



The Effects of Monosodium Glutamate Consumption on Oral Glucose Tolerance Test (OGTT) in Rats

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Background and Objective: Monosodium glutamate (MSG) is a sodium salt of glutamic acid, widely used as a food additive both in household and food industry. An injection of MSG into newborn mice causes of several metabolic disorders such as obesity, non-alcoholic fatty liver disease and type 2 diabetes. We aimed to investigate the effect of MSG consumption on glucose regulation in adult rats.

Methods: Twenty adult male Wistar rats were randomly divided into control and treatment groups. Both groups were fed *ad libitum* with a standard rat chow pellet and water, except the treatment group were received MSG (2 mg/g body weight/day) in drinking water for nine months. Oral glucose tolerance tests (OGTT) were

investigated. Water intake, food intake and body weight were also recorded.

Results: There were no significant differences in OGTT results between control and MSG-treated animals. MSG-treated rats had significantly higher water intake compared to controls. However there were no significant differences in food intake and body weight between control and MSG-treated animals.

Conclusion: The results revealed that daily MSG consumption with the dose of 2 mg/g body weight /day for nine months had no effect on OGTT, an index of glucose regulation, in adult rats.

Key words: monosodium glutamate, oral glucose tolerance test, islets of Langerhans

สรินธรินทรเวชสาร 2556;28 (supple) Srinagarind Med J 2013;28 (supple)

Introduction

Monosodium glutamate (MSG) is a sodium salt of glutamic acid, widely used as a food additive in both household and food industry. Several studies demonstrated that MSG is associated with metabolic diseases both in human and animals. In rodent models, injection of MSG into newborn mice induced weight gain, fat deposition and insulin resistance causes of obesity, metabolic syndrome and type 2 diabetes¹. Moreover, the injection of MSG into newborn mice causes pancreatic islets hypertrophy and hyperplasia^{2, 3}. Therefore, we aimed to investigate the effects of MSG consumption on glucose regulation in adult rats.

Methods

Twenty adult male Wistar rats with six weeks of age were randomly divided into control (n=10) and treatment groups (n=10). Both groups were fed *ad libitum* with a standard rat chow pellet and water, except the treatment group were received MSG (2 mg/g body weight /day) in drinking water for 9 months. Water intake, food intake and body weight were recorded. Rats were maintained in the environment temperature at 25±3°C with 60±15% humidity and 12 h dark/light cycle. All experiments were done under the guideline of the Northeast Laboratory Animal Center (NELAC), Khon Kaen

University, Thailand.

For the determination of Oral glucose tolerance test (OGTT) rats were fasted overnight and were fed the glucose solution with the dose of 4 g/kg BW. Blood samples were withdrawn from the tail vein by a capillary tube. Glucose levels were determined at zero, 30 and 120 minutes after glucose load.

Results

During nine months of experiment, MSG-treated animals consumed water significantly higher than the controls ($p < 0.05$, Figure 1) whereas daily food intake and body weight were not different from the controls (Figure. 2 and 3). There were no significant differences in glucose levels during OGTT (Fig. 4) between control and MSG-treated groups.

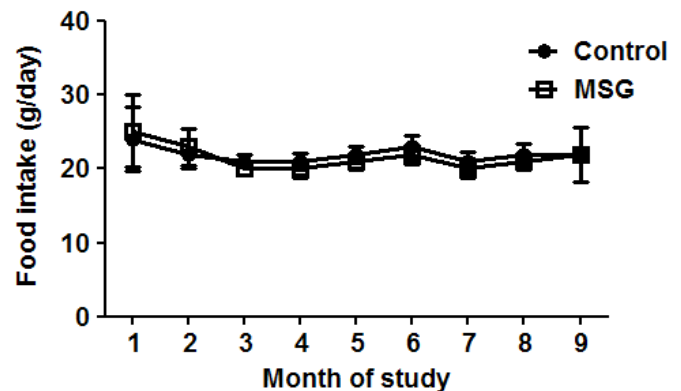


Figure 2 Food intake (mean ± SD) of control and MSG-treated rats.

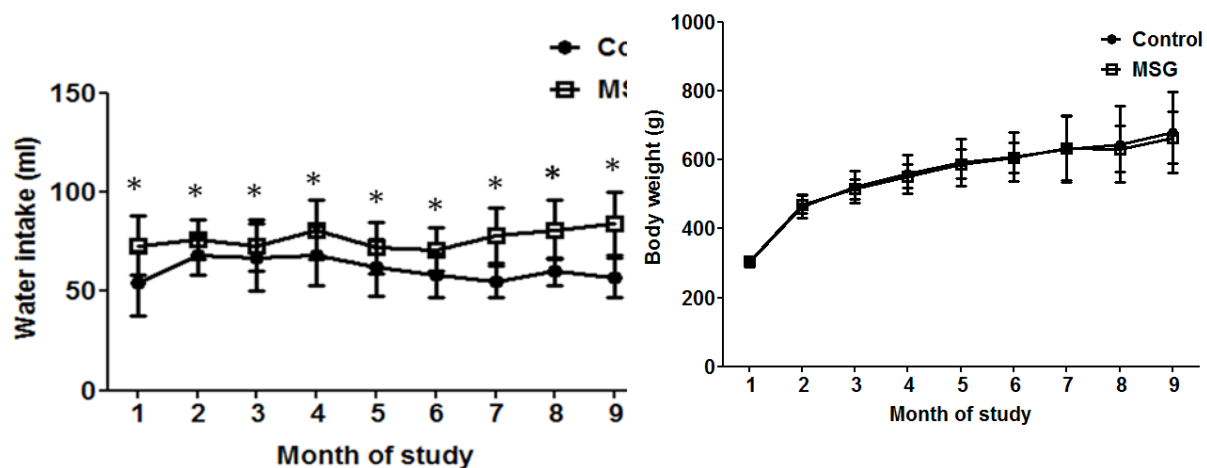


Figure 3 Body weight (mean ± SD) of control and MSG-treated rats

Figure 1 Water intake (mean ± SD) of control and MSG-treated rats * $p < 0.05$

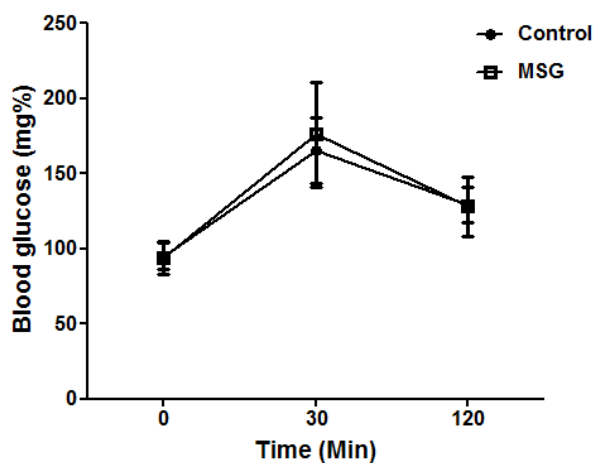


Figure 4 Result of oral glucose tolerance test of control and MSG-treated groups

Conclusion

The results indicated that daily MSG consumption with the dose of 2 mg/g BW /day in adult rats has no effects on glucose regulation during nine months of MSG expo-

sure.

Acknowledgements

This study was supported by the invitation research funds # 54139, Faculty of Medicine and the NRU-KKU Scholarship # MIH-2554-M-11, the Research and Technology affairs division, Khon Kaen University. Thanks to the Northeast Laboratory Animal Center at KKU for animal husbandry facilities including all dedicated animals.

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