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Effect of high-fat diet on body weight and spontaneous physical activity of SD rats

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Objective Excessive intake of high-energy foods and insufficient levels of physical activity are important causes of obesity. In addition, inadequate physical activity is also a major cause of cardiovascular disease and type 2 diabetes. Relevant data suggests that most adults fail to achieve the level of physical activity needed to improve their health. Therefore, understanding the reasons for the lack of physical activity levels is essential for developing a reduction in sedentary and thus preventing chronic acute illnesses. It is well known that physical activity is good for health, but little is known about the genetic and biological factors that may affect this complex behavior. Some studies have shown that diet-induced obesity may alter dopaminergic activity and thus reduce physical activity levels, suggesting that obesity and diet may be inversely related to dopamine signaling. Therefore, it is necessary to further study the correlation between obesity, dopamine and physical activity levels, and to explore the relationship between high-fat diet and body weight changes and physical activity levels.

Methods Sixteen male Sprague-Dawley rats were randomly divided into two groups. The control group (n=8) was fed with basal diet for 8 weeks, and the high-fat group (n=8) was fed with high-fat diet for 8 weeks. To compare the difference in body weight and physical activity between SD rats fed with high-fat diet and normal diet, and the relationship between body weight and body activity level; in order to study the effect of obesity on exercise behavior, use the open field experimental recorder for each. The movements of the rats in the group were recorded (autonomic activity for 30 min), and the correlation between the effects of high-fat diet on body weight and spontaneous activities of SD rats was analyzed.

Results High-fat diet and normal-fed rats were in energy intake (high-fat group 4583.94 ± 349.85 ; control group 3201 ± 298.58), body weight (high-fat group 406.23 ± 29.35 ; control group 306.66 ± 31.44) and Lee's index (high-fat group 26.17 ± 0.57 ; control group 24.35 ± 0.97) were significantly different. There was a high correlation between energy intake and body weight in rats, correlation coefficient $r=0.911$ ($p<0.01$); correlation coefficient between body weight and physical activity level $r = 0.576$ ($p < 0.05$). In addition, by comparing the exercise time and average speed of rats in each group, the difference in exercise time between the two groups was not significant, and the average speed difference was significant ($p<0.05$); exercise time was significantly correlated with physical activity level, $r= 0.734$ ($p<0.01$); and the mean speed was also positively correlated with physical activity level, and the correlation coefficient was 0.660 ($P<0.01$).

Conclusions Obesity is greatly affected by dietary factors, and long-term high-fat diets lead to a decline in physical activity, which in turn promotes further deterioration of obesity. This interaction can create a vicious circle between obesity and physical activity. Further research on the mechanisms of obesity, lack of physical activity and their interaction may provide a theoretical basis for increasing the level of physical activity in obese people.