



## An exploratory study of health behaviors and the risks for triple H (hypertension, hyperlipidemia, and hyperglycemia) in young adults with disabilities between 20 and 39 years of age

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### ABSTRACT

Metabolic syndrome is highly prevalent and has important implications for the health care sector. However, information on the implications of metabolic syndrome for people with disabilities is limited. The purpose of this study was to explore the relationship between health behaviors and the risk for triple H (hypertension, hyperlipidemia, and hyperglycemia) in young adults with disabilities. The present study analyzed the annual health examination charts of 705 young adults with disabilities between ages 20 and 39 in Taiwan. Results found that the prevalence of hyperglycemia, hyperlipidemia, and hypertension in adults with disabilities was 5%, 15% and 17.7%, respectively. These prevalence figures were higher than those for the general population of the same age group in Taiwan. Multivariate logistic regression analyses revealed that almost none of the health behaviors were significantly correlated with the occurrence of triple H disorders among young adults with disabilities. Only one factor, BMI, independently predicted the occurrence of triple H disorders. We suggest that future studies should scrutinize the effects of health behaviors on triple-H disorders in people with disabilities to initiate personalized health promotion programs for this group.

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## 1. Introduction

Metabolic syndrome is a combination of medical disorders including abdominal obesity, hypertriglyceridemia, low high-density lipoprotein cholesterol, high blood pressure and high fasting plasma glucose (National Institutes of Health, 2001). When these disorders occur together, the patient is at risk for developing diabetes, cardiovascular disease and other ailments (Grundy et al., 2005; Haffner et al., 1992; Isomma, Almgren, & Tuomi, 2001; Trevisan, Liu, Bahsas, & Menotti, 1998). Ford, Giles, and Dietz (2002) reported that metabolic syndrome is highly prevalent and may have important implications for the health care sector. Boudreau et al. (2009) conducted a two-year study that compared annual health care costs for people with and without metabolic syndrome in the United States, and subjects with metabolic syndrome had higher utilization of

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inpatient, primary care and other outpatient and pharmacy services and higher costs compared with subjects without metabolic syndrome; the syndrome can increase a person's health care expenses nearly 1.6-fold per year.

The high prevalence of metabolic syndrome may have serious implications for the general population. However, information on the implications of metabolic syndrome for people with disabilities is limited. Regular health screening has an important contribution to make in improving the health of people with disabilities (Barr, Gilgunn, Kane, & Moore, 1999). Many organizations and researchers highlight the importance of screening and management of metabolic syndrome in people with disabilities (Chang et al., 2012; Hsu et al., 2012; Lin, Lin, & Lin, 2010; Lin et al., 2013, 2012; Mackin, Bishop, & Watkinson, 2007; Sivakumar, 2007; Welsh Office, 1996). Therefore, we sought to establish the prevalence of triple H (hypertension, hyperlipidemia, and hyperglycemia) and to examine their relationship with health behaviors among people with disabilities.

## 2. Methods

The present study analyzed the 2010–2012 annual health examination charts of young adults with disabilities in Taiwan. Adults with disabilities can freely participate in health screenings, which are provided by a local government, Yilan County. The study population included adults with disabilities who participated in the annual health examination, and approval to cooperate with the research was received from the local health department.

We recruited 705 young adults with disabilities, from ages 20 to 39, to participate in the analyses. The analyzed information included each client's demographic characteristics (gender, age, education, marital status, disability type and level), health behaviors (smoking, drinking alcohol, exercise, betel nut chewing, and vegetable and fruit consumption) and the prevalence of triple-H disorders (hypertension, hyperglycemia and hyperlipidemia) among them. Blood pressure consisted systolic blood pressure (SBP) and diastolic blood pressure (DBP). Patients were considered hypertensive if their SBP  $\geq 140$  mmHg or DBP  $\geq 90$  mmHg or if they were currently taking medication for hypertension (National Institutes of Health, 2003). Hyperlipidemia was defined as TG  $\geq 200$  mg/dL or TC  $\geq 240$  mg/dL (National Institutes of Health, 2001), and a patient was considered to have hyperglycemia when FPG  $\geq 126$  mg/dL (The American Diabetes Association, 1997).

Data were analyzed using SPSS 20.0 statistical software; the chi-square method was primarily used to analyze number, percentage, mean, standard deviation (S.D.), and range to describe the sample demographic's health behaviors and their correlation with triple-H disorders. A logistic regression analysis that included odds ratios (O.R.) and a 95% confidence interval (C.I.) was conducted to identify the potential risk factors associated with the occurrence of triple-H disorders in young adults with disabilities.

## 3. Results

**Table 1** presents the study sample's demographic characteristics, including gender, age, education, marital status, aboriginal, disability type and level, and whether they had been taking any medications long-term. Results showed that 59% of subjects were men, 70.6% were between ages 30 and 39, and nearly three-quarters had received a junior or senior high school education and were unmarried. With regard to their disability conditions, 30.5% of the study subjects had intellectual disabilities, 27.9% had chronic psychoses, 18.4% had limb disabilities, 11.5% had multiple disabilities, and 11.6% accompanied with other disabilities. In terms of disability level, most of the subjects in this study (84%) were mildly or moderately disabled, and 16% had a severe or profound level of disability. Over a third (37.9%) reported that they were ill and taking medication long-term. In terms of the BMI distribution of the study sample, 40.4% had normal indexes, 21% were overweight, and 29.5% were obese.

**Table 2** shows the health behavior distribution of the study sample. The rate of smoking was 27%, of consuming alcohol, 18.6% and of betel nut chewing, 11.5%. Nearly two-thirds (66.8%) of the subjects exercised regularly, meaning at least 3 times a week, and the nutritious food consumption survey indicated that 52.2% of patients ate at least 5 servings of fresh vegetables and fruits daily.

With regard to the subjects' triple-H component figures, **Table 3** shows that the mean values of diastolic and systolic blood pressure (mmHg) were  $76.07 \pm 13.19$  (range = 40–133) and  $120.58 \pm 16.96$  (range = 56–196), respectively. Nearly fifteen percent and 12.3% of the participants, respectively, had high diastolic ( $\geq 90$  mmHg) and systolic ( $\geq 140$  mmHg) blood pressure. Five percent of patients had elevated FPG. The biochemical analysis results showed that the hyperlipidemia rates of each component were the following: TC (6.7%) and TG (11.9%). In general, we estimated the prevalence of triple-H disorders at hypertension, 17.7%, hyperglycemia, 5.0% and hyperlipidemia 15% (**Table 4**).

We conducted chi-square tests on the occurrence of triple-H disorders and the subjects' demographic characteristics in a bivariate analysis (**Table 5**). The results showed that being male ( $p = 0.001$ ), education ( $p = 0.006$ ), marital status ( $p = 0.007$ ), disability type ( $p = 0.032$ ) and BMI ( $p < 0.001$ ) were significantly correlated with hypertension. The factors of age ( $p = 0.045$ ), education ( $p = 0.015$ ), taking medication long-term ( $p = 0.002$ ) and BMI ( $p = 0.003$ ) were correlated with hyperglycemia. Hyperlipidemia was more likely to occur in men ( $p < 0.001$ ), people of older age ( $p = 0.035$ ) and people with higher BMI ( $p < 0.001$ ).

**Table 6** shows the chi-square test results of the relationships between health behaviors and the experience of triple-H disorders. The results found that smoking ( $p < 0.001$ ), drinking alcohol ( $p < 0.001$ ), and chewing betel nuts ( $p < 0.001$ ) were

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