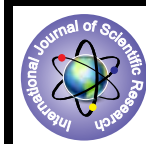


## Prevalence of Duck Sauce Syndrome among Students of a Private Medical University in Mangalore, DK District



### Medical science

**KEYWORDS:** Duck sauce syndrome, monosodium glutamate, medical students

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### ABSTRACT

*Introduction: Emerging trend of Indo-Chinese food could be bane. Chinese restaurant syndrome (CRS) was coined by Dr. Kwok in the year 1968. He noticed symptom complex after ingestion of Chinese meal added with Monosodium glutamate (MSG). It is also called as Duck Sauce Syndrome (DSS) as MSG was first used in sauce provided with duck roast. This syndrome is characterised by triad of symptoms (facial pressure, chest pain, and burning sensation/ flushing).*

*Objectives: This study was conducted to assess the prevalence of Duck Sauce syndrome and to assess the factors associated.*

*Methodology:*

*A cross-sectional study using simple random sampling was conducted among 146 university students. The data was collected using a self-structured validated questionnaire and analyzed with SPSS16.*

*Results: The prevalence of DSS was 34.9%. Those having schwarmma recipe (with MSG) more frequently had 100% chances of getting DSS and found statistically significant ( $p < 0.001$ ). Majority of the subjects (70%) having meals (without MSG) didn't develop DSS and found statistically significant ( $p < 0.002$ ).*

*Conclusions: Prevalence is high among students. Both male and female have equal chance of developing DSS. It is revealed that more frequent intake of food with MSG triggers the symptoms.*

*Implications: The local FHA should be authorized to periodically test sample of food about the MSG content. The Existing PFA act to be strictly implemented regarding consumption of MSG/person/day. Further exploration on ill effects of taste enhancer is recommended.*

### Background

Emerging trend of Indo-Chinese food could be bane in near future. There are four basic tastes - sweet, sour, salty, and bitter and there is also a fifth taste, called "umami". MSG has a long history of use in foods as a flavour enhancer<sup>1-3</sup>. The flavour enhancing property of MSG was discovered by Dr.Kikunae Ikida<sup>2, 4</sup>. Chinese restaurant syndrome (CRS) coined by Dr. Kwok in the year 1968 which was reported in the letter to the editor of the New England Journal of Medicine<sup>5</sup>. He noticed a complex of symptoms after ingestion of Chinese meal added with Monosodium glutamate (MSG)<sup>2, 6</sup>. In 1976, Reif-Lehrer et al. surveyed 1,500 subjects with a questionnaire to study the prevalence of CRS<sup>7</sup>. They found that 25% reported some adverse reactions possibly caused by MSG in food. It is also called as Duck Sauce Syndrome (DSS) as MSG was first used in sauce provided with duck roast. This syndrome is characterised by triad of symptoms (Chest pain, Numbness and burning sensation or flushing). The DSS will aggravate the pre-existing illness (Bronchial asthma, IHD etc.), some studies link MSG to vasoconstriction<sup>8</sup>. These symptoms occur within 15 to 30 minutes of eating foods with concentrations of MSG. These symptoms usually go away without treatment in about 90 minutes<sup>1</sup>. The recommended average daily intake of MSG according to Prevention of Food Adulteration Act (PFA) is 0.3gm to 1 gm, but in a highly seasoned restaurant it is added as much as 5gm<sup>2, 3</sup>.

**Objectives: To assess the prevalence of Duck Sauce syndrome and the factors associated.**

### Materials and Methods :

A cross-sectional study was done among the students of Yenepoya University for a period of two months from July-August 2014. A detailed questionnaire was framed to assess personal history, family history, diet history, dietary habits etc. Inclusion criteria were all consumers of Chinese food and food with MSG; those who are suffering from bronchial asthma/Ischemic Heart Disease/Hypertension and pregnant women were excluded from the study. Institutional ethical committee had given permission to conduct the study and written informed consent was obtained

from the participants. Pre-designed, Pre-tested validated semi-structured questionnaire was self-administered to the study subjects with objectives explained and the confidentiality of the data and results had been assured.

### Sample size and sampling method

Sample size was calculated for testing of a single proportion. With the population proportion as 22.9% from the reference article<sup>9</sup> and the expected sample proportion to be 33%, level of significance as 5%, power as 80%, the minimum sample size was found to be 146. Study subjects were selected by simple random sampling.

### Statistical Analysis

The data was analyzed using SPSS 16.0; Descriptive statistics were presented as frequency (Percentage) for categorical variables, Mean (SD) for continuous variables. Chi-Square at 5% level of Significance was used to find whether there was a statistically significant association between DSS and the recipes.

### Results:

The Demographic information profile is provided in Table 1. The prevalence of DSS was found to be 34.9%. The mean age of medical students was 20.09(±1.781) years. The students with existing health problems didn't take MSG added food as that might aggravate their illness.

The Nutritional information of the participants was assessed. Two out of 7(28.6%) who were on vegetarian diet and forty nine out of 139(35.3%) who were on mixed diet developed DSS. Two out of 14(14.3%) having home-made food, nine out of 22(40.9%) having only outside food and forty out of 110(36.4%) having both tend to develop DSS. Prevalence of DSS for the home made food with MSG usage was assessed. Eight out of 10(80.0%) having the practice of adding MSG at home and forty three out of 136(31.6%) not having the practice of adding MSG develops DSS and found statistically significant. Table 2 shows the pattern of DSS among subjects with that of frequency of food with MSG intake per week. Table 3 shows recipe wise prevalence of food

without MSG among non-syndromic subjects.

**Discussion:**

The prevalence of DSS in this study was found to be 34.9%. Kerr et al in his medical school community study assessed for “possible CRS” as 31%<sup>10</sup>.The prevalence of DSS among both male was and female 34.9% which signifies equal chance of developing DSS. It was observed in this study, subjects with family history of diabetes and hypertension is more likely to develop DSS. Similarly the prevalence among the students with family history of both diabetes and hypertension was 63%. Significant number of medical students was found to be hypertensive (12%) and diabetic (13%). In this study students with known history of hypertension had 67% chance of getting DSS. VuThiThu et al found in his study that there were significant interactions for MSG intake and blood pressure among participants who took hypertension medication<sup>11</sup>. Around 53% of the DSS students were known diabetic. The role of diabetes in causation of DSS has to be further explored. Allen et al in his study found MSG could be potential risk factor as an asthma trigger <sup>12</sup>.

In this study it was observed that those who had schwarmma recipe(with MSG) more frequent had 100% chances of getting Duck Sauce and 90% of subjects who frequently took food without MSG like meals, bread sandwiches, Idiyappam and Soya cury didn't develop DSS.

**Conclusion:**

The prevalence of duck sauce syndrome in this study was little high. Though these symptoms are unpleasant, they get slowly unnoticed without treatment in short duration. As the student community is so familiar with Junk food culture, craving for Pizza and fast food, an amendment has to be made in Public health act. It is suggested the existing PFA act has to be strictly implemented. The local food health authority should be authorized to test the sample of fast food about the MSG content and labeling; those who are violating the norms to be punishable. Awareness programme regarding ill effects of MSG in excess has to be disseminated to the community through multimedia and minimum amount of MSG to be consumed by per person per day. However further exploration on ill effects of taste enhancer is recommended.

**Limitation:** The quantity of MSG in the food was not measured.

**Acknowledgement:** I wholeheartedly thank Yenepoya Univer-

sity, colleague as well as those who participated in the study.

**Source of support:**Nil

**Conflict of interest:**None

**Table 1: Demographic information of the participants (N=146)**

Back ground Variables	Total number of students	Prevalence of DSS
Sex		
Male	83(56.8)*	29(34.9)*
Female	63(43.2)*	22(34.9)*
Family type		
Nuclear family	124(84.9)*	44(35.5)*
Joint family	20(13.7)*	5(25.0)*
Others	2(1.4)*	2(100.0)*
Religion		
Hindu	34(23.3)*	8(23.5)*
Christian	20(13.7)*	4(20.0)*
Muslim	92(63.0)*	39(42.4)*
Marital status		
Unmarried	141(96.6)*	49(34.8)*
Married	5(3.4)*	2(40.0)*
Family History of DM		
Yes	69(47.3)*	28(40.6)*#
No	77(52.7)*	23(29.9)*#
Family History of HT		
Yes	50(34.2)*	25(50.0)*
No	96(65.8)*	26(27.1)*
Family History of DM & HT		
Yes	44(30.2)*	27(62.8)*#
No	102(69.9)*	24(23.5)*#
Physical Activity		
Inactive	2(1.4)*	2(100.0)*
Minimally active	120(82.2)*	42(35.0)*
HEPA active	24(16.4)*	7(29.2)*
Known HT		
Yes	18(12.3)*	12(66.7)*#
No	128(87.7)*	39(30.5)*#
Known DM		
Yes	19(13.0)*	10(52.6)*
No	127(87.0)*	41(32.3)*
Health problems**		
Yes	4(2.7)*	0(0.0)*#
No	142(97.3)*	51(35.9)*#

\*Figures in parenthesis indicate percentages \*\* Asthma, Heart related problems # statistically significant

**Table 2: Showing DSS among more frequent intake of food with MSG (N=51)**

Recipe	Number of subjects frequently taking food in a week	Subjects who developed DSS	Chi-square With 1 df	P-value	Significance
Schwarmma	>3times/wk=24 <3times/wk=122	24(100%)* 27(22.1%)*	53.50	<0.001	Significant
Fried rice	>3times/wk=23 <3times/wk=123	22(95.7%)* 29(23.6%)*	44.285	<0.001	Significant
Chicken biriyani	>3times/wk=14 <3times/wk=132	11(78.6%)* 40(30.3%)*	12.974	<0.001	Significant
Samosa	>3times/wk=22 <3times/wk=124	17(77.3%)* 34(27.4%)*	20.431	<0.001	Significant
Grilled chicken	>3times/wk=12 <3times/wk=134	11(91.7%)* 40(29.9%)*	18.516	<0.001	Significant
Soup	>3times/wk=27 <3times/wk=119	25(92.6%)* 26(21.8%)*	48.456	<0.001	Significant

\* Figures in parenthesis indicate percentages

**Table 3: Recipe wise prevalence showing food without MSG among non-DSS (N=95)**

Recipe	Total number of students	Chi-square	P value
Meals	87( 91.5% )*	9.390(1df)	0.002
Bread sandwiches	88( 92.6% )*	18.236(1df)	0.001
Idiyappam	94(98.94%)*	18.516(1df)	0.001
Soya curry	94(98.94%)*	2.905(1df)	0.088

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