



## Review Article

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### ADVERSE EFFECT OF MONOSODIUM GLUTAMATE IN RELATION TO THE CONCEPT OF DUSHI VISHA: A REVIEW

Lalita Annaji. Somnath<sup>1\*</sup>, Sonali Chalakh<sup>2</sup>

<sup>1</sup>PG Scholar, Agadtantra Dept, Mahatma Gandhi Ayurved College, Hospital and Research Centre, Salod (Hirapur), Wardha- 442001, Maharashtra, India

<sup>2</sup>Prof and HOD, Agadtantra Dept, Mahatma Gandhi Ayurved College, Hospital and Research Centre, Salod (Hirapur), Wardha – 442001, Maharashtra, India

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#### \*Corresponding author

E-mail: drminakshiurkude@gmail.com

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#### ABSTRACT

In modern era, due to western and fast lifestyle, peoples changed their food habits. Chinese and fast foods mean noodles, burger, fried rice, pizza, soups, chips and packed foods are most popular in today's trend of society. Ajinomoto is one of the preservatives which is used in almost all type of fast and packed foods containing monosodium glutamate which is mainly used as flavour enhancer of food. It increases the appetite by stimulating the appetite centre but now a day it has been debated for its safety and harmful effects as it affect almost every major organ in the body. The adverse effect of MSG ingestion may be cumulative, cumulative toxicity is the accumulation of the toxins over a period of time and in turn resulting in the harsh effect on the body and mind. Dushi Visha is one of the kritrim types of the visha explained in Ayurveda. It is a type of toxin which remains inside the body for long time and then produces various ill effects on the body. Dushi Visha has got its own significance in the present day because of increased food adulteration, change in the food processing and increased use of chemical manures which produce toxic effect on long run. This cumulative toxicity is similar to the Dushi Visha concept defined by Acharya Sushruta which cannot produce its symptoms immediately, but it takes long time and manifest after getting favourable condition.

**KEY WORDS:** Monosodium glutamate, Dushi visha, cumulative toxicity, Ajinomoto

#### INTRODUCTION

Now a days due to influence of western life style, fast food, adulteration, pesticides, environmental pollutants, peoples are unknowingly exposed to such type of toxic material in their daily activities. Food preservatives are such elements that are continuously exposed to us, in order to enjoy food, taste and flavour are necessary. So, tasteless food even it composed of required nutritional elements is usually rejected. Ajinomoto is one of the preservatives which is used as a flavour enhancer in food<sup>1</sup>. Ajinomoto containing monosodium glutamate is widely used in restaurants, industrial food production and home also, for taste enhancer<sup>2</sup>. Though MSG improves taste stimulation and enhances appetite, many researches indicate that it is toxic to human and experimental animals. It produces many adverse effects on human body<sup>3</sup>. Monosodium glutamate is just like a Cumulative Poison<sup>4</sup>, not immediately eliminated from the body. It tends to bio-accumulate in the system and can produce symptoms of chronic poisoning. In last few years, the burden of chronic toxin accumulation as a cumulative poison in the form of Dushi Visha.

Dushi Visha is one of the chronic toxicity due to accumulation of either inanimate or animate or artificial poisons. After its treatment, when it becomes less potent and when its effects are not nullified completely because some of its residues are remained in the body, that particular less potent part called Dushi Visha<sup>5</sup>. That doesn't produce any immediate effect on the body, it spreads slowly in the tissues of the body when the condition becomes suitable, it is manifested like Dushi Visha symptoms.

So the harmful effect of monosodium glutamate can correlate with the DushiVisha.

It is a literature review to find the relation in between Dushi Visha and cumulative toxicity produce by monosodium glutamate from Ayurvedic text, different Samhita's, published research articles and web sides.

#### MONOSODIUM GLUTAMATE

Monosodium glutamate (MSG) is one of world's most widely used food additives as a flavour enhancer. It stimulates or produces taste which is described in Japanese as Unami called as Savoury. In many countries MSG goes by the name 'China-salt'<sup>6</sup>. Monosodium glutamate (MSG) is the sodium salt of glutamic acid. Glutamic acid is a non-essential amino acid i.e. body can produce its own amino acid and does not require supplement containing glutamic acid. Naturally, Tomatoes, Cheese, Mushrooms, contain large quantity of glutamate which is used to enrich the taste and flavour of food<sup>7</sup>. But now a day's monosodium glutamate is manufactured by a chemical process in which glutamic acid is isolated and then bound to a sodium molecule and purified into a white powder. MSG (C<sub>5</sub>H<sub>8</sub>NO<sub>4</sub>Na) contains 78% of glutamic acid, 22% of sodium and water<sup>8</sup>. It was once made predominately from wheat gluten, but now, it is made mostly from bacterial fermentation<sup>9</sup>.

The optimal palatability concentration of MSG is between 0.2 and 0.8 % with the largest palatable dose for human being about 60mg/kg body weight<sup>10</sup>. Although there is no problem if MSG is present in small amount in any one food, but problems occurs when MSG is consumed in continuously in different common

foods. MSG is present in chips, jelly, pastry, candy, Biscuits, fruity, bread, chocolate, jam, juice, cerelac, burger, French-fries, pizza, cold drinks, noodles etc. and food served in every fast food restaurant in different forms or names, most probably to keep people unaware of its presence<sup>11</sup>.

#### HIDDEN NAMES FOR MSG:<sup>12</sup>

MSG is being added in common food stuffs under the heading of different names–

**Table 1: Different names of MSG**

Glutamic Acid (E 620)	Calcium Caseinate
Glutamate(E 6200)	Sodium Caseinate
Monosodium glutamate (E 621)	Yeast Food
Monopotassium glutamate (E 622)	Yeast Nutrient
Calcium glutamate (E 23)	Autolyzed Yeast
Mono ammonium Glutamate (E 624)	Gelatin
Yeast Extract	Soy Protein
Yeast Extract	Soy Protein Concentrate
Anything “hydrolyzed	Soy Protein Isolate
Glutamic Acid (E 620)	Whey Protein
Natrium Glutamate	Textured Protein

#### ADVERSE EFFECT OF MSG

Daily intake of MSG by different food sources may results in accumulation and rise of glutamic acid concentration in blood and shows adverse reaction on every major organ in the body<sup>13</sup>. Side effects of monosodium glutamate in animal trials, it has been proved to be toxic for both humans and experimental animals. Side-effects should be reported by various studies or it can be appeared in the form of anomalies of metabolic, digestive, respiratory, circulatory and nervous system<sup>14</sup>.

Free glutamic acid can cause problem in brain just like it can get into the brain, injuring and frequently killing neurons and also many allergic reaction on body because brain have many receptors for glutamic acid and some areas (e.g. hypothalamus) do not have an impermeable blood brain barrier<sup>15</sup>. Free glutamic acid reaction in sensitive people causes Tachycardia, Angina, Rise or drop in blood pressure, Headache, loss of balance, joint pain, anxiety, stiffness, dizziness, hyperactivity, disorientation, insomnia, migraine, lethargy, muscle weakness, behavioural problem in children, diarrhoea, nausea, vomiting, irritable bowel syndrome, mental confusion, also respiratory complication including asthma, chest pain, runny nose, sneezing, shortness of breath and many types of skin diseases<sup>16</sup>.

#### CONCEPT OF DUSHI VISHA

The word Dushi means impure or possessing property to vitiate.

#### DEFINITION OF DUSHI VISHA

The poison which vitiates Dhaatus because of factors such as Desha (habitat), Kala (season), Anna (food) and sleeping during day time is called Dushi Visha<sup>17</sup>.

Acharya Sushruta has been stated that a part of Sthavara (Inanimate), Jangama (Animate) or Kritrim (Artificial) poison which accumulated and could not be excreted from the body completely due to its chronic and cumulative nature or becomes less potent after digestion or counter action of antidotes and stays in the body for a prolong period and vitiating the body slowly is called Dushi Visha<sup>18</sup>.

Acharya Vagbhata stated that poison whether Sthavara, Jangama or Kritima- which has not gone out of the body completely without leaving any residue, that poison which is very old, inactivated by anti-poisonous things, that which is evaporated (destroyed partially) by forest fire, wind and sun, that which by nature is poor in its qualities, attain the name Dushi Visha (impoverished /impotency /weak poisons), because of poor potency it does not kill the person quickly and remains in the body for many years covered by kapha<sup>19</sup>.

All Acharya describes that Dushi Visha is like a slow poison which accumulates in our body, due to its low potency it does not produce any acute ill effect but produces chronic illness due to prolong exposure.

#### SYMPTOMS OF DUSHI VISHA

Vagbhata explained the Avyakta and Vyaktaawastha of Dushi visha-<sup>20</sup>

**Avyakta- awastha** of Dushi Visha- The veerya of dushivisha being less, it does not show any immediate fatality. On the other hand, it becomes avritta by kapha and stays in that state for years. Its symptoms do not arise immediately.

**Vyakta- awastha** of Dushi Visha – Unfavourable environment (desha), time (kala), food, over- exertion, mental dilemma, anger etc., reduce the immunity of a person. In such circumstances, the Eastern/frontal winds, day sleep, Clouds, Indigestion, indulgence in unsuitable food. Help in the further vitiation of the dhatu and the symptoms of Dushi visha appear<sup>21</sup>.

#### POORVAROOP OF DUSHI VISHA (PRODERMAL SIGNS):<sup>22</sup>

When Dushi Visha is about to flare up it produces some symptoms. These symptoms are specific for each individual patient. When the patient feels these prodromal symptoms he should take preventive measures.

**Table 2: Poorvaroop of Dushi Visha**

Excessive sleep	Feeling of loosening of the joints
Heaviness	Pilo- erection
Excessive yawning	Body ache

#### SIGNS OF DUSHI VISHA:<sup>23</sup>

Dushi Visha vitiates the Rakta dhatu and causes -furuncles, patches and skin eruptions. Indigestion, anorexia, oedema of the limbs, ascites, vomiting, diarrhoea, changes in the skin colour, vertigo, fever with chills and intense thirst are also seen.

Some poisons cause insanity or abdominal distension or shukra-kshaya or voice change or skin eruption due to their special effects.

#### SYMPTOMS ACCORDING TO SITE:<sup>24</sup>

The Dushi Visha situated in the aamashaya shows symptoms of the kapha and vatadoshas, whereas that in the pakwashaya shows those of vata and pitta. The hair of the head and body of the person fall and he appears like a bird with broken wings. All these signs appear on and off many times.

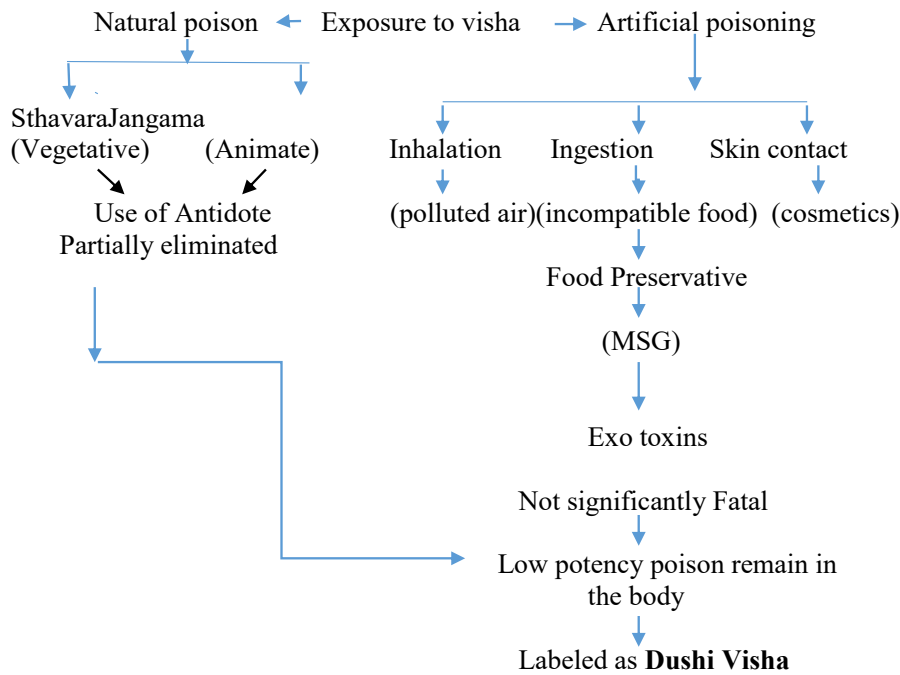
**UPADRAVAS OF DUSHI VISHA:<sup>25</sup>**

**Table 3: Updravas of Dushi visha**

Fever	Loss of consciousness
Burning sensation	Vertigo
Hiccups	Heart diseases
Abdominal distension	Abdominal enlargement
Shukra-kshaya	Insanity
Oedema/inflammation	trembling
Diarrhoea	Other complication

**DUSHI VISHA RELATED TO MONOSODIUM GLUTAMATE:<sup>26</sup>**

Pathogenesis of Dushivisha



**CORRELATION BETWEEN MSG AND DUSHI VISHA**

**Table 4: Correlation**

Adverse effect of Monosodium glutamate	Upadrava of Dushi Visha
Tachycardia, Angina, Rise or drop in blood pressure	Heart diseases
Diarrhoea	Diarrhoea
Infertility, sterility, PCOD	Shukra-kshaya
Irritable bowel syndrome, constipation	Abdominal distension, hardness of stool
Allergic diseases like asthma, skin diseases	Furuncles, patches and skin eruptions due to vitiated raktadhatu
Insomnia, migraine, headache	Vertigo, headache

**DISCUSSION**

Artificial substances are used as food preservatives. Monosodium glutamate is used in the food industry as flavour enhancer. Long term use of this artificial substance in food acts as slow acting poison which produces end organ damage, by accumulating in the body.

Dushi Viṣha is an artificial substance, which produces hazardous effect on body, but does not lead to instant death, as it is not easily metabolized in the body. It gets accumulate in the body and produces chronic systemic ill effect.

Chronic exposure of Monosodium glutamate by different food sources enter in the body and it does not get completely

eliminated from the body. This repeated accumulation may lead to cumulative toxicity.

Due to cumulative toxicity, hazardous effect of MSG not seen on the body immediately, but it can be seen slowly after their long term use.

Most of the clinical manifestation and complication of the cumulative toxicity of Monosodium glutamate are similar to Dushi Visha like nausea, vomiting, muscle weakness, tremor, seizer, allergic disorder like asthma, skin allergy, reproductive disorders like infertility, sterility, PCOD, , hypertension, obesity, etc. So, the adverse effect of MSG ingestion may be cumulative, over a period of time and in turn resulting in the harsh effect on the body and mind.

So, artificial food preservatives like MSG should be compared with Dushi Visha described in Ayurveda.

## CONCLUSION

From the above discussion we can concluded that Dushi Visha described by Ayurveda can be correlate with cumulative toxicity induced by Monosodium glutamate.

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