food. They constitute an important component of the human diet. They play a vital role in food and nutritional security of the ever growing population of our country. When immune boosting foods are the talk of the day during Covid-19 times, a diet rich in vegetables is a sure way to strengthen the immune. All systems of medicines suggest the inclusion of a variety of fruits and vegetables in the diet because each vegetable contains a unique combination of phyto-nutriceuticals. The wide publicity for healthy functionality of vegetables has not only motivated people to include more fruits and vegetables in the diet but has kindled interest in them to try and experiment with new exotic vegetables

The exotic vegetables are new and not native to our country. They require specific conditions to grow. The common exotic vegetables grown in India are Lettuce, Broccoli, Bok Choy, Brussels sprouts, Asparagus, Parsley, Leek, Zucchini, Kale, Cherry tomato, Celery, Chinese cabbage, Red Cabbage, Coloured Capsicum, Chives etc. The key growth drivers for exotics are the rapidly growing organized food service sector, higher consumer demand through increased awareness, and innovation in supply chain, including penetration of modern retail & ecommerce, delivery platforms, and digital payments. The healthy functionality of these vegetables has not only motivated people to include these vegetables in the diet and also increase ones interest in trying and experiment with these exotic vegetables. Consumers include these vegetables in their diet mostly as salads, pizza toppings, sandwiches, smoothies etc. It is due to increase in their taste buds to different world cuisines.

The major market for these vegetables are high end retail chains like Spencer's, More, Reliance fresh, online segment like Big basket, star hotels, quick service restaurants like McDonalds, Subway, etc., offices, hospitals and social functions. The exotic vegetables market is still expected to grow at a higher rate largely due to the growth of the organized food service sector and the higher consumer demand. Increase in supply chain capabilities, especially in tier II cities, will help to convert non-consumers to consumers and enhance the reach and usage of these vegetables. The main objective of the study was to study the consumption pattern of exotic vegetables by the consumers.

Methodology

The study was undertaken during the year 2019- 2020. The study was conducted in Dharwad and Hyderabad cities of Karnataka and Telangana states respectively. The total sample was 120 consumers. From each of the city's 30 university employees were selected purposively and 30 outliers i.e., citizens other than university staff were selected randomly.

In the present study quantitative research design using the survey method was used. The purpose of survey research is to generalize from a sample to a population so that inferences can be made about some characteristics, attitudes or behaviour of this population (Cresswell, 2003) [5]. Survey research design was chosen because the sampled elements and the variables that are being studied are simply being observed as they are without making any attempt to control and manipulate them

A well-structured and pre-tested schedule was used to collect the information from the exotic vegetable consumers. In this study, an interview schedule, having 12 vegetables was taking. These vegetables had been categorized as asian greens, flower vegetables, leafy and solanaceous vegetables. The responses observed from the different consumers were divided into two categories i.e. yes and no. The statement having "No" responses were given zero mark and the statement having "Yes" were given one mark. So, individual vegetable consumer can get maximum marks of 12 and thus a minimum mark was zero. The data collected was tabulated and analyzed using percentage, frequency, 't' test and correlation.

Karl Pearson's correlation

Correlation is a measure of intensity or degree of linear relationship between two variables for 'n' pair of observations. Numerical measure of correlation coefficient is given by,

$$r = \frac{n\Sigma xy - \Sigma x \Sigma y}{n\sqrt{\{\Sigma X^2 - (\Sigma x)^2\}\{\Sigma Y^2 - (\Sigma y)^2\}}}$$

Where,
r is the correlation coefficient
x and y are two variables.
n is the sample size.

The significance of the correlation coefficient (r) is tested by using 't' statistics and is given by,

$$t_{(n-2)} = \frac{|r|\sqrt{(n-2)}}{\sqrt{1-r^2}}$$

Where,
r is the correlation coefficient.
n is the sample size.

Test statistics value is compared with table value for (n-2) degrees of freedom at given level of significance.

T-test: It was used for comparison between mean of two groups *i.e.* men and women.

$$t = \frac{X_1 - X_2}{\sqrt{Sp^2\,(1/n_1 + 1/n_2)}}$$

$$Sp^2 = \frac{\{(n1-1)\,S1^2 + (n2-1)\,S2^2\}}{(n1+n2-2)}$$

Where,
X1 =Mean of the first group
X2 = Mean of the second group
n1 = Number of observations in the first group
n2 = Number of observations in the second group
$S1^2$ = Variance of first group
$S2^2$ = Variance of second group
Sp^2 = Pooled variance of $S1^2$ and S2

Results and Discussion

Consumption of exotic vegetables by consumers of Dharwad and Hyderabad

Based on the consumption of exotic vegetables the consumers were classified into three categories. The fig 1 shows that among Dharwad consumers, majority (80.00%) of the UAS staff had medium consumption level, 13.33 per cent had high and 06.67 per cent were under low level of consumption. Among outliers, half (50.00%) of the respondents were under medium category followed by low (46.67%) and high (03.33%). From Fig 1 it also showed that 53.33 per cent of PJTSAU staff had medium level of consumption while 46.67 per cent had low. Among outliers, majority (66.67%) of them were having low consumption whereas, 33.33 per cent had medium level. None of the staff and outlier consumers of Hyderabad had high level of exotic vegetable consumption.

This could be because these vegetables in Dharwad are available in the University (Hi-Tech Horticulture Unit), many growers deliver at door steps as well as availability in the retail outlets. As these vegetables are grown in Dharwad they are available almost all the year either in retail outlets or University or local growers. Whereas, in Hyderabad, most of these vegetables will be imported from other states. So, the Hyderabad consumers had these vegetables only when they are available in the markets or in retail outlets. Hence, Hyderabad consumers had low consumption level.

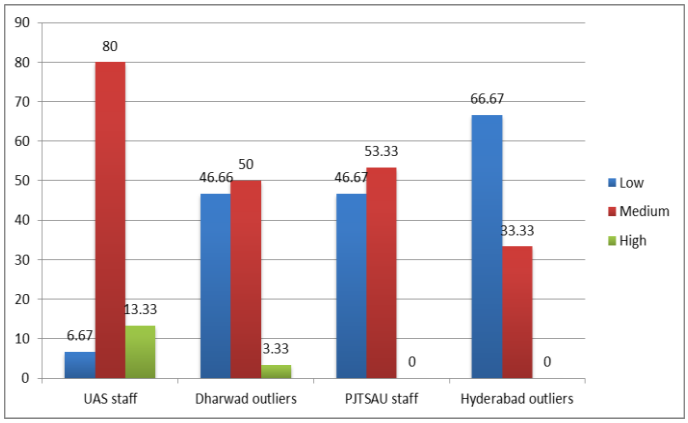

Fig 1: Consumption level of exotic vegetable consumers n=120

Reasons for consumption of exotic vegetables by Dharwad and Hyderabad consumers

The reason for consumption are presented in table 1. It could be seen that most of the consumers believe that consumption of these vegetables provide better nutrition and health. This is because consumers are aware that vegetables are rich source of vitamins, minerals and anti oxidants. The other reasons for consumption were taste, attractiveness and wish to try new

vegetables. The consumers wish to try new vegetables in their foods only when they found these exotic vegetables with very attractive colors. The consumption also increases when they were found to be tasty. The results are in line with Christina *et al.* (2011), Kareem *et al.* (2016) and Silva *et al.* (2020) [4, 9,10].

Table 1: Reasons for consumption of exotic vegetables N=120

Sl. No	Reasons	Dharwad (n=60)				Hyderabad (n=60)			
		UAS staff (n=30)		Outliers (n=30)		PJTSAU staff (n=30)		Outliers (n=30)	
		F	%	F	%	F	%	F	%
1	Healthy/ better nutrition	25	83.33	30	100.00	26	86.67	30	100.00
2	Organic products	10	33.33	04	13.33	08	26.67	03	10.00
3	Attractive	14	46.67	06	20.00	06	20.00	07	23.33
4	Tasty	16	53.33	22	73.33	11	36.67	15	50.00
5	Readily available	02	06.67	01	03.33	01	03.33	-	-
6	Wish to try new vegetables	18	60.00	09	30.00	15	50.00	08	26.67
7	Can afford	01	03.33	-	-	-	-	-	-
8	Add variety to the diet	01	03.33	-	-	-	-	-	-
* Multiple responses are possible									

Cooking methods of exotic vegetables by consumers

Cooking vegetables breaks down the plant walls, releasing more nutrients bound to those cell walls. The vegetables which are cooked supply more antioxidants including beta carotene, leutin and lycopene.

Cooking methods of exotic vegetables was studied and is presented in table 2. Out of five cooking methods listed it could be seen that most of the consumers shallow fry the vegetables. This is because sauting of these vegetables improve the taste and adds texture to food. Sauting is mostly done for quick cooking and also for immediate consumption. Another reason is that many of the exotic vegetables have high water content and light frying will keep crisp and crunchiness of the food. It is also seen that over cooking of these vegetables lose its taste, texture, nutritive value and looks soggy. For example: heavy cooking of Chinese cabbage gives pasty cabbage and very unpleasant smell. The other method which is used mostly for these vegetables was boiling. It is because they are used to boiling the regular vegetables and so continuous to use them by boiling.

Table 2: Method of cooking exotic vegetables by consumers n=120

S. No	Statements	Dharwad(n=60)				Hyderabad(n=60)			
		UAS staff (n=30)		Outliers (n=30)		PJTSAU staff (n=30)		Outliers (n=30)	
		F	%	F	%	F	%	F	%
1.	Boiling	21	70.00	20	66.67	07	23.33	14	46.67
2.	Steaming	05	16.67	08	26.67	06	20.00	12	40.00
3.	Sauting (shallow frying)	28	93.33	24	80.00	28	93.33	29	96.67
4.	Deep frying	01	03.33	06	20.00	-	-	09	30.00
5.	Blanching	02	06.67	-	-	-	-	-	-
* Multiple responses are possible									

Consumption types of exotic vegetables

After studying cooking methods, it was further explored as in what form they were eaten. This data is presented in table 3 and 4. It could be seen that in raw form these vegetables are taken as salads, as toppings on pizzas, sandwiches etc. whereas, in cooked form these vegetables were consumed in curry, sabji, in pulav/ fried rice etc. The probable reason is that some of the vegetables taken better in raw form and cannot be cooked because of their high water content. While some are like regular vegetables. For example broccoli (green cauliflower) can be cooked same as regular cauliflower as they belong to same family and shares same properties and nature. By cooking these vegetables as local varieties the consumers satisfaction of eating these vegetables was fulfilled. The results are in line with Acheampong *et al.* (2012) [1].

Table 3: Raw consumption forms n=120

Sl. No	Raw form	Dharwad(n=60)				Hyderabad(n=60)			
		UAS staff (n=30)		Outliers (n=30)		PJTSAU staff (n=30)		Outliers (n=30)	
		F	%	F	%	F	%	F	%
1	Direct	03	10.00	06	20.00	04	13.33	06	20.00
2	Salad	30	100.00	23	76.67	23	76.67	15	50.00
3	Pizza	02	6.67	05	16.67	07	23.33	22	73.33
4	Sandwich	04	13.33	12	40.00	06	20.00	07	23.33
5	Pickled	02	06.67	01	03.33	-	-	-	-
* Multiple responses are possible									

Table 4: Cooked consumption forms n=120

Sl. No	Direct form	Dharwad(n=60)				Hyderabad(n=60)			
		UAS staff (n=30)		Outliers (n=30)		PJTSAU staff (n=30)		Outliers (n=30)	
		F	%	F	%	F	%	F	%
1	Curry	17	56.67	19	63.33	15	50.00	23	76.67
2	Fried rice/pulav	08	26.67	24	80.00	05	16.67	10	33.33
3	Sabji	17	56.67	04	13.33	07	23.33	01	03.33
5	Sauce	-	-	02	6.67	-	-	--	--
6	Half boiled	01	03.33	04	13.33	02	06.67	03	10.00
7	Soup	05	16.67	09	30.00	03	10.00	09	30.00
* Multiple responses are possible									

Comparison of the consumption pattern of exotic vegetable consumers

It could be inferred from Table 5 that in comparison of Dharwad and Hyderabad consumers mean scores on their consumption pattern. The more the number of preparation the higher is the consumption pattern. The table shows there was a highly significant difference between UAS Dharwad & PJTSAU Hyderabad and PJTSAU Hyderabad &Hyderabad outliers. Indicating that Hyderabad PJTSAU staff was superior to Hyderabad outliers and UAS Dharwad staff was better in consumption than staff of PJTSAU.

This is because the university staff gets these vegetables either from university or retail outlets but outliers consume these vegetables only when they are available in the market. Moreover the vegetables being costly the university staff can afford to buy them while outliers may find them very expensive.

Table 5: Comparison of mean consumption pattern score of Dharwad and Hyderabad consumers n=120

Sl. No	Consumption pattern	Mean	SD	't' test
1	Dharwad UAS staff	1.90	0.76	0.50NS
	Dharwad outliers	2.00	0.79	
2	Hyderabad PJTSAU staff	1.37	0.61	3.51*
	Hyderabad outliers	2.17	1.09	
3	Dharwad UAS staff	1.90	0.76	2.99*
	Hyderabad PJSTAU staff	1.37	0.61	
4	Dharwad outliers	2.00	0.79	0.68NS
	Hyderabad outliers	2.17	1.09	

*Significant at 95% level (p<0.05)

Relationship between independent variables with consumption pattern of consumers of exotic vegetables

In order to find out which of the independent variables were influencing consumers consumption pattern, Spearman's rank correlation was computed (Table 6). The results showed that source of information and source of motivation were found to be positively and significantly correlated with consumption patter at 5 and 1 per cent level of significance respectively. The other variables were not related to the consumption pattern.

This is because consumers get information and motivation from friends, family and also by seeing internet where different websites post different videos which shows how to cook exotic vegetables in innovative ways. The information about these vegetables nutritive value and health benefits also make consumers to consume these vegetables.

Table 6: Relationship between independent variables with consumption pattern of consumers of exotic vegetables n=120

Sl. No	Independent variables	Pearson correlation coefficient "r value" Dependent variable
		Consumption pattern (n=120)
1	Age	-0.119NS
2	Education	-0.125NS
3	Family income	-0.124NS
4	Family size	-0.102NS
5	Family occupation	-0.055NS
6	Social media	-0.015NS
7	Innovativeness	0.132NS
8	Source of information	0.231*
9	Source of motivation	0.282**

Conclusion

It can be concluded from the study that coloured capsicum, cherry tomato, lettuce and broccoli were the most consumed vegetables. With regards to consumption level of exotic vegetables, majority of Dharwad (UAS staff and Outliers) and Hyderabad (PJTSAU staff) consumers come under medium consumption level whereas, Hyderabad outliers were having low consumption level. Better nutrition was the main reason for the consumption of these vegetables. Sauting (Shallow frying) was the most followed cooking method to consume these vegetables. More number of consumers has these vegetables in raw form like salad, Pizza toppings and in cooked form like pulav and curry form. There was a significant difference in consumption pattern between UAS Dharwad & PJTSAU Hyderabad and PJTSAU Hyderabad &Hyderabad outliers. Source of information and source of

motivation were positively significant and highly influence consumers in consumption of exotic vegetables.

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