Nutritional Status of 35 Elderly People Residing in a Nursing Home: A Dual Challenge of Energy Surplus and nutritional insufficiency

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Abstract

Introduction: The ability to control dietary energy intake becomes impaired with age, even in healthy older adults. This problem, in conjunction with reduction in total energy expenditure mainly due to decrement of resting energy expenditure and activity-induced energy expenditure, chronic diseases, chewing problems, poly pharmacy, living alone, and low income, likely explains the high vulnerability of the elderly population to energy imbalances. The chronic energy imbalance between feeding and expenditure leads to undesirable changes of body weight and body composition, i.e. weight gain or weight loss, and reductions in skeletal muscle and corresponding increases in visceral adipose tissue and intermuscular adipose tissue. The imbalance further contributes to the progressive decline of physical performance and the development of age-associated chronic degenerative diseases, which ultimately increases the risk for premature mortality. Fortunately, recent observations show that objectively measured free living activity-induced energy expenditure is strongly associated with lower risk of mortality in healthy older adults. Thus, simply spending energy through daily physical activity may confer survival advantages in older adults by improving body composition and physical fitness.

Methods and Materials:

The study, each subject completes an evaluation of health status by means of a medical questionnaire checked by a physician. Excluded from this study were smokers, regular alcohol users, subjects taking medication (e.g., β-blockers), and subjects with a hypo-energetic or hyper-energetic diet that could influence energy expenditure. Subjects using multivitamins and trace element supplements for at least four weeks prior the study were excluded. Subjects with serious diseases or disabilities that could interfere with the performance of physical activities during the study were excluded.

Statistical analysis Values for all results were expressed as mean standard deviation if normality test passed. Otherwise, results were presented as median (P25, P75). Analyses of differences between groups were performed using a paired Student t test. According to Chinese Food Composition Table, consumptions of energy and nutrients of individuals were computed using Microsoft Excel 2000 software (Microsoft Corporation). Two-sided P values less than 0.05 were considered significant unless otherwise indicated. All data were analyzed using SPSS version 15.0 (SPSS, Chicago, IL). Kolomogorov-Simirnov onesample test was used to test a normal distribution, and paired-samples t test was used to test differences between treatments.

Results: Subject characteristics and anthropometrics Subjects' mean age was 85.5±7.0 years, and the age range was from 65 to 98 years. The percent of female was 82.9%, and that of male was 17.1%. According to the classification of body mass index for Chinese adults, constituent ratios of underweight, normal weight, overweight and adiposity were 14.3%, 37.1%, 34.3% and 14.3%, respectively. The rate of abnormal weight categories (including underweight, overweight and obesity) was 62.9%, most of which was overweight and obesity indicating energy excess (together accounting for 48.6%).

Dietary assessment Intakes of energy, carbohydrate, protein, fat, thiamine and riboflavin of 35 subjects were 5.63±1.32 (MJ), 193.8±51.3 (g), 45.2±9.9 (g), 43.3±11.6 (g), 0.82±0.25 (mg), and 0.46±0.15 (mg), respectively; and carbohydrates, proteins, and total fat provided 57.6%, 13.4%, and 29.0% of energy intake, respectively. Compared with Chinese dietary reference intakes in 2000 for elderly people over the age of 80, the prevalence of inadequate intake of energy, protein, thiamine and riboflavin was 88.6%, 77.1%, 88.6%, and 100%, respectively; and the proportion of energy consumed from carbohydrate and fat was acceptable (acceptable ranges for carbohydrate and fat: 54%-65% and 20%-30%), whereas the proportion of energy consumed from protein was lightly lower (acceptable range for protein: 15%-16%.).Physical activity level and total energy expenditure If it was adopted that light PAL for reference elderly people as 1.49 to estimate the TEE of subjects, the values for total energy expenditure derived from the adjusted Schofield equation and the predictive equation developed by Chinese Taiwan scholars were 6.92±0.93 (MJ/d) and 6.43±1.43 (MJ/d), respectively. Both of the two estimated values for TEE were higher than the current energy intake (t=7.054, P=0.001; and t=3.599, P=0.001), which was consistent with the result as compared with the recommended nutrient intake for energy

Discussion As compared with the Chinese dietary reference intakes for the elderly, they had an inadequate intake of nutritional components such as energy, protein, and some of water-soluble B vitamins (for example, thiamine and riboflavin) which were vulnerable to

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insufficient intake for the Chinese senior, but their anthropometric parameters paradoxically showed the presence of excessive fatty tissue. Our results almost coincide with those from a Polish study for free-living elderly people. Our results also showed that the study population presented an energy imbalance being predominantly an energy excess, but micronutrient needs for older adults does not decrease proportionally with energy needs, thus it is further revealed that the dietary nutritional quality of the subjects is very poor including a dual problems of nutritional inadequacy and over plus. In the present study, the TEE was estimated by the BEE measured with the predictive equation, in combination with PAL. Because the average PAL for the study population was very low closely falling into a resting state (physical activity level=1.0), which suggested that the subjects were almost immobilized, there was a relatively high proportion of overweight and obesity although their insufficient prevalence of energy intake seemed to be higher as compared with the recommended nutrient intake for energy, which could be explained by subjects getting used to a sedentary lifestyle and a low energy cost, and a consequent energy excess and an increase of body weight.

Conclusion: additional studies are necessary to identify recommended PAL and energy requirement needed for optimal health and function in the Chinese elderly population of advanced age, on the basis of a diet of nutrient-rich foods supplying adequate intake for all essential nutrients and avoiding processed foods rich in refined carbohydrates and partially hydrogenated oils.

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