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Association Of Glucose Metabolism and Physical Activity By Chronotype in Elderly Japanese Adults

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Objective Chronotype is a trait determining individual circadian preference in behavioral and biological rhythm relative to external light-dark cycle. Although evening chronotype has been reported to be associated with bad glucose control and low physical activity in middle-aged adults, it is not known whether it is true in elderly people. Therefore, the aim of this study was to investigate the relationship between glucose metabolism and physical activity by chronotype (circadian rhythm) in elderly Japanese adults.

Methods A cross-sectional study was conducted in 178 adults (72 men and 106 women), aged 60-79 years, who were classified into three chronotype groups, "definitely morning type (DMT)", "moderately morning type (MMT)" and "neither type (NET)", based on the Morningness/Eveningness Questionnaire scores (MEQ-Score). All participants were required to report their daily rhythms of behavior, such as meal time and sleep-wake cycle. Additionally, their physical activity were measured by an uniaxial accelerometer (Kenz Lifecorder EX, SUZUKEN, Nagoya, Japan). Energy intake was assessed by a brief self-administered diet-history questionnaire. Blood was drawn for biochemical analysis after an overnight fast.

Results BMI and serum insulin in the DMT group was significantly higher than MMT and NET groups in male. The DMT group had a significantly shorter time interval between dinner and sleep than the other two groups, both in male and female. After adjustment for covariates (age, smoking and alcohol status, energy intakes, moderate-vigorous physical activity (MVPA) and sleep duration), the BMI, serum insulin, fasting blood glucose (FBG) and HOMA-IR in the DMT group was significantly higher than other groups. However, after adjustment for the time interval between dinner and sleep, the significant difference had disappeared.

There was significant difference in terms of low-intensity physical activity between male and female. And MVPA in the DMT group, the subjects with low MVPA (<23Mets·hour/week) had higher FBG, serum insulin and HOMA-IR than the subjects with high MVPA (>23Mets·hour/week) in men, but not in women.

Conclusions This study demonstrated that the DMT group with early sleep-wake lifestyle had higher BMI, FBG, serum insulin and HOMA-IR, specially in elderly Japanese men with low MVPA, but not in women.