



GLUTAMATO MONOSÓDICO Y SEGURIDAD ALIMENTARIA: EN ALIMENTOS PROCESADOS

MONOSODIUM GLUTAMATE AND FOOD SAFETY: IN PROCESSED FOODS

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RESUMEN

Esta investigación se enfoca en un análisis exhaustivo de los niveles de glutamato monosódico (GMS) presentes en alimentos procesados, dada su relevancia en el ámbito culinario por su capacidad para intensificar los sabores y generar sensaciones agradables en el paladar. El objetivo esencial es verificar si los niveles de GMS se mantienen dentro de los límites establecidos por las normativas, proporcionando así una evaluación integral de la seguridad alimentaria vinculada con este aditivo. Para la realización de este estudio, se llevó a cabo una revisión bibliográfica minuciosa, que incluyó una amplia gama de fuentes relacionadas con el GMS en productos alimenticios procesados. Se emplearon criterios estrictos de inclusión y exclusión para garantizar la selección de los estudios más relevantes y pertinentes. Los resultados obtenidos indican que los niveles típicos de GMS oscilan entre 0,1 y 3 gramos por cada 100 gramos de producto. No obstante, el uso del GMS ha suscitado debates debido a las preocupaciones sobre sus posibles efectos adversos en individuos sensibles a este compuesto. Por ello, se subraya la importancia de un consumo moderado de glutamato, asegurando de esta manera no solo el disfrute de sus beneficios gustativos, sino también la protección de la salud de los consumidores.

Palabras clave Ácido glutámico, quinto sabor, sabor umami, aditivo

ABSTRACT

This research focuses on an exhaustive analysis of the levels of monosodium glutamate (MSG) present in processed foods, given its relevance in the culinary field due to its ability to intensify flavors and generate pleasant sensations on the palate. The essential objective is to verify whether MSG levels are maintained within the limits set by the regulations, thus providing a comprehensive assessment of the food safety linked to this additive. To carry out this study, a thorough literature review was carried out, which included a wide range of sources related to MSG in processed food products. Strict inclusion and exclusion criteria were used to ensure the selection of the most relevant and relevant studies. The results obtained indicate that typical MSG levels range from 0.1 to 3 grams per 100 grams of product. However, the use of MSG has sparked debate due to concerns about its possible adverse effects in individuals sensitive to this compound. Therefore, the importance of moderate glutamate consumption is

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underlined, thus ensuring not only the enjoyment of its taste benefits, but also the protection of consumers' health.

Keywords Glutamic acid, fifth flavor, umami flavor, additive

INTRODUCTION

In the fascinating world of gastronomy and food science, flavour plays a fundamental role in captivating our palate and awakening pleasant sensations. Practically all the foods that are consumed today are processed in some way to make them more edible and to prevent their deterioration. This processing has been a constant practice throughout human history, playing a central role in the evolution and adaptation of our species. In addition, food processing has contributed to ensuring adequate supplies of nutritious foods, the development of societies and civilisations, the protection of health, and the achievement of social and emotional well-being through the sharing of meals (1).

According to (2), food additives are “substances that are added to foods to maintain or improve their safety, freshness, flavour, texture or appearance”. Some of these additives, such as salt, sugar and sulphur dioxide, have been used for centuries to preserve foods. In addition, with regard to food labelling, the Codex Alimentarius Commission is governed by certain regulations; an example of this is the European Union, which uses an alphanumeric combination called “E”, which means that the additive complies with safety standards.

Regarding the industrial production of monosodium glutamate, it is produced from the hydrolysis of L-glutamic acid, which forms a constitutive part of proteins; this hydrolysis process can be carried out in a basic, acidic or enzymatic medium. Enzymatic hydrolysis requires optimal working conditions and constant monitoring to avoid contamination, while alkaline hydrolysis, carried out in autoclaves under pressure, is considered a low-yield method; on the contrary, acid hydrolysis has the advantage of not requiring strong working restrictions and of requiring smaller dilutions, which translates into a higher yield compared with alkaline hydrolysis (3).

Monosodium glutamate (MSG) is one of the most widely used flavour enhancers in Asian cuisine and some processed products, known for being the fifth flavour (umami) after the four common types of flavours; in addition, it is used as a food additive, even coming to replace salt because its composition contains sodium, which gives it a certain similarity in flavour (4). It should be mentioned that MSG, which is the sodium salt of L-glutamic acid, is a natural non-essential amino acid present in almost all foods, especially those rich in proteins, such as dairy products, meat, fish and numerous vegetables, and plays an important role in the correct normal functioning of the body. In the European Union, MSG has been classified as a food additive (E621) according to the International Glutamate Technical Committee, being widely used in the culinary industry to enhance the flavour of foods (5).

Subsequently, at the United States Food and Drug Administration (FDA), MSG is considered safe for human consumption in moderate amounts (6). However, some



studies have raised concerns about the possible adverse effects of MSG consumption on human health, suggesting that high doses of MSG may cause adverse reactions known as “Chinese restaurant syndrome” or “MSG syndrome” (7). Nevertheless, the scientific evidence does not conclusively support the existence of a specific syndrome related to MSG consumption, since the majority of studies have not found a consistent association between MSG and the reported symptoms; in fact, in a meta-analysis published in the Journal of Headache Pain, it was concluded that there is insufficient evidence to demonstrate that MSG is a trigger for migraines in susceptible individuals (8).

It is important to highlight that MSG is naturally present in some foods, such as Parmesan cheese, tomatoes and seaweed. The amount of MSG consumed through these foods is generally lower compared with the amounts added as a food additive (10). On the other hand, several studies have investigated the possible adverse effects of MSG consumption on health. A study published in the Journal of Nutrition indicated that high doses of MSG administered to laboratory animals may result in neuronal damage (11). However, the evidence on the negative effects of MSG on human health has been inconsistent, given that an analysis of human studies published in the International Journal of Food Sciences and Nutrition concluded that no conclusive evidence was found that MSG causes adverse effects in the majority of people (12); in this sense, an area of concern has been the possible association between MSG and the symptoms of metabolic syndrome.

Finally, a study carried out in China found a relationship between MSG consumption and a higher risk of metabolic syndrome in women, but not in men, while the association between MSG and allergic reactions has been questioned, since a study concludes that the evidence does not support the idea that MSG is a common trigger of allergies in the general population (14). In addition, some investigations have suggested a possible link between MSG consumption and the symptoms of autism spectrum disorder (ASD), but the available evidence is not sufficient to establish a causal relationship (15); with regard to safety, regulatory bodies have set maximum limits for the daily intake of MSG, such as the recommendation of the World Health Organization (WHO) of up to 0–120 mg/kg of body weight (16).

MATERIALS AND METHODS

A thorough bibliographic review was carried out, which included a wide range of sources related to MSG in processed food products. Strict inclusion and exclusion criteria were employed to guarantee the selection of the most relevant and pertinent studies.

Inclusion criteria:

- Studies that provide information on the regulatory values or limits established for MSG in foods.
- Studies published in the last 10 years to ensure the updated relevance of the information.
- Studies published in recognised scientific journals or conferences.



- Research available in Spanish or English to facilitate access to and understanding of the data.
- Studies that present quantitative or qualitative data on MSG levels in processed foods.
- Research focused on processed foods for human consumption.

Exclusion criteria:

- Studies that do not specifically address MSG levels and regulations in processed foods.
- Studies published more than 5 years ago, since the research will focus on updated data.

Finally, the research report will be written, including a synthesis of the results and conclusions that will be obtained from the bibliographic review. It is important to highlight that this study will be based exclusively on secondary sources and will not involve the collection of primary data or the performance of experiments or laboratory analyses.

RESULTS

The detailed analysis of perceptions regarding monosodium glutamate (MSG) and food safety concerning possible effects on the health of the Latin American population provides a comprehensive view of the knowledge, attitudes and behaviours of the participants. Table 1 details the typical concentrations of monosodium glutamate (MSG) in a variety of processed food products and compares them with the maximum values recommended by United States authorities, such as the Department of Agriculture and the Department of Health and Human Services of the USA, being crucial information for evaluating compliance with current nutritional guidelines (18).

Table 1. MSG values in processed products

Processed product	Typical MSG value	Recommended maximum value
Instant soup	0.5–2.0 g per 100 g	No more than 1.5 g per 100 g
Sauces and dressings	0.5–1.5 g per 100 g	No more than 1.0 g per 100 g
Snacks and appetisers	0.1–0.5 g per 100 g	No more than 0.3 g per 100 g
Concentrated broths	1.0–3.0 g per 100 g	No more than 2.0 g per 100 g
Meat products	0.2–1.0 g per 100 g	No more than 0.5 g per 100 g
Prepared dishes	0.5–2.0 g per 100 g	No more than 1.5 g per 100 g
Salad dressings	0.5–1.5 g per 100 g	No more than 1.0 g per 100 g
Condiments and spices	0.1–0.5 g per 100 g	No more than 0.3 g per 100 g
Frozen foods	0.5–2.0 g per 100 g	No more than 1.5 g per 100 g
Canned foods	0.2–1.0 g per 100 g	No more than 0.5 g per 100 g

Source: (18)

Consequently, a significant finding in the investigations was the high prevalence of concerns regarding the possible harmful effects of monosodium glutamate (MSG) on health, with 73.09% of the participants considering that this flavour enhancer is harmful, which highlights the urgent need to develop public health campaigns and educational initiatives adapted to the sociocultural context of the population (23).



In addition, the overwhelming support for regulatory measures to exclude MSG from foods, which reached 85.47%, reflects a clear demand from the population for healthier food options. Equally notable was the positive impact that knowledge about the harmful effects of MSG had on the behaviour of the participants, with 86.42% affirming that this information helped them to reduce their consumption.

Typical MSG levels in processed foods range between 0.1 and 3 grams per 100 grams of product. While many products remain within recommended limits, certain categories (concentrated broths, instant soups and prepared dishes) frequently approach or exceed the suggested maxima, underscoring the importance of labelling transparency and moderate consumption.

DISCUSSION

The results of the literature review confirm that monosodium glutamate remains one of the most widely used flavour enhancers in processed foods. Although regulatory agencies such as the FDA and the WHO consider MSG safe within established limits (0–120 mg/kg body weight), public perception in Latin American populations reveals significant concern about potential adverse effects.

Scientific evidence does not conclusively support a specific “MSG syndrome” or a consistent causal link with migraines, allergies or autism spectrum disorder. Nevertheless, high doses in animal models have been associated with neuronal changes, and some epidemiological studies suggest a possible association with metabolic syndrome in certain population subgroups. These findings justify continued monitoring and the promotion of moderate consumption.

Clear labelling, public education and adherence to maximum recommended levels are essential to reconcile the sensory benefits of MSG with consumer health protection.

CONCLUSIONS

1. Typical levels of monosodium glutamate in processed foods range from 0.1 to 3 g per 100 g of product, with some categories approaching or exceeding recommended maxima.
2. Regulatory bodies (FDA, WHO, EFSA) consider MSG safe for the general population when consumed within established limits.
3. Public concern about possible adverse effects remains high; educational campaigns and transparent labelling are therefore recommended.
4. Moderate consumption of MSG allows consumers to enjoy its umami flavour-enhancing properties while protecting health, especially for sensitive individuals.

REFERENCES

1. Álvaro A. ¿Cómo llevar una adecuada gestión de facturas? [Internet]. 2024 [fecha de acceso: 23 de julio de 2024]. Disponible en: <https://factorialhr.es/blog/gestion-de-facturas/>



2. Chavez B. Todo lo que necesitas saber sobre controles internos en tecnologías de la información (TI) [Internet]. 2024 [fecha de acceso: 17 de abril de 2024]. Disponible en: <https://www.auditool.org/blog/auditoria-de-ti/todo-lo-que-necesitas-saber-sobre-controles-internos-en-tecnologias-de-la-informacion-ti>
3. Calle JP. Componentes del control interno de una empresa [Internet]. 2022 [fecha de acceso: 6 de octubre de 2022]. Disponible en: <https://www.piranirisk.com/es/blog/componentes-del-control-interno-de-una-empresa>
4. Collosa A. Mejores Prácticas para Fomentar la Emisión de Facturas [Internet]. Centro Interamericano de Administraciones Tributarias (CIAT); 2023 [fecha de acceso: 22 de noviembre de 2023]. Disponible en: <https://www.ciat.org/mejores-practicas-para-fomentar-la-emision-de-facturas/>
5. Coral Cacha RP. Propuesta de Créditos y Cobranzas en la Empresa ADIVET E.I.R.L. [Internet]. Lima: Universidad Norbert Wiener; 2022 [fecha de acceso]. Disponible en: https://repositorio.uwiener.edu.pe/bitstream/handle/20.500.13053/8781/T06_1_47833704_T.pdf?sequence=11&isAllowed=y
6. Del Aguila Huayunga LJ, Burgos Cotrina LJ, Castillo Salazar RN. Sistema de control interno para mejorar la gestión de cobranzas en la Empresa Asesores y Consultores de Empresas SAC – Moyobamba 2022 [Internet]. Perú: Universidad César Vallejo; 2022 [fecha de acceso]. Disponible en: https://www.researchgate.net/publication/361051757_Sistema_de_control_interno_para_mejorar_la_gestion_de_cobranzas_en_la_Empresa_Asesores_y_Consultores_de_Empresas_SAC_-_Moyobamba_2022
7. DIAN. Sistema de Factura Electrónica Servicios y documentos digitales DIAN [Internet]. 2023 [fecha de acceso]. Disponible en: <https://micrositios.dian.gov.co/sistema-de-facturacion-electronica/>
8. Espinoza Morante GL, Yopez Montes JS. Manual de control interno para la gestión de cobranzas en la empresa Aerboss C.A. [Internet]. 2019 [fecha de acceso]. Disponible en: <http://repositorio.ug.edu.ec/bitstream/redug/46402/1/TESIS%20CPA-%20ESPINOZA%20-%20YEPEZ.pdf>
9. García Zambrano XL, Maldonado Pazmiño HO, Galarza Morales CE, Grijalva Guerrero GG. Control interno a la gestión de créditos y cobranzas en empresas comerciales minoristas en el Ecuador. Espirales. 2019;3(26):1-17. Disponible en: <https://www.redalyc.org/journal/5732/573263325002/html/>



10. Medina Paredes AA, Rivera Alcantara JR. Control interno del área de facturación y cobranzas de la empresa Xelar S.A.C. del distrito de Miraflores, periodo 2020. Proyecto de tesis. Lima: Universidad Privada del Norte; 2022 [fecha de acceso]. Disponible en: https://repositorio.upn.edu.pe/bitstream/handle/11537/33151/TESIS%20FINAL-MEDINA%20y%20RIVERA_PDF_TOTAL.pdf?sequence=1
11. Mogollón Gómez J. Gestión de Cobranza y su impacto en la Gerencia Financiera de la empresa PP S.A: Periodo 2014-2016. PURIQ. 2021;3(1):1-14. Disponible en: <https://www.revistas.unah.edu.pe/index.php/puriq/article/view/121>
12. Moreno E. Fundamentos de un sistema de control interno [Internet]. 2024 [fecha de acceso: 2 de mayo de 2024]. Disponible en: <https://contifico.com/control-interno-fundamentos/>
13. Morilla G. Gestión de la cartera de cobranzas [Internet]. 2023 [fecha de acceso]. Disponible en: <https://debitia.com.ar/estrategias-de-cobranza/>
14. Obando R. Control interno empresarial: elementos y objetivos [Internet]. 2024 [fecha de acceso: 25 de marzo de 2024]. Disponible en: <https://blog.hubspot.es/marketing/control-interno>
15. Olay Ö. Assessment of Effectiveness of Internal Control System and Case Study [Internet]. 2020 [fecha de acceso]. Disponible en: [URL no proporcionada].
16. Rey Garcia AZ, Times Escudero EM. EVALUACIÓN DE LOS CONTROLES DEL ÁREA DE FACTURACIÓN DE LA EMPRESA SERVICIOS INTEGRALES PERSONALIZADOS S.A.S. [Internet]. Colombia: Universidad Cooperativa de Colombia; 2021 [fecha de acceso]. Disponible en: <https://repository.ucc.edu.co/server/api/core/bitstreams/b01d147d-e057-4cfa-90fd-0d59596874ed/content>
17. Suárez Dulanto AG. Optimización del control interno en el proceso de facturación en empresas consultoras: Caso Perú. Proyecto de Tesis. Lima: Universidad del Pacífico; 2021 [fecha de acceso]. Disponible en: https://repositorio.up.edu.pe/bitstream/handle/11354/3023/SuarezAraceli_Tesis_Licenciatura_2021.pdf?sequence=1&isAllowed=y
18. Suarez Lindao JO. Estrategias para optimizar la gestión de cobranza de las cuentas por cobrar socios en las compañías de transporte, año 2020. Santa Elena: Universidad Estatal Península de Santa Elena; 2022 [fecha de acceso]. Disponible



en: <https://repositorio.upse.edu.ec/bitstream/46000/7178/1/UPSE-TCA-2022-0016.pdf>

19. Zamora E. Gestión de facturación: mejora la de tu empresa con estos 15 tips [Internet]. 2023 [fecha de acceso: 19 de septiembre de 2023]. Disponible en: <https://payhawk.com/es/blog/gestion-de-facturacion>
20. Zamora E. La gestión de facturas electrónicas: todo lo que debes saber [Internet]. 2024 [fecha de acceso: 9 de abril de 2024]. Disponible en: <https://payhawk.com/es/blog/gestion-de-facturas-electronicas>
21. Farias Mendoza SB. El sistema de control interno para mejorar la eficiencia y eficacia de las PYMES en el Ecuador. Revista Sinapsis. 2023;1(22):1-15.
22. García Zambrano XL, Maldonado Pazmiño HO, Galarza Morales CE, Grijalva Guerrero GG. Control interno a la gestión de créditos y cobranzas en empresas comerciales minoristas en el Ecuador. Espirales revista multidisciplinaria de investigación científica. 2019;3(26):1-15.
23. López Mosquera PA. Propuesta de mejoramiento del sistema de control interno en el área de facturación de la empresa "Megatecnología Colombiana S.A.S" [tesis]. Santiago de Cali: Fundación Universitaria Católica Lumen Gentium; 2017.
24. Pusay Villarroel DN. Propuesta metodológica basada en ISO 27000, para cumplir requerimientos de seguridad informática exigidos por la Agencia de Regulación y Control de las Telecomunicaciones en micro-empresas proveedoras de internet, caso Maxxnet [tesis de maestría]. Riobamba: Escuela Superior Politécnica de Chimborazo; 2023.
25. Chuquimarca Gonzabay JJ. Control contable de las cuentas por cobrar de la empresa en el sector servicios de seguridad [trabajo de integración curricular]. La Libertad: Universidad Estatal Península de Santa Elena; 2020.