

## Original article

# A STUDY ON CONSUMER AWARENESS, SAFETY PERCEPTIONS & PRACTICES ABOUT FOOD PRESERVATIVES AND FLAVOURING AGENTS USED IN PACKED /CANNED FOODS FROM SOUTH INDIA

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## ABSTRACT

**Introduction:** The increasing use of preservatives and flavouring agents has the potential to cause health problem among the people. There are no published studies from India exploring the awareness, safety perception, & practices about Food Preservatives (FPs) and Flavouring Agents (FAs). So this study was conducted with the objectives of assessing the awareness, safety perceptions & practices about Food Preservatives (FPs), Flavouring Agents (FAs) in commonly bought / purchased packed food items.

**Materials & method:** This cross-sectional study was conducted in January 2012. Sample size of 126 was computed using the formula for infinite population. People who bought packed food items in malls were approached and requested to fill a pre-tested semi-structured questionnaire. The questionnaire explored awareness, safety perception & practices of FPs & FAs. Data was then analyzed using SPSS version 10.0. Chi-square test was used to know if the observed differences were statistically significant. 'p' value <0.05 was considered significant.

**Results:** Totally 123 people (males- 48.8% and females-51.2%) participated (response rate of 97.6%) in the study. Majority of the people were aware about presence of 'FPs' (91.7%) and 'FAs' (84.9%) though their knowledge was inadequate. Breakup of the study subjects according to level of awareness about FPs was as follows (%): Good (37.4), Satisfactory (40.6), Poor (22) & FAs (%): Good (49.6), Satisfactory (36) & Poor (14). Distribution according to type of practices for FPs was as follows (%): Favourable (14), Unfavourable (86) & FAs (%): Favourable (30.5), Unfavourable (69.5). There was a gap between knowledge and practices.

**Conclusion:** Though there was awareness, the knowledge was inadequate. Unfavourable practices were observed. The gaps in the knowledge and unhealthy practices need to be addressed by public awareness campaign.

**Key words:** Food Preservatives, Flavouring Agents, Knowledge & Practices.

## INTRODUCTION

Food Preservatives (FP) which enhance the shelf life of various food items and Flavoring Agents

(FA) which increase the palatability are plentiful in number. Their use is in various food products increasing day by day. Some of the commonly

used class II FPs in packed /canned foods include: benzoic acid, sulphurous acid, nitrates and nitrites of sodium and potassium, methyl or propyl parahydroxybenzoates sodium diacetate, Propionates of Calcium or sodium, lactic acid and its sodium, potassium and calcium salts and acid calcium phosphate.<sup>1</sup> Although law permits their use, it has been shown by various studies that excessive consumption of these leads to myriad side effects.<sup>2</sup> Increased consumption of fast food, high or rich in FPs & FAs among adolescents has been directly correlated with obesity.<sup>3</sup> High levels of N-nitrosodimethylamine in diet has a possible role in high incidence of gastrointestinal cancers.<sup>4</sup> It has been seen that the food preservatives sodium benzoate and propionic acid and colorant curcumin suppress Th1-type immune response in vitro.<sup>5</sup> Regular-soda intake independent of weight status is associated with asthma among US high school students.<sup>6</sup> Research has confirmed a link between attention deficit hyperkinetic disorder and food additives.<sup>7</sup> And with the current trends of increasing consumption of Packed food in diet, the incidence and range of such ill effects has also increased.<sup>8</sup>

As most of these are permitted chemicals, raising public awareness is an effective way to reduce their consumption and their impact on human health. So studies, which explore the knowledge and perceptions of the people about these chemicals, are necessary as they give inputs for planning intervention strategies. Studies conducted in South Korea and USA (Illinois) have shown that the current awareness level among the people regarding FPs & FAs.<sup>9, 10</sup> No studies have been published on this subject from India. So this study was undertaken with the objective of assessing the awareness, safety perceptions & practices about FPs & FAs in commonly purchased packed / canned foods.

## Material & Methods

This study was conducted in the coastal city of Mangalore, situated in the state of Karnataka, South India. The city has a number of malls and it is a shopping destination for not only the people of Karnataka but also the neighbouring state of Kerala. The study was conducted in the month of January 2012.

**Study Design:** This was a questionnaire based cross sectional study done in the popular malls in city.

**Study Population:** People who came to malls and bought packed foods were considered for the study. Those who refused to participate were excluded after obtaining the reasons for the same.

**Sample size:** Using the formula for the infinite population  $N = Z^2PQ / d^2$  where 'awareness' was assumed to be = 60%, for 95% Confidence Interval and a precision of 15% a sample size of 113 was obtained. Accounting for a 10% non-response the total sample size was computed to be 126.

**Sampling:** Non-random sampling with sequential inclusion of the study subjects who met the inclusion criteria till the required sample size was reached.

**Operational definitions:** I. "Packed foods", "Processed foods": for the purpose of study any foodstuff that fulfills the following criteria were considered: A. Those which contain FPs & or FAs as mentioned on the labels.<sup>11</sup> B. Those which are commonly bought junk foods.

II. "Juices", "canned foods" & "Cold Drinks": were those food items which met the criteria 'A' irrespective of whether they are aerated or not.

**Development of Study Instrument & Pre-testing:** A semi-structured questionnaire was devised to collect the following components of information: 1. Basic socio-demographic data (like age, gender, occupation, income etc.). 2. Questions to explore the awareness about presence of FPs & FAs 3. The safety perceptions including effects of FPs & FAs 4. Practices about the foods containing FPs & FAs. The Knowledge and the safety perceptions were scored. The questionnaire was critically analysed by 4 experts for appropriateness of the content and the questions. This was then translated in to "Kannada" & "Malayalam" which are the local languages spoken in this city. These local versions were back translated to English by a linguistic expert who was not familiar with the original version. Both the versions were compared for conceptual equivalence. All the three versions were pretested for feasibility of use and some changes were made. The Maximum knowledge score was 45 with the break up as follows: Good (> or equal to 32), Satisfactory (18 - 31) & Poor (< or equal to 17). The maximum safety perception score was 17 with the break up as follows: Good (> or equal to 12), Satisfactory (7-11) & poor (< or equal to 6). The practices were categorized as 'Favourable' & 'Unfavourable'

**Data Collection:** Permission was obtained from the Institutional Ethics Committee to conduct the study. The study subjects were approached in the malls and their permission was sought for their participation. Those who bought any packed food stuff or juice or cold drink were included for the study. Those who refused to participate were excluded. The subjects were provided the questionnaires in the language of their choice. A time span of about 15 minutes was given to complete the forms. Filled forms were collected, scored and then the data was entered.

**Data analysis:** The data was entered in SPSS version 12 and analyzed. Results were expressed in proportions in appropriate tables. Comparisons were made between those with good, satisfactory and poor knowledge. Cross tabulation between knowledge and practices was done. Chi-

square test was the test of significance used. 'p' < 0.05 was considered significant.

## RESULTS

Totally 123 people participated in the study. The total number of female participants (51.2%) was slightly more than males (48.8%). Most of the study participants (76.4%) were between 18-30 years of age. Majority of our study participants were made up of students (50.4%), followed by professionals (23.6%).

The commonly bought packed food items in household were as follows (%): Chips (50.4), Tomato ketchup (43.9), Packed juices (39), Pickles (36.6), Ready to eat mixtures (29.3), Aerated beverages (28.5), Cheese (26.8), Breakfast cereals (24.4), Canned meat and fish (16.3), Others (5.7).

**Table 1: Awareness, Safety Perceptions & Practices about Food Preservatives & Flavouring Agents**

Awareness about Flavouring Agents	Numbers	Awareness about Food Preservatives	Numbers
<b>I know about flavoring agent</b>		<b>I know about food preservatives</b>	
Yes	50 (41.6)	Yes	70 (57.3)
Somewhat	52 (43.3)	Have some idea	42 (34.4)
Maybe	9 (7.5)	May be	5 (4.09)
Don't know	9 (7.5)	No	5 (4.09)
<b>I know that chemicals are used as flavoring agent</b>		<b>I know that chemicals are used as food preservatives</b>	
Yes	91 (75.8)	Yes	104 (87)
No	29 (24.1)	No	15 (12.6)
<b>I know that aspartame, used as artificial sweetener, has carcinogenic property</b>		<b>I know about sodium benzoate and trans fat</b>	
Yes	53 (44.1)	Yes	71 (60.6)
No	67 (45.8)	No	46 (39.3)
<b>Grading of Knowledge</b>		<b>Grading of Knowledge</b>	
Good	57 (49.6)	Good	46 (37.4)
Satisfactory	41 (36)	Satisfactory	50 (40.6)
Poor	16 (14)	Poor	27 (22)
II. Practices		II. Practices	
<b>I use artificial sweeteners</b>		<b>I avoid purchase of food containing preservatives</b>	
Yes	67 (56.4)	Yes	21 (17.1)
No	52 (43.6)	No	97 (82.9)
<b>I read the nutritional facts on the label</b>		<b>I use Packed foods</b>	
Yes	65 (55.0)	Everyday	21 (17.1)
No	53 (44.9)	Frequently	61 (49.6)
		On special occasions	19 (15.4)
		Rarely	17 (13.8)
		Never	0 (0)
<b>Type of Practice</b>		<b>Type of Practice</b>	
Favourable	36 (30.5)	Favourable	16 (14)
Unfavourable	82 (69.5)	Unfavourable	98 (86)

Figure in parenthesis indicate percentage

Knowledge & Practices about FPs & FAs are presented in Table 1. Though the people knew about the presence of some chemicals as 'Food Preservatives' & 'Flavouring Agents', they did not have any specific awareness about the names or the effects of these (Table 1). Most of their practices were not favorable.

Proportion of study subjects who were aware about the presence of 'Flavouring Agents' in the common food items are as follows (%): Aerated beverages (52.8), Ice-creams (52), Fruit Juices (48.8), Instant Noodles (48), Pastries (42.3), Chips (40.7) & Biscuits (36.6).

**Table 2: Knowledge & Practices of food preservatives across various socio-demographic variables**

Variable	Knowledge			Practices	
	Poor (%) [n=27]	Satisfactory (%) [n=50]	Good (%) [n=46]	Unfavourable (%) [n=98]	Favourable (%) [n=16]
<b>Gender</b>					
Male	16 (59.2)	21 (42.0)	23 (50.0)	45 (45.9)	11 (68.7)
Female	11 (40.7)	29 (58.0)	23 (50.0)	53 (54.0)	5 (31.2)
<b>Education</b>					
Primary school	1 (3.7)	1(2.0)	0(0.0)	2(2.0)	0(0.0)
High school	14 (51.8)	11(22.0)	11(23.9)	26(26.5)	4(25.0)
Graduate	7 (25.9)	27(54.0)	26(56.5)	51(52.0)	7(43.7)
Post Graduate	5 (18.5)	11(22.0)	9(19.5)	19(19.3)	5(31.2)
<b>Occupation</b>					
Professional	3 (10.3)	13 (26.0)	13 (28.2)	20 (20.4)	8 (50.0)
Student	10 (13.1)	31 (62.0)	21 (45.6)	55 (56.1)	4 (25.0)
Others	1 (12.5)	1 (2.0)	6 (13.0)	6 (6.1)	0 (0.0)
Business	5 (45.4)	4 (8.0)	2 (4.3)	7 (7.1)	2 (12.5)
House wife	6 (46.1)	1 (2.0)	4 (8.6)	10 (10.2)	2 (12.5)

**Table 3: Knowledge& Practices regarding flavoring agents across socio-demographic variables**

Variable	Knowledge			Practices	
	Poor (%) [n= 16]	Satisfactory (%) [n=41]	Good (%) [n=57]	Unfavourable (%) [n=82]	Favourable (%) [n=36]
<b>Gender</b>					
Male	7(43.7)	22(53.6)	25(43.8)	43(52.4)	15(41.6)
Female	9(56.2)	19(46.3)	32(56.1)	39(47.5)	21(58.3)
<b>Education</b>					
Primary school	1(6.2)	1(2.4)	0(0)	1(1.2)	1(2.7)
High school	7(43.7)	11(26.8)	13(22.8)	20(24.3)	11(30.5)
Graduate	6(37.5)	22(53.6)	30(52.6)	43(52.4)	19 (52.7)
Post Graduate	2(12.5)	7(17.0)	15(26.3)	18(21.9)	5 (13.8)
<b>Occupation</b>					
Professional	3 (18.7)	7 (17.0)	15 (26.3)	23(28.0)	6 (16.6)
Student	9 (56.2)	24 (58.5)	28 (49.1)	40(48.7)	20 (55.5)
Others	0 (0.0)	1 (2.4)	5 (8.7)	4(4.8)	3 (8.3)
Business	2 (12.5)	4 (9.7)	4 (7.0)	6(7.3)	3 (8.3)
Housewife	2 (12.5)	5 (12.1)	6 (10.5)	9(10.9)	4 (11.1)

About 52.5% were aware that such agents have ill effects on health & 28.3% of these knew about the carcinogenic potential of such chemicals. Few never even noticed it or read the label (38.3%). Proportion of the subjects who were aware about various health effects were as follows (%): Allergies (70.7), Skin rashes (39.8), Cancer (37.7), Hyperactivity in children (17.5), Asthma (16.6), Migraine (14.0), Problems in conceiving children (12.2). Most [for FAs (51.6%) & FPs (55.1%)] of them were not satisfied with the information given on the labels.

Education improved knowledge but not the practices which were unfavourable. This was similar for the FPs & FAs (Table nos. 2&3 respectively). Profession did not have an impact on the knowledge and practices of the participant (Table nos. 2&3).

**Table 4: Grading of knowledge and practices about FPs & FAs**

Grading of Knowledge	Practices		$\chi^2$ (p)
	Unfavourable	Favourable	
<b>Food Preservatives</b>			
Poor	20(20.4)	2(12.5)	1.167
Satisfactory	42(42.8)	6(37.5)	(0.56)
Good	36(36.7)	8(50.0)	
<b>Flavouring agent</b>			
Poor	8(22.2)	8(10.3)	8.654
Satisfactory	17(47.2)	23(29.8)	(0.013)
Good	11(30.5)	46(59.7)	

## DISCUSSION

There are no reported studies from India with which the findings of this study can be compared. Majority of them had awareness about the presence of 'Food Preservatives' & 'Flavouring Agents' in the packed foods that they buy. But they lacked any specific knowledge about the

effects of these chemicals. Similar results have been reported from South Korea.<sup>9</sup> One study from USA reported low levels of consumer awareness can't be compared with our study as they explored the consumer awareness attitudes on genetically modified foods, irradiated foods, chemical & microbiological contamination.<sup>10</sup>

Majority (50.4%) of the population were college graduate students. The foods commonly purchased reflect their snacking pattern. Some (like chips, ketchups, aerated beverages & ready to eat mixtures) of these foods are addictive. This can be inferred from the unfavourable practices {like purchasing such foods every day (17.1%), frequently (49.6%) & not avoiding purchase of such foods (22.8%)} in spite of the awareness of the presence of such chemicals in the packed foods (Table 1). Knowledge of specific effects of these agents was poor (52.5%). The need for more information about these chemicals was apparent from the fact that more than half of the participants [ FAs (51.6%) & FPs (55.1%)] were not satisfied with the labels. As there are reports of effects like asthma<sup>6</sup>, attention deficit hyperkinetic disorder<sup>7</sup>, gastrointestinal cancers<sup>4</sup>, Th1-type immune response in vitro<sup>5</sup>, there is a need to carry out sustained campaign to raise awareness and change their food consumption patterns. This is especially important considering the fact that most of the study population consisted young graduate students.

There could be some response bias which cannot be ruled out. Due to feasibility reasons, the timing of the data collection was in the evenings. Unfortunately most of the study participants were students who had come to purchase food items like those mentioned in the results. This could have resulted in the certain amount of bias. As most of the reported effects of these agents are long term affects, it is better to study the practices in this young age group rather than older age group there by reducing the impact of such a bias.

## CONCLUSIONS

The study participants are aware about the presence of the FPs & FAs in the packed foods even though they lack the knowledge about the effects about the specific effects. Their practices are unfavourable. There is a need to carry out sustained long term campaign to change their food consumption patterns to reduce the impact on health.

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