International Journal of Food Science and Nutrition
ISSN: 2455-4898; Impact Factor: RJIF 5.14
Received: 05-04-2020; Accepted: 08-04-2020; Published: 04-06-2020
www.foodsciencejournal.com
Volume 5; Issue 3; 2020; Page No. 66-68

Usage of traditional spice and condiments preference for vegetables among students

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Abstract
The mix of spices and herbs in combination with regularly available vegetables can improve the intake of these vegetables by the adolescent school going students. Since these spice and herbs are the plant parts and extracts, they provide immense health benefits to the adolescent students and of course to aged people because of the bioactive compounds available in them. Their role is not just limited to maintain good health but also increase the acceptability among consumers because of their usage found in several forms. Because vegetables are the main course of the meal, their combination with seasoning may enhance the quality of the diet that is available in the lunch programs among rural schools.

Keywords: students, spices, condiments, schools

1. Introduction
Ever since the usage of spices and herbs is known to the world, they have been used in several forms such as preservatives, flavours and also as therapeutic agents. These herbs as well as spices are added to high-value commodities because of their cost-effectiveness and profound flavour. Their usage is not just limited to above-mentioned forms but today, most of the 70-80% of the world depends on herb related sources for a medicine according to the survey conducted by the world health organization.
Role of these herbs and spices has also extended into additives in food all over the world but also to improve the shelf life of the commodities by eliminate foodborne pathogens. Furthermore, the addition of these herbs as well as spices or its extracts acts as carriers for nutraceuticals in food commodities. So, discovering ways to improve the functionality of traditional foods will be added value and help to raise the potential benefits of consumers.

1.1 Spices and Herbs
Spices and Herbs are obtained from:
Few examples are the following,
Leaves: basil, oregano, mint, sage
Bark: cinnamon, cassia.
Flower /bud, pistil: clove, saffron.
Fruits/ berries: pepper, chilli
Bulbs: onion, garlic, turmeric.
Aril: mace
Seed: aniseed, caraway, coriander.

1.2 Classification of Spices and Herbs
Herbs and spices are plant originated and their classification is as follows:
- Flavour and colour (pepper, mustard)
- Slight flavour (coriander, paprika)
- Aromatic spices (clove, cumin)
- Aromatic herbs (bay leaf, onion, garlic)
- Based on colour (turmeric and saffron)
- Based on their taste such as sweet, bitter, spicy, sour.

Functional role of herbs and spices
Spices and herbs have a dominant role in providing flavour, colour, aroma and, in preservation. There are on going studies and also recognised their usage in medicinal sciences. The bioactive compounds present these commodities help in maintaining the better health of a human body and can prevent from several disease like diabetes, obesity, cancer and cardiovascular diseases. Since these are plant parts and extracts, the combination of vegetables and spices is recommended for more benefits of physical health. As vegetables are the main part of the meal and are highly recommended for the maintenance of proper dietary health because of their richness in fibre, vitamins and minerals. Consequently. One of the reasons for low consumption of vegetables among youth is due to the undesirable taste and flavours. The dislike for vegetables is common among adolescents (majorly) and it is due their bitter taste and lack of sweetness. Although these can be improved by cooking methods and addition of condiments there is still the need for the improvement in vegetable consumption among adolescents. These include hiding pure vegetables with entrees or serving vegetables as main course.
This limited data is possible enough to carry out studies using spices and herbs in combination with regularly used vegetables in the lunch program of the school going adolescent students. In these experiments we Have done survey among students and parents in school and we are used seasoned and plain vegetables and added smmal amount of oil and salt on vegetables and these students and parents have done sensory among plain and seasoned vegetables.

2. Materials and Methods
1. Study plan
2. Participants: Phase I and Phase II
3. Taste test
4. Data processing and analysis
5. Result
6. Discussion
7. Strength and limitations
8. Conclusions

3. Study plan
The main objective of the study plan is to determine the preference and liking of vegetables specifically seasoned or plain among the middle/high school going adolescent students in a rural public school. Their choice of liking or preference between plain and seasoned (seasoned with oil and salt) vegetables are served during the student lunch program in the school from (10:30 am-12:00 pm). The process of serving this kind of vegetables to the students in the school lunch program and using each recipe for a total of four visits (Jan-Feb, 2020)

4. Participants
Major participants in the survey are the adolescent students of the rural school, staff and parents. Almost 500 students of the rural school, studying VI-X class participated in the survey. The survey phase started in the month of January 2020 and continued till February 2020 in several visits. Volunteers also joined the survey and helped in knowing the barriers to consumption of vegetables.

4.1 Questionnaires
These are the set of questions created manually by our team to understand the choice of liking of the vegetables among the school going adolescent students that are served in their school lunch program. So this questionnaire is completely based on the current trend consumption of the preferred vegetables in combination with herbs and spices for the participants involved in the survey. As we believe that the process of conducting a survey based on manually prepared questionnaire can sort out the barriers for the dislike of vegetables among the target adolescent students of a rural school, questions were prepared accordingly and each of their feedback in the survey has greater importance in finding out the solution. The first one to the student was done with sensory of 7 point headonic sacle and bu using on that we are asking about ranging of food by liking, more liking, moderately liking and all these and we are adding spices and herbs in the sweet corn and Carrot and onion.
After all the survey is conducted, their feedback is collected to develop final recipes with accessible served vegetables with in school lunch programs. Two recipe," sweet corn with hing" and "onion and carrot seasoned with chat masala" are prepared and these results of students prefred flavours.

4.2 Recipe development

Table 1: Ingridents (seasoned)

Vegetables	Ingredients using	Quantity (g)
Sweet corn	Hing	5.02g
	Sweet corn	1542g
Carrot& onion	Carrot	1921g
	Onion	1234g
	Masala	53g

5. Data processing and analysis
The data is collected from the survey conducted and analysis is made using different statistic techniques like standard deviation, means, interests and percentages. IBM SPSS tool is used for statistical analysis and comparison is done by ratings provided to the plain and seasoned vegetable recipes.
In these survey we are using 100mm scale rating which measure left anchor (0mm) to close of 1.0mm ruler. Becouse the evaluation of students defer on different days sowe have done a pair of attributes and hypothasis and we have done T test for visual anology scale in mm of attributes like smeel, appereance, texture, flavour, overall acceptability.
Anova is conducted to camapre between seasoned and plain recipes given by participants and we have two receipes of same satastical measures of t tests and anova

6. Results
Phase I- students, parents and staff questionnaires
The participants in the survey made their choices between the vegetable combinations based on their preference and liking. School going adolescent students' choice was towards the sweet corn with hing and parents liking was towards carrot and onion with the masala. This conclusion is made only after considering all the participants' majority choice among students and parents separately.

Phase II- Test Taste Rating Results
Rating for liking overall summarized in figure-1 and rating for smell, appearance, flavour, texture. summarized in table 2, stastical analysis are smell, flavour and overall summarized in table 3.

Table 2: mean$\pm$sd rating in 100mm analog visual scale of which sensory attributes rated of each vegetable.

	Attributes									
	Appearance		Smell		Flavor		Texture		Overall acceptability	
	Plained	Seasoned	Plained	Seasoned	Plained	Seasoned	Plained	Seasoned	Plained	Seasoned
sweet corn with Hing	67.6±30.7	69.2±34.7	69.1±43.3	74.4±44.5	67.5±54.3	54.4±45.6	54.5±65.5	56.8±46.8	66.6±56.7	76.5±65.7
carrot and onion with chat masala	43.2±34.5	51.4±44.2	43.2±32.3	54.5±66.4	65.5±76.0	67.5±56.5	45.3±43.3	56.7±45.5	55.0±65.7	65.5±61.0

All these scales ranging from worst to best expert. The overall spice was rated not enough (0mm) to too much (100mm).

Attribute analysis using one-way t-test using 50 size as test value of spice

Table 3: This table displays about paried samples and stastical measuresin t-tests conducted b/w seasoned and plain vegetables by using one-way ANOVA.

	Appearance			Smell			Flavor			Texture			Overall		
	t sta	Df	Sig.	t sta	Df	Sig.	t sta	df	Sig.	t sta	df	Sig.	t sta	Df	Sig.
sweet corn with Hing	-0.82	99	0.48	-1.2	99	0.20	-1.2	99	0.18	-1.3	98	0.17	-1.7	98	0.15
carrot and onion with chat masala	-3.3	102	0.001*	-5.5	102	<0.001*	-3.4	102	<0.001*	-3.6	101	0.001*	-4.5	101	<0.001*

These Negative t statistics indicates the seasonedis higher then the plain sample Here we can say that sweet corn appearance is (P = 0.48), smell is (p = 0.20), flavor (p=0.18), overall l (p=0.15) For carrot and onion with chat masala appearance is(p=0.001), smell (p=<0.00l), overall (p=<0.001)

Table 4: This Table says that stastical results conducted on one sample t tests when plain/seasoned are compared.

Seasoned Vegetables	Plain			Seasoned		
sweet corn with Hing	T statistic	Df	Sig.	T statistic	df	Sig.
	-4.8	100	<0.001*	5.2	99	<0.001*
carrot and onion with chat masala	-6.6	102	<0.001*	1.5	101	0.050*

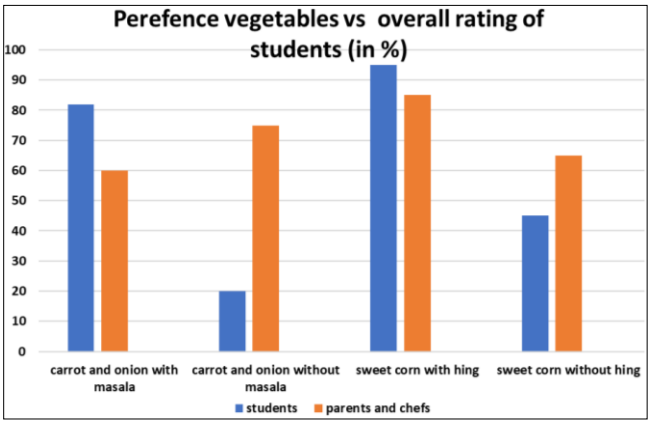

Fig 1: Liking of the students and parents.

7. Discussions

After the review of the conducted survey, there came a variety of conclusions from the participants. Since it is a known fact that liking and preference change from age to age, few participants' choices towards sweet corn with hing are higher and of course liking towards onion with masala is no less among the parents. On the whole, it can be segregated that sweet corn with hing is more preferred among middle/high school going adolescent students whereas the parents voted their liking towards the onion and carrot combination in plain rather than seasoned. Here comes the clear conclusion of usage of herbs and spices in regularly used vegetables among the school going adolescents improved the desire of having these in their lunch. The applied strategy for getting the accurate results from students and parents participated in the survey is successful and the outcome made us realize usage of these spices and herbs with slight adjustments in cooking methods can improve the flavor, appearance and, overall acceptance of the served vegetables among students. Nevertheless of these results, there is a huge possibility to improve the liking and preference for vegetables when the change in recipe is made by the food service staff in the rural school

8. Strengths and limitations

8.1 For sweetcorn with Hing

Acceptance for sweetcorn is high for several reasons and it includes the taste, color and also its palatability among the consumers.

8.2 For carrot and onion with chat masala

Although the acceptable range is high among aged people, because of the presence of the healthier phenolic and bioactive compounds, it can't be much attractive. This can be compensated with the addition of condiments and other vegetables.

9. Conclusion

However, in short term intervention herbs and spices did not produce robust increases in school lunch vegetable intake among rural students, but limited repeated exposure may increase students' willingness to consume these flavors. This could create an impact on the preference and accepetance among middle/high school students. These can be concluded herbs and spices are added in to food products improve flavor and aroma and these should be liking by students.

10. References

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