Original Research Article

Determination of symptoms associated with *hiesho* among young females using *hie* rating surveys

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ABSTRACT

Objective: *Hie* (cold sensation) is one of the most well-known health complaints in Japan and elsewhere in East Asia. Those who suffer from severe *hie* are considered to have *hiesho* (cold disorder). This study was conducted to determine symptoms associated with *hie* in young females using a survey consisting of the *hie* scale and *hie* diary.
Methods: Two hundred and seventy-one participants were included for the analysis. Survey forms were distributed to the participants. Diagnosis of *hiesho* was determined by using the *hie* scale. A discriminant score of over −0.38 was considered *hiesho*. The Short Form-8 Health Survey Standard Version (SF-8) was used to measure health-related quality of life (QOL). The participants were also asked to respond to the questionnaire evaluating 14 physical and emotional symptoms, utilizing a six-level Likert scale item.
Results: The 1st factor (*hie* factor) was correlated with *hie* ($r = 0.546$), dry mouth ($r = 0.332$), lower-extremity edema ($r = 0.450$), headrushes ($r = 0.470$), shoulder stiffness ($r = 0.311$), headrushes with chills ($r = 0.726$), and fatigue ($r = 0.359$). Cronbach's α of the 1st factor was 0.748, which indicated reliability between the items. When *hie* factor was the dependent variable, standardized partial regression coefficient was $\beta = -0.387$ for physical component score ($P < 0.001$) and $\beta = -0.243$ for mental component score ($P < 0.001$).
Conclusion: This study indicated that *hiesho* symptoms among young female adults were associated with bodily pain and general health perceptions of the SF-8 QOL survey.

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1. Introduction

Hie (cold sensation) is one of the most well-known health complaints in Japan and elsewhere in East Asia [1,2]. Those who suffer from severe *hie* are considered to have *hiesho* (cold disorder) [3]. The characteristic symptom of *hiesho* is a feeling of cold, mainly in the feet and hands, typically at environmental temperatures in which a healthy person does not feel cold [4–7]. Moreover, many individuals with *hiesho* also manifest various physical and emotional complaints that affect their quality of life (QOL) [8,9].

According to the Comprehensive Survey of Living Conditions, conducted in 2013, by the Japanese Ministry of Health and Welfare,

15.3 men and 32.6 women out of 1000 in the general population complained of cold sensation in their hands and feet [10]. It has also been suggested that over 50% of Japanese women suffer from *hiesho* [8,11–13]. *Hiesho* used to be considered specific to postmenopausal women [2,6]. However, in recent years it has also been reported to affect young males and females [14,15].

Typically, *hiesho* has been screened based on autonomic functioning tests which include evaluating skin temperature and/or blood flow [16–18]. However, these evaluation methods require devices such as infrared thermography, and often require patients to undergo stressful procedures such as cold immersion [2]. It would be useful in clinical and research settings if simple, non-invasive, and comprehensive *hie* diagnostic methods were available.

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To that end, we had previously conducted a study in an attempt to develop a questionnaire (hereafter referred to as a *hie* scale) in order to evaluate existence and severity of *hiesho* [19]. The *hie* scale used in the study showed that the sensitivity was 84.5% for males and 83.3% for females, and the specificity was 86.0% for males and 85.2% for females. We determined that the *hie* scale could identify *hiesho* in young males and females with a high level of accuracy. The *hie* scale used in the previous study could be useful in clinical settings as the *hie* evaluation tool, as it is non-invasive and requires no diagnostic equipment.

In addition to the aforementioned coldness or chilly sensations in various parts of the body, *hiesho* patients often manifest various symptoms which are likely associated with autonomic dysfunction [8,20]. Thus, we have been utilizing a *hie* diary when evaluating an acupuncture treatment for *hiesho* patients. This *hie* diary consists of an evaluation sheet with the list of 14 physical and emotional *hie*-associated symptoms utilizing a Likert scale item.

Our *hie* diary was created based on the Blood Stasis Questionnaire by Terasawa et al. [21] We modified their questionnaire by adding more questions and the Likert item was changed from four-level to six-level. In our previous study, we had not examined the internal consistency and relationship between *hie* intensity and the *hie*-associated symptoms. This study was conducted in order to determine the associated symptoms with *hie* on young females using a survey consisting of the *hie* scale and *hie* diary.

2. Subjects and methods

2.1. Participants

The study participants were recruited among female students attending three health science universities and two health science vocational schools. Three hundred and forty-eight students initially responded to the survey. Participants who were taking any prescribed medications at the time of study were excluded (*n* = 6). In addition, respondents who had a history of health conditions including allergies, gynecological conditions, asthma, dysautonomia, renal diseases, hyperthyroidism, herpes labialis, hemorrhoids, and anemia were excluded from the analysis (*n* = 25). Incomplete items on any of the survey sheets were also excluded (*Hie* daily: *n* = 8; *hie* scale: *n* = 8; health-related QOL: *n* = 3; height and/or weight: *n* = 27). After accounting for exclusions, 271 participants remained for the analysis (Fig. 1). The participants' age range was 18 to 29 years old (mean age: (20.4 ± 2.0) years). The body mass indexes (BMIs) of the participants were between 14.2 kg/m^2 and 34.0 kg/m^2 (mean BMI: (20.6 ± 2.6) kg/m^2). The study was approved by the ethics committee of each educational facility where the data were collected.

2.2. Measures

The investigation period lasted two months, from September 1 to October 31, 2012. The survey forms were distributed to the participants. After the participants voluntarily filled out their responses in each field, the forms were inserted into the designated collection box at each survey location. The survey forms were collected on October 31.

Diagnosis of *hiesho* was determined by using *hie* scale. According to the report of Sakaguchi et al. [19], a discriminant score of over –0.38 was considered *hiesho*.

2.3. Construction of the linear discriminant function model from discriminant analysis

The formula of the discriminant score was described in detail in our previous paper [19]. Briefly, the discriminant score was calculated based on the sum of the order scores from the following 7 questions minus 1.715 (expression constant): (A) Compared to others, I tend to be more sensitive to the cold (order score × (−0.083)); (B) I sometimes suffer because my entire body is cold (order score × (−0.044)); (C) I have been suffering from the cold for the last several years (order score × 0.233); (D) Compared to
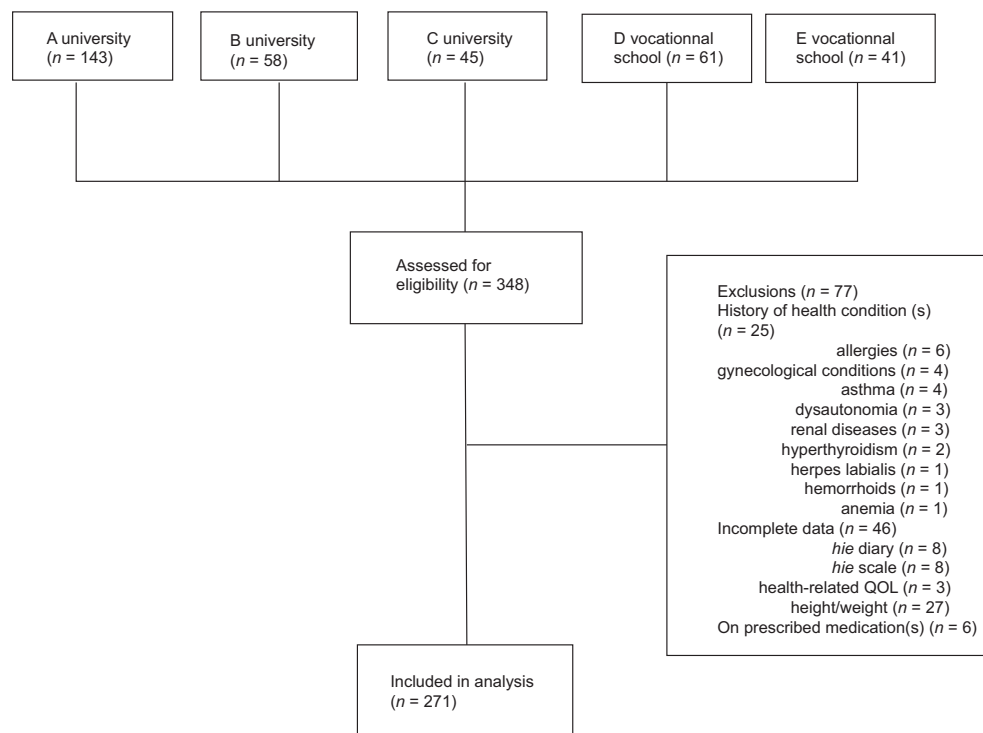

Fig. 1. Flow chart of recruitment of participants.