Chronic Administration of Monosodium Glutamate Induces Oligozoospermia and Glycogen Accumulation in Wistar Rat Testes

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ABSTRACT

The effect of monosodium glutamate (MSG) on spermatogenic and non-spermatogenic cells was investigated in 30 Wistar rats. MSG caused significant oligozoospermia and increasing abnormal sperm morphology in a dose-dependent fashion in the treated rats. MSG-induced oligozoospermia, in turn, resulted in glycogen deposition in testicular interstitial space. The glycogen accumulation probably resulted from under-utilisation by the few available sperm cells, or from inhibition by MSG of glycogen phosphorylase activity, which is involved in glycogen metabolism. Chronic ingestion of large doses of MSG has serious implications for fertility of male rats. (*Afr J Reprod Health* 1998;2(2):190–197)

RéSUMÉ

L'administration chronique de glutamate de monosodium induit de l'oligozoospermie et une accumulation de glycogène dans les testicules des rats wistars. Une étude était faite des effets de la glutamate de monosodium (GMS) sur les cellules spermatogéniques et non-spermatogéniques de 30 rats wistars. Administré en une certaine dose, la GMS a provoqué une oligozoospermie importante et a augmenté l'anomalité de la morphologie du sperme des rats traités. L'oligozoospermie induite par la GMS a à son tour provoqué un dépôt de glycogène dans l'interstice des testicules des rats. L'accumulation de glycogène est probablement le résultat de la sous-utilisation de ce glycogène par le peu de cellules spermatiques restants, ou alors de l'inhibition de l'activité de phosphorilation glycogène (qui est liée au métabolisme glycogénique) du fait de la GMS. L'ingestion chronique de larges doses de GMS comporte de sérieuses implications pour la fertilité des rats mâles. (*Rev Afr Santé Reprod* 1998;2(2):190–197)

Key Words: Monosodium glutamate, food additive, cytotoxicity, oligozoospermia

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effectiveness by other routes. However, literature is replete with evidence that several doses administered to humans and experimental animals via several routes did produce varying levels of toxicity. Further work is currently being done on the effects of boiled or cooked MSG on testicular tissue. This will also simulate the form in which this drug is consumed in humans.

A wide variety of abnormality of the testicular structure and function have come to light during the course of clinical investigation of infertilities in humans. Oligozoospermia (total sperm count less than $20 \times 10^6$ spermatozoa/ml or 20 percent reduction of the normal total sperm count), abnormal sperm morphology, and reduced motility of spermatozoa can all contribute to male infertility. Bostofte and Rebbe have shown a clear relationship of high number of abnormal sperm and reduced fertility. Thus, the significance of the spermatozoa of MSG treated rats in our investigation may be indicative of possible reduced fertilizing capacity of the spermatozoa.

We postulate that chronic usage of large doses of MSG as food additive could be harmful to human through its effect in inducing oligospermia. While direct implications for human fertility have not yet been determined, further work on the reproductive effects of MSG on humans is warranted.

References


