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Original Article

Association of Education, Health Behaviors, Concerns, and Knowledge with Metabolic Syndrome among Urban Elderly in One Medical Center in Taiwan

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SUMMARY

Background: The purpose of this study is to examine the relationship of education, health behaviors, concerns, and knowledge with metabolic syndrome (MetS) among urban elderly living in northern Taiwan.

Methods: A total of 1181 participants (405 men, 34.3%; 766 women, 65.7%) were surveyed. MetS was defined using the modified National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATPIII). An empirical model consisting of education, health behaviors, concerns, knowledge, and MetS was estimated.

Results: A total of 34.4 percent of the respondents (405 persons) met the criteria for MetS. High education level was associated with reduced odds of MetS [senior high school: odds ratio (OR) = 0.50, 95% confidence interval (CI), 0.28–0.88; college: OR = 0.45, 95% CI, 0.25–0.85)]. The health behaviors of regularly monitoring waist circumference and blood pressure were associated with reduced odds of MetS (OR = 0.58, 95% CI, 0.51–0.64; OR = 0.61, 95% CI, 0.41–0.89). When the total health knowledge score was higher, the odds of MetS were lower (OR = 0.98, 95% CI, 0.97–0.99). It was found that each additional point on a scale of hypertension and diabetes knowledge was associated with 7% and 8% reductions of the MetS odds, respectively.

Conclusions: This study demonstrated that high education level influences the odds of MetS. The development of health education programs that can enhance prevention and self-monitoring for MetS by providing the knowledge and behaviors is appropriate for an elderly population living in Taiwan.

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1. Introduction

Individuals with MetS are at an increased risk of developing these chronic diseases as well as a higher risk of mortality from cardiovascular disease and all-cause mortality.[1] Previous research indicates that people with MetS suffer from increased risk of developing diabetes, hypertension, heart disease, and stroke in the future, at 6, 4, 3, and 2 times greater risk than the general population, respectively.[2]

The Elderly Nutrition and Health Survey in Taiwan (NAHSIT-II, 1999–2000, N = 2,432[3,4]; NAHSIT 2005–2008, N = 897[5]), a national survey of non-institutionalized elderly Taiwanese (≥65 years of age), revealed that in the period between 1999 and 2008, the prevalence of MetS increased progressively from 25.5% to 44.5% in elderly men and from 46.8% to 57.3% in elderly women.[3–5] Therefore, identifying the modifiable risk factors associated with the development of MetS is of critical public health importance.

The identification of social and economic characteristics associated with MetS occurrence is essential for the success of primary preventive measures.[6] Education is a good indicator of social position in epidemiological studies, and is often seen as the easiest method of measuring present socioeconomic status.[6,7] A number of studies have shown evidence of increased risk of morbidity and mortality due to MetS in individuals from lower as compared with higher socioeconomic positions.[7,8]

Patients' knowledge, attitudes, and behavior play a large role in preventing and managing the risk factors comprising MetS.[9] Individuals with the risk factors of MetS require continuous ongoing

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self-monitoring of lifestyle behaviors, but several barriers to modifying risky behaviors exist.[7] To achieve such changes in lifestyle behaviors, it is essential to understand health behaviors, concerns, and knowledge related to MetS, as well as what barriers are encountered by elderly individuals. Health-related behaviors, with awareness of the context of the knowledge and concerns about MetS held by elderly individuals, can be designed for adequate use by elderly individuals regardless of diversity of living in an urban or rural area, socioeconomic level, or education level.[10]

This study differs from previous studies in that it was conducted with elderly individuals living in an urban area (those over 65 years of age and living in Taipei City),[3–5] and the questionnaires were completed via one-on-one interviews. We gathered information on education level, health behaviors, health concerns, and health knowledge (specifically, knowledge of future chronic diseases induced by MetS). Few foreign studies have performed such an investigation.[6–9] This study aims to enable better understanding of patient awareness of and behaviors related to MetS in an urban elderly population, thus allowing for development of effective preventive strategies for MetS for the entire elderly population of Taiwan.

2. Materials and methods

2.1. Participants

This study targeted elderly individuals (aged ≥65 years) who received a health examination from March to November 2009 at medical centers in Taipei City. Questionnaires were completed via one-on-one interviews. A total of 1799 elderly individuals received the health examination. Of these, 420 cases were excluded due to incomplete questionnaires as a result of specific disabilities (e.g., dementia, difficulty in expression, severe hearing impairment; response rate: 76.7%), and another 198 cases were eliminated due to incomplete data on the five components of MetS. In the end, a total of 1181 complete questionnaires (actual response rate of 65.6%) were used.

The study protocol was examined and approved by the Human Research Ethics Committee in our hospital and then issued project research number 09MMHISO11.

All participants provided written informed consent

2.2. Assessment of socio-demographic variables

Socio-demographic variables, including gender, age, education level, and living conditions, were assessed in the survey. Age was divided into four groups: 65–69, 70–74, 75–79, and ≥80 years old. Education level was classified as one of the following five levels: illiterate, elementary school, junior high school, senior high school, and college or higher. Living conditions were defined as living alone or living with family.

2.3. Development of questionnaire

The content of the questionnaire about health behaviors, health concerns, and health knowledge was based on existing literature.[11–13]

2.3.1. Health behaviors

Six types of health behaviors were assessed during the interview. Questions were asked regarding regular blood pressure monitoring (considered yes if one time or more per week), regular waist circumference monitoring (considered yes if one time or more per week), regular checking of body weight (considered yes if one time or more per week), alcohol consumption (considered yes if 4 drinks or more per week), smoking tobacco (considered yes if current or former smoker), and regular exercise (considered yes if three times or more per week) in the previous six months. These variables were assessed using in the Lipid Research Clinics Questionnaire, which was self-reported physical activity status, and were analyzed.[11]

2.3.2. Health concerns

Three questions were administered during the interview, including "Do you usually discuss your own or others' health issue with others?" "Do you pay attention to news coverage of the relevant medical and health issue?" and "Do you pay attention to food labels, including the date of manufacture marked on the packaging, preservation period, the effective date, or low-sodium, low-sugar, low-sodium, low-fat, calcium-rich, and low-calorie options?" Subjects used a four-point Likert-type scale (1 "never," 2 "seldom," 3 "sometimes," 4 "usually") to respond to the questions above.

2.3.3. Health knowledge

To assess health knowledge, we used the question, "Please determine the relationship between the risk factors and diseases." Six kinds of diseases were listed, including hypertension, stroke, acute myocardial infarction, diabetes, urolithiasis, and osteoarthritis. The seven kinds of risk factors listed included the four of the main criteria of MetS (high blood pressure, high lipid level, high blood sugar level, and abnormal body weight), smoking habit, high uric acid level, and hereditary factors. Answers were scored 1 for a correct answer and 0 for an incorrect answer. Seven scores were calculated for each disease, with the total score ranging from 0 to 42. A higher score indicated more plentiful health knowledge.[12,13]

2.3.4. Expert validity

Five experts, including endocrinology and family medicine physicians who had practiced for up to five years, were invited to review that the integrity, comprehensibility, suitability, and diction of the questionnaire were appropriate.

A content validity index (CVI) was calculated to quantify the extent of the experts' agreement on content relevance, using a 4-point scale for each item based on the recommendation of existing literature.[14] After the scoring process, the questionnaire's expert validity rating scores averaged more than 3.5 points, indicating only modest modifications and reservations, and the content validity index (CVI) was 100%.

2.3.5. Pre-test procedure of questionnaire and reliability analysis

To assess respondents' semantic understanding of the questionnaire, we invited 20 clinical patients (more than 65 years of age) to participate in the pre-test procedure. The results of the pre-test were used as the basis of item revisions.

The study questionnaire was analyzed for internal consistency reliability using the Cronbach's α coefficient. The Cronbach's α coefficient was 0.856, indicating good internal reliability.

2.4. Ascertainment of body mass index

The height and weight of each participant were measured during the physical examination. Body mass index (BMI) is currently recognized as the standard measure of obesity and is calculated as weight in kilograms divided by the square of the height in meters (kg/m^2).[15,16]

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