



## A Study on Cardio Respiratory Response Among Young Adults Having Chinese Restaurant Syndrome

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### ABSTRACT

*Introduction: Chinese food has become an integral part of Indian culinary scene. 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). Eating food seasoned with MSG stimulates the glutamate "umami" receptors on our tongue, enhancing savory flavor of the foods.*

*Objectives: This study was conducted to assess the cardio respiratory response among individuals sensitive to Chinese restaurant syndrome.*

*Methodology: A descriptive study followed by case control study was done among medical students in a private medical college.*

*Results: Both heart rate and systolic blood pressure increased after taking soup with MSG. There was a fluctuation in diastolic BP. A drop in oxygen saturation level was noticed immediately while taking vegetarian soup having MSG.*

*Conclusions: People sensitive to MSG may experience arrhythmias, angina and asthma.*

**KEYWORDS :** Cardio respiratory response, Chinese restaurant syndrome, Monosodium glutamate

### Background:

Generally people are enjoying pleasant experience by eating Chinese food in the fast food restaurant. Monosodium Glutamate (MSG) is an important ingredient in Chinese food. Dr. Kikunae Ikeda of Tokyo Imperial University who invented "delicious" flavor of kombu was due to glutamic acid<sup>1, 8</sup>. All commercially produced glutamic acid is termed Monosodium glutamate<sup>2</sup>. MSG is used as a chemical additive by food industries and is commonly marketed as a flavor enhancer. MSG is available in the market in different brand name. People enjoying food with MSG is having a complex of symptoms known as Chinese restaurant now it is called as "MSG symptom complex"<sup>3</sup>

The average daily intake of MSG in industrialized country is 0.3 to 1 gm, but in a highly seasoned restaurant it is used as much as 5 gm<sup>4, 5, 6, 7</sup>. MSG is safe for most people when "eaten at customary levels". People sensitive to glutamic acid may experience Arrhythmias, Rise or drop in blood pressure, tachycardia, Angina, and Asthma<sup>3</sup>. A strong link between ingestion of MSG and induction of an asthma attack had been proved in some epidemiological studies. People with asthma do get MSG-induced attacks on asthma (Allen *et al* 1987, Moneret-Vautrin 1987, Hodge *et al* 1996) MSG. A peripheral neuro-excitatory effect acting on irritant receptors in the lung, leading to reflex bronchoconstriction<sup>4, 6</sup> People having the CRS symptoms will aggravate the pre-existing illness such as bronchial asthma, COPD, IHD, cardiac arrhythmias and Blood pressure. Oral administration of high doses of MSG causes oxidative stress which plays an important role in the development of cardiac dysfunction<sup>9</sup>.

One school of thought links MSG to vasoconstriction says there is a rise in stroke incidence among young adults in Asian countries<sup>3</sup>. As the fast food and junk food culture is especially high among student community, it is necessary to find out the cardio respiratory response among medical students with Chinese restaurant syndrome.

### Methods:

In this two stage study design, a descriptive cross-sectional study fol-

lowed by case control study was conducted. By using a pre-tested, detailed structured Questionnaire to assess the symptoms for Chinese restaurant syndrome among 131 adult medical students. A 10 point score was given for the triad of symptoms. Those who were having 30 scores were CRS and those having 0 score were Non-CRS. The Chinese restaurant syndrome was observed among 30 students. By simple random sampling, 19 medical students were selected from syndrome students as cases and 19 from remaining Non-syndrome students as controls.

With approval of ethical committee of the medical college, this study was conducted. After obtaining the written informed consent from all participants, Systolic Blood pressure, Diastolic blood pressure, Heart rate and oxygen saturation level were recorded after allowing them to relax for 10 minutes. A cup of homemade tomato soup added with 2.5 gm of MSG was served to the subjects. The same procedure was repeated immediately, 15min, and 30min after taking the soup.

### Results:

All the parameters assessed are shown in table 1. The heart rate & systolic blood pressure (SBP) increased immediately and dropped after 15min and came back to normal after 30min. Diastolic Blood pressure (DBP) was normal but fluctuated within a narrow range. The increase of heart rate could be due to stimulation of the chemo receptors sending inhibitory impulses to vasodilator area and it decreases the vagal tone also. The fluctuation of DBP in this experiment could be probably due to the glutamate in MSG has vaso-constrictive effect on blood vessels due to its action as a calcium channel opener<sup>10</sup>. Glutamate has also been shown to vaso dilate blood vessels in skeletal muscle and in the cerebral cortex through activation of peripheral NMDA receptors<sup>10</sup>. The fluctuation of DBP in this experiment could be probably due to the glutamate in MSG has vaso constrictive effect on blood vessels due to its action as a calcium channel opener<sup>11</sup>.

Oxygen saturation is decreased immediately after consuming MSG added soup, drops after 15 min and remains static after 30 min.

MSG suppresses the physiologic functions of the organ systems by reducing the availability of oxygen in tissues through the inhibition of the production of red blood cells, the cell mediated immunity by suppressing the production of WBC, and by increasing the cardiovascular stress as a result of the induction of metabolism related to the production of cardiovascular risk metabolites with the active involvement of the hypothalamic hunger-satiety neuronal pathways.<sup>2,7</sup> The drop in oxygen saturation after they had soup containing MSG could be probably due to the sodium, it would cause retention of water intake causing decreased alveolar-capillary membrane diffusion leading to hypoxia<sup>12</sup>.

**Discussion:**

A possible association between MSG and the triggering of asthma attacks was first suggested by Allen and Baker (1981). Since then a small number of studies have been conducted to investigate this association but have produced conflicting results. Five of these studies did not demonstrate MSG-induced asthma attacks (Schwartzstein 1987, Germano 1991, Altman 1994, Woods 1998, Woessner 1999), whereas three have concluded that some people with asthma do get MSG-induced attacks (Allen 1987, Moneret- Vautrin 1987, Hodge 1996).

**Conclusion:**

People sensitive to glutamic acid may experience arrhythmias, angina and asthma. Further research in this area would confirm and strengthen the cardio- respiratory response due to MSG among people with hypertension, Bronchial asthma and IHD

**Keywords:**

Cardio respiratory response, Chinese restaurant syndrome, Monosodium glutamate

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**Annexure: Table 1**

**Table: 1 showing the parameters assessed at the Basal level, immediate, after 15 min & after 30 min.**

Variable	Basal	Immediately	15 minute	30 minute
<b>Mean systolic Blood pressure</b> Non-CRS CRS	103 105	101 108	100 102	102 105
<b>Mean diastolic blood pressure</b> Non CRS CRS	67 69	66 69	66 66	69 67
<b>Mean heart rate</b> Non CRS CRS	84 81	87 84	88 79	88 83
<b>Mean oxygen saturation</b> Non-CRS CRS	99.2 99.2	98.7 99	99 98.4	99 98.3

(Note: Blood pressure in mm of Hg and Mean oxygen saturation in %)

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