

# MONOSODIUM GLUTAMATE EFFECT ON WOMEN WEIGHT GAIN AND REPRODUCTIVE ORGAN

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## ABSTRACT

**Introduction:** Monosodium glutamate (MSG) is widely used as food preservative. Asian countries are the major user among all to use this kind of additives despite of many debates among the safety of MSG for human consumptions. Natural MSG was found in foods with high protein, sea product, and vegetables. **Method:** Articles search via Google Scholar, and Sage Publication database. The search was not limited to English language but no article in bahasa Indonesia was found. **Results:** Research about weight gain and Body Mass Index (BMI) in human after MSG intake show contrary results. There were some studies that suggested body weight gain and BMI but some studies didn't suggested. Research about genotoxicity of MSG mostly conducted on experimental animal. **Discussion:** This review reveal that even though there were evidence that MSG produce negative effect such as weight gain, cell inflammation, damage of reproductive organ in female animal samples, no generalized conclusion published to provide necessities of MSG prohibition in human foods.

Keywords: monosodium glutamate, weight gain, BMI, genotoxicity

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## INTRODUCTION

Monosodium glutamate (MSG) has been a debate in our society. Other than additive substance, MSG was found in natural product especially foods with high protein such as meat, and fish. It also occurs in vegetables like tomatoes, and mushrooms, and sea product such as seaweed (EUFIC 2002). Many people, even health workers believe that the use of MSG in food is consider being bad for our health. Study of MSG is a very active research than research of any other additives for food. Most nurses suggest their patients including women patients to avoid food containing MSG in their diet. Their explanation are MSG can produce bad effect for health as general and triggers cancers especially cancer in reproductive system. United States Food and Drug Administration (FDA) and European Food and Information Council (EUFIC) recommended that MSG use in food is safe according to researches. Despite the recommendation, scientist in Europe request the European Food Safety Authority (EFSA) to provide scientific prove of MSG safety since there were changes in MSG production method (EFSA 2015). In Indonesia Badan Pengawasan

Obat dan Makanan (BPOM), food and drug agency of Indonesia has press released that the use MSG as food additives is safe (Esy and Rie 2009). Thus the correlation between monosodium glutamate intake and women's health remain unclear.

## METHODS

Articles searches conducted electronically via Google Scholar, and Sage Publication database. The search was not limited to English language articles but no article in Bahasa Indonesia was found. Keywords used were monosodium glutamate, l-glutamine, and women's health. The search yielded 311 articles, 25 were matched with the criteria and 12 of them were reviewed in this paper.

## RESULTS

MSG is widely use, not only in Asian countries such as Japan and China but also in other continents like Europe, America, and Australia (Hien VuThiThu 2013). It added to foods and produces a flavoring called "umami". This flavor was explained as savory taste or meat like taste (EUFIC 2002). This so called

umami taste according to a research in women found that obese women comparing to normal weight women have increase in MSG detection thresholds. Obese women prefer a high concentration of MSG than normal weight women (Pepino 2010). An INTERMAP study about association on MSG intake and overweight in Chinese adults suggest that women had slightly lower MSG intake than man. The research included 48.7% women as samples found that MSG user had higher body mass index (BMI) and likely to get overweight than MSG non-user (He 2008). A study on elderly also found MSG increase energy intake, body weight and BMI (Bautista et al. 2013). MSG alone decreased blood triglyceride and total cholesterol (T-CHOL) levels. MSG in combination with Aspartam (ASP) elevated body weight, and caused a further increase in fasting blood glucose compared to Controls (prediabetic levels); together with evidence of insulin resistance during the insulin tolerance test (ITT) (Kate S Collison 2012). On contrary, a study also on Chinese adult population found that MSG intake was not associated with weight gain when the results was adjusted for age, sex, multiple lifestyle factors and energy intake (Zumin Shi 2010). Another study in women recommended that the addition of MSG to chicken broth did not increase energy intake or affect motivational consumption of the next meal (Carter et al. 2011). One study suggested that MSG intake did not increase Hemoglobin level in women with normal body weight (Shi et al. 2013).

Many believe that MSG produce genotoxicity effect on human organ, a lot of research conducted using experimental animals to reveal this suspicion. A research about the effect of vitamin C administration on monosodium glutamate induced liver injury proposed Light microscopic examination of the liver on rats given MSG alone shows increased number of vacuoles and inflammatory cellular infiltration with small fragmented pycnotic nuclei that were more abundant around the central vein of hepatocytes. These damages show less in group with the combination of MSG and vitamin C (El-Meghawry El-Kenawy et al. 2013). Activity of glucose-6-phosphatase in the liver and kidneys rats increase after intraperitoneal MSG and significantly cause micronucleated polychromatic erythrocytes (MNPCEs) formation. Administration of vitamin C and quercetin on experimental rats on

this study inhibit MNPCEs induction (Farombi and Onyema 2006). An experiments in 2 group of female wistar rats given 0.04mg/kg and 0.08mg/kg of MSG thoroughly mixed with the growers' mash showed fallopian tube cellular hypertrophy, degenerative and atrophic changes, and lysed red blood cells in lumen. These condition was severe in group given 0.08mg/kg of MSG. It is suggested that MSG may have some deleterious effects on the fallopian tubes of adult female Wistar rats at higher doses of MSG (Eweka et al. 2010). Other study in female wistar rats also proposed the histopathological evaluation of the tissues of the ovary showed Infiltration of inflammatory cells in and around the oocyte as well as in the zonal granulosa layer and there was distortion of tissue architecture after oral administration of MSG (Ilegbedion et al. 2013). An in vitro experiment of human lymphocytes investigate the genotoxic potential of MSG by using chromosome aberrations (CAs), sister-chromatid exchanges (SCEs), cytokinesis-blocked micronucleus (CBMN), and random amplified polymorphic DNA-polimerase chain reaction (RAPD-PCR) show MSG is genotoxic to the human peripheral blood lymphocytes (Ataseven et al. 2016).

## DISCUSSION

Some researchers suggested MSG usage on food may increase women BMI and weigh while other study found that MSG did not change women motivation to take more meals, and no weight gain and increase hemoglobin level in women. One study even stated that women had decrease in snack and hunger after MSG containing food (Carter et al. 2011; He 2008; Shi et al. 2012). MSG in some studies increase energy intake in elderly and elevated glucose level in blood (He 2008). This proposed MSG might elevated body weight as MSG add delicacy and motivate people to take more foods. Genotoxicity of MSG has become focus research in many years. Most of the study was conducted on animals samples and human substance in vitro (Ataseven et al. 2016; El-Meghawry El-Kenawy et al. 2013; Farombi and Onyema 2006; Ilegbedion et al. 2013; Kate S Collison 2012; Zumin Shi 2010). Although most research in animals and human lymphocytes showed negative effect of MSG, researchers state that the results of the studies should not be generalized for human. Besides, some antioxidant like vitamin C, and quercetin

show positive protection effect on cell with MSG inflammation effect (El-Meghawry El-Kenawy et al. 2013; Farombi and Onyema 2006). The study of MSG effect on human health especially women's health need to be continue. Despite lots of in vitro studies shows negative effect of MSG on female reproductive organ, to necessitate the prohibition of use of MSG is not available. It is important that MSG is not use excessively as an additive in foods for women.

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