



IS MONO SODIUM GLUTAMATE SALT (MSG) HARMFUL TO LIVING SYSTEMS?

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Abstract: Monosodium glutamate (MSG), also known as sodium glutamate, is the sodium salt of glutamic acid, one of the most abundant naturally occurring non-essential amino acids. A widespread and silent killer that's worse for your health than alcohol, nicotine and many drugs is likely lurking in your kitchen cabinets right now. "It" is monosodium glutamate (MSG), a flavor enhancer that's known widely as an addition to Chinese food, but that's actually added to thousands of the foods you and your family regularly eat, especially if you are like most of the people who eat the majority of your food as processed foods or in restaurants. MSG is one of the worst food additives on the market and is used in canned soups, crackers, meats, salad dressings, frozen dinners and much more. It's found in your local supermarket and restaurants, in your child's school cafeteria and, amazingly, even in baby food and infant formula. We tested the efficacy of toxicity of MSG on certain living cells (epithelial cells of buccal cavity, blood cells, onion root tips) and DNA extracted from onions. We found that at low concentrations the salt does no harm whatsoever but as concentration is increased (10% and above) harmful effects like disintegrating nuclei and malformed cells were observed. Therefore we conclude that though it has no effects at low concentration, it may harm the living system if consumed without any inhibition at high concentrations (daily eating of fast foods and processed foods) or via accumulation of salt in the system resulting in high concentration over a period of time.

Key Words: Monosodium glutamate (MSG),

INTRODUCTION

In 1908, that monosodium glutamate was discovered by Kikunae Ikeda, a Japanese man who identified the natural flavor enhancing substance of seaweed. Chemically speaking, MSG ($C_5H_8NO_4Na$) is approximately 78 percent free glutamic acid ($C_5H_9NO_4$), 21 percent sodium (Na), and up to 1 percent contaminants.

It's a misconception that MSG is a flavor or "meat tenderizer." In reality, MSG has very little taste at all, yet when you eat MSG, you think the food you're eating has more protein and tastes better. It does this by tricking your tongue, using a little-known fifth basic taste: umami.

Umami is the taste of glutamate, which is a savory flavor found in many Japanese foods, bacon and also in the toxic food additive MSG. It is because of umami that foods with MSG taste heartier, more robust and generally better to a lot of people than foods without it.

MSG is an excitotoxin, which means it overexcites your cells to the point of damage or death, causing brain damage to varying degrees – and potentially even triggering or worsening learning disabilities, Alzheimer's disease, Parkinson's disease, Lou Gehrig's disease and more.

Part of the problem also is that free glutamic acid is the same neurotransmitter that your brain, nervous system, eyes, pancreas and other organs use to initiate certain processes in your body.

Studies have shown that the body uses glutamate, an amino acid, as a nerve impulse transmitter in the brain and that there are glutamate-responsive tissues in other parts of the body, as well. Abnormal function of glutamate receptors has been linked with certain neurological diseases, such as Alzheimer's disease and Huntington's chorea. Injections of glutamate in laboratory animals have resulted in damage to nerve cells in the brain

According to Dr. Blaylock, numerous glutamate receptors have been found both within your heart's electrical conduction system and the heart muscle itself. This can be damaging to your heart, and may even explain the sudden deaths sometimes seen among young athletes. "When an excess of food-borne excitotoxins, such as MSG, hydrolyzed protein soy protein isolate and concentrate, natural flavoring, sodium caseinate and aspartate from aspartame, are consumed, these glutamate receptors are overstimulated, producing cardiac arrhythmias. When magnesium stores are low, as we see in athletes, the glutamate receptors are so sensitive that even low levels

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of these excitotoxins can result in cardiac arrhythmias and death.”⁶

Many other adverse effects have also been linked to regular consumption of MSG, including:

1. Obesity
2. Eye damage
3. Headaches
4. Fatigue and disorientation
5. Depression

Further, even the FDA admits that “short-term reactions” known as MSG Symptom Complex can occur in certain groups of people, namely those who have eaten “large doses” of MSG or those who have asthma.⁷

According to the FDA, MSG Symptom Complex can involve symptoms such as:

1. Numbness
2. Burning sensation
3. Tingling
4. Facial pressure or tightness
5. Chest pain or difficulty breathing
6. Headache
7. Nausea
8. Rapid heartbeat
9. Drowsiness
10. Weakness

No one knows for sure just how many people may be “sensitive” to MSG, but studies from the 1970s suggested that 25 percent to 30 percent of the U.S. population was intolerant of MSG – at levels then found in food. Since the use of MSG has expanded dramatically since that time, it’s been estimated that up to 40 percent of the population may be impacted.⁸

MATERIALS AND METHODS

Step 1:

Commercially available MSG salt was taken from the local market of Hyderabad. A pure extract was made by dissolving MSG in distilled water. This pure extract was diluted at different concentrations viz. 6%, 8%, 10%, 12%.

Step2:

After obtaining the extract, the extract was used to test change in density of DNA by using Onion DNA Solution, the MSG extract was added to DNA solution at different concentrations and the DNA solution was checked for solubility at different interval of time using a UV Spectrophotometer. Changes in DNA density were observed and readings were noted.

Step3:

After the testing MSG extract on DNA solution and knowing that the results indicate change in density (increase in the absorbance value) of DNA at different time intervals and concentrations of extract another experiment was done to prove that MSG harms DNA with the help of onion root tips, epithelial cells of buccal cavity and blood cells.

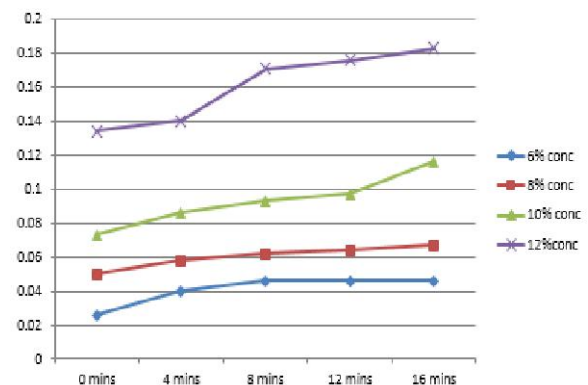
The onion bulbs were placed in water beaker for 3-4 days for roots to arise. Then the bulbs with fully grown roots were subjected to extract of MSG at different concentrations viz.6%, 8%, 10% and 12% by soaking them for 30 mins at room temperature.

After the given time interval the roots from both the onions were cut and dipped in 9 drops of acetocaramine stain + 1 drop of HCL and incubated for 20 minutes now the roots were smashed on glass slides and examined under the microscope

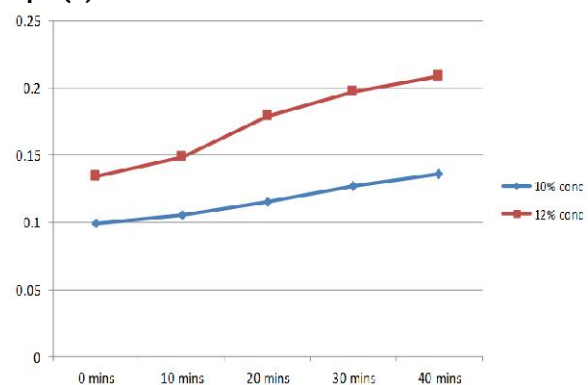
Same way the epithelial cells from the buccal cavity and blood cells were treated with the MSG and were examined under the microscope to check the abnormality of the cells after treatment with MSG.

RESULTS AND DISCUSSION

In our study of change of density of DNA the following observations were made



Graph (a)



Graph (b)

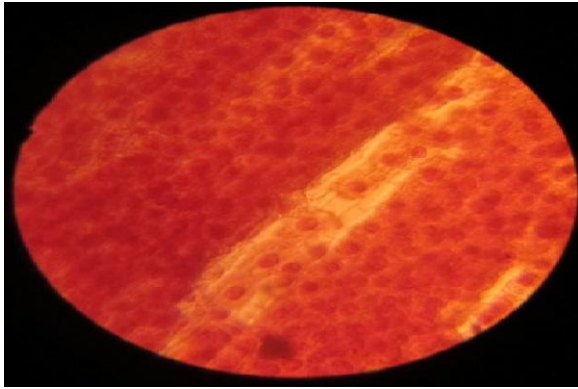


Figure (a): Control slide for MSG of onion root tips in which cells are showing prophase and nuclei and chromosomes are prominent.

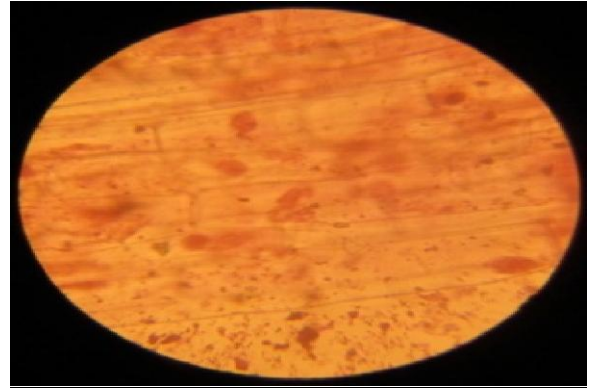


Figure (e):

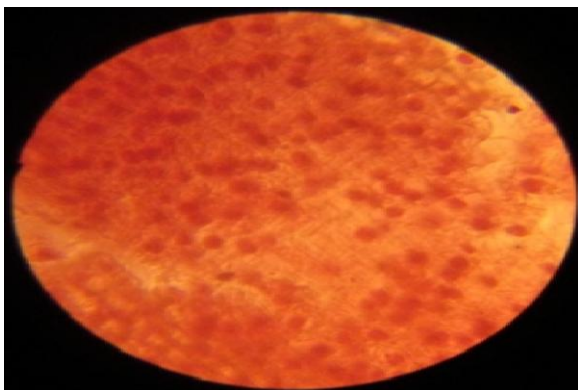


Figure (b): Control slide for MSG again showing prophase.

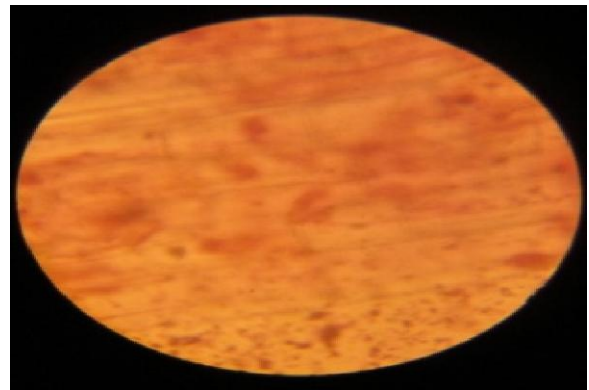
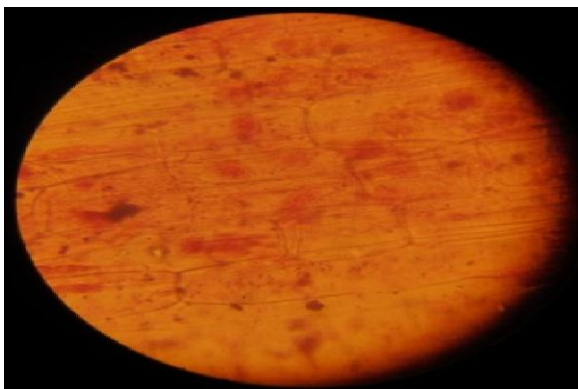
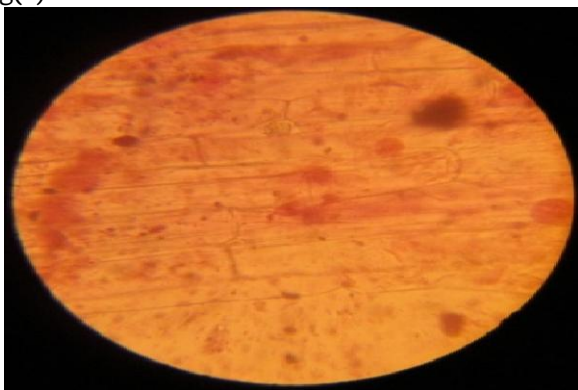


Figure (f):

Figure (c), (d), (e) & (f) slides treated with MSG. The cells have ruptured nuclei and lysis of cells is also taking place and malformed cells are seen which are empty because of disintergerated nuclei.



Fig(c):



Fig(d):

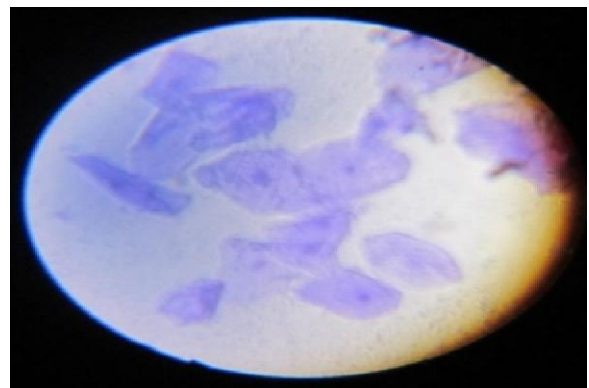


Figure (g): control slide for buccal epithelium cells. The cells are normal and show no malformation.

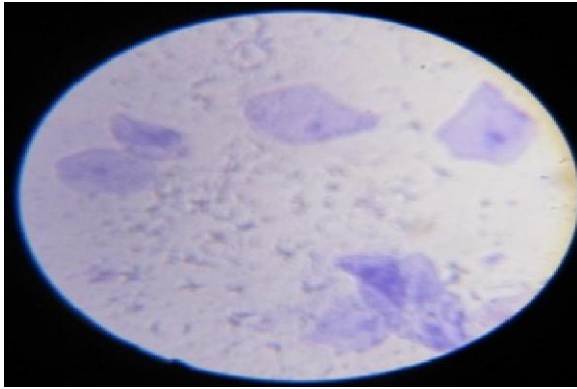


Figure (h): slide treated with MSG. Less no. cells are observed and debris around the cells is also seen. The nuclear membrane is slightly hazy.

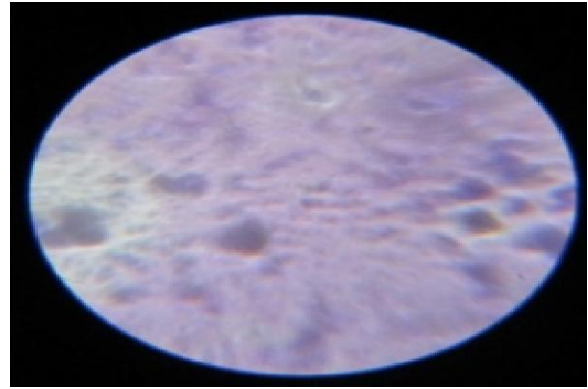


Figure (l)

Figure (j), (i), (k) & (l) slides treated with MSG of blood cells. Lot of damaged and malformed cells are seen in the form of dark masses.

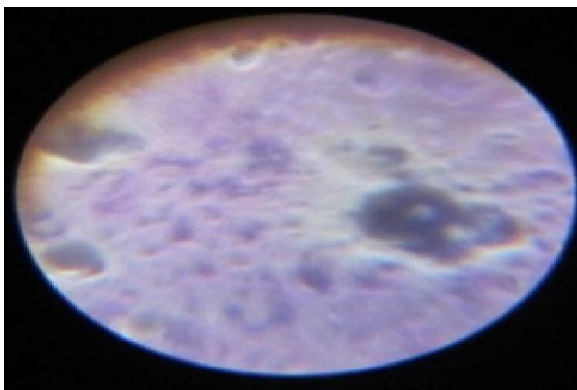


Figure (i):

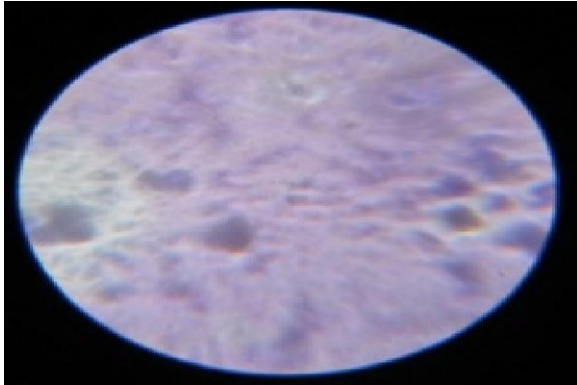


Figure (j):

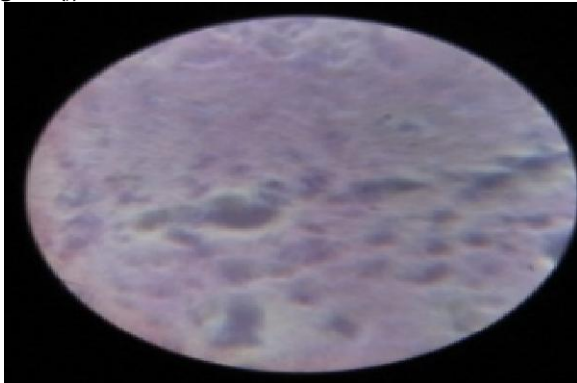


Figure (k):

CONCLUSION

Almost everybody is aware that fast food or street food is generally unhealthy. Just because of low cost and faster availability people prefer to go to fast food center rather than eating home food. Working people and students prefer eating in fast food centers during their working hours as it saves their time. From the above studies and results we conclude that regular use of MSG in your diet maybe harmful to your living system. MSG does not have any effect at low concentrations. It is found from our studies that concentrations below 12% are harmless but if raised above then the living systems maybe damaged. People are advised to consume MSG at concentrations below 12% and check the level of concentrations before consumption of fast food and processed food.

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