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GENDER-RELATED DIFFERENCES IN EMOTION, STRESS AND COPING STRATEGIES UNDER EXTREME CONDITIONS: RESULTS OF A 21-DAY COMPLETE FASTING HUMAN EXPERIMENT

Abstract

Backgrounds: During long-term space missions, astronauts may be required to stay in a hypometabolic state in some extreme situation with life risks. Previous research showed gender differences in emotional responses and stress coping strategies in extreme conditions such as space mission simulation and Arctic exploration. With the increasing heterogeneity of crews, it is necessary to study gender-related differences in mental health under the hypometabolic through experiments to ensure the safety of future missions. **Methods:** Eight male and five female volunteers were recruited in the 34-day hypometabolism experiment comprising 4 phases that are 3 days of baseline consumption, 21 days of complete fasting (only water ad libitum), 5 days of calorie restriction, and a 5-day recovery period with normal eating. The volunteers' mood states, anxiety and depression, stress and recovery level were measured at 9 time points through the whole experiment. **Results:** Across the measurements, a significant gender effect was found in emotions and stress. Compared with male, female volunteers reported a significantly higher level of stress and negative emotions, whereas a lower level of recovery and positive emotions. Specifically, the anxiety, depression and total mood disturbance scores were higher in female volunteers during the whole phases of experiment. The differences in these self-reported emotions were greater during the complete fasting period, then getting smaller after the resumption of the diet. In terms of stress, the gender-related differences were not appeared at the first period. The stress level of female volunteers increased significantly after the start of fasting, and did not return to the baseline level after resuming the diet. However, the stress level of male volunteers showed a slow downward trend through the whole experiment. **Conclusions:** The results of this study showed the gender-related differences in self-reported emotions, stress and coping strategies under the condition of long-term fasting. Females show more negative emotions and experience stronger stress in a long-term hypometabolic state, especially during complete fasting. Given a fact that achieving low metabolism through fasting could respond to food shortage emergencies during long-term space flight, these findings could provide a reference for the development of manned space missions. Additionally, since the interpersonal problems may become increasingly prominent during long flights, it is necessary to consider coping pattern for astronauts of different genders under the extreme conditions.