

Effects of Garlic and Stevia Extract Following Aerobic Exercise on Hypothalamic Semaphorin 4A and Plexin D1 Genes Expression in High-Fat Diet-Induced Obese Rats

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Abstract : Introduction: Childhood obesity is a serious medical condition that affects children and adolescents even in the central nervous system. Semaphorins also play a role in the inflammatory process of the nervous system. On the other hand, it has been stated that garlic and stevia extracts following aerobic exercise are effective on immune system inflammation in addition to aerobic activity. Materials and Methods: For 15 weeks, 50 3-week-old male Wistar rats were fed with conventional rodent chow for control and a high-fat diet to induce obesity. Obese rats then were randomly assigned into 7 groups (n=5) based on the Lee index: healthy control (C), obese (OBS), obese + garlic (OBS+GAR), obese + Stevia (OBS+STV), obese + aerobic exercise (OBS+EXE), obese + garlic + aerobic exercise (OBS+GAR+EXE), and obese + stevia + aerobic exercise (OBS+STV+EXE). Training groups completed a progressive aerobic running program (at 8-15 m/min, 5-20 min/day, 5 days/week), and Stevia and garlic extract group (250 mg/kg/day, 5 days/week) were given orally once a day. Real-time PCR was used to determine the levels of Semaphorin 4A, and Plexin D1 gene expressions in the hypothalamus. Fold change analysis with ANOVA was performed for statistical analysis, with a significance threshold of $P < 0.05$. Results: Body weight increased significantly in OBS compared to C ($p = 0.013$), but was not significantly changed in all treatment rats. Moreover, Semaphorin 4A was significantly increased in obese compared to control group ($p = 0.041$) and after 8 weeks, stevia extract ($p = 0.006$), aerobic exercise ($p = 0.012$) and garlic extract + aerobic exercise ($p = 0.008$) significantly decreased compared to obese rats. In addition, Plexin D1 genes were also found in the hypothalamus of both obese and control rats but were insignificantly up-regulated when compared with the obese group ($p = 0.950$). Conclusion: High-fat diet caused neuroinflammation by elevation of sema4A in obese rats and stevia, stevia with aerobic and garlic with aerobic could reduce this inflammation in rats. Also, none of them could alter Plexin D1.

Keywords : sema 4A, plexin D1, garlic, stevia

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