



## A community-based cross-sectional study of fatigue in middle-aged and elderly women



Meng-Juan Jing<sup>a,1</sup>, Jia-Ji Wang<sup>b,1</sup>, Wei-Quan Lin<sup>b</sup>, Yi-Xiong Lei<sup>b,\*</sup>, Pei-Xi Wang<sup>a,b,\*\*</sup>

<sup>a</sup> Institute of Public Health, School of Nursing, Henan University, Kaifeng, China

<sup>b</sup> Department of Preventive Medicine, School of Public Health, Guangzhou Medical University, Guangzhou, China

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### ABSTRACT

**Background:** Fatigue has been widely studied in the general population; however, limited studies have investigated it in the female population. The objectives of this community-based study were to (1) investigate the prevalence of fatigue, (2) explore the relationship between gynecological history and experiences of fatigue, and (3) identify risk factors for fatigue in middle-aged and elderly women.

**Methods:** Based on a cross-sectional health study that employed a multi-instrument questionnaire, 1272 women aged 45 years or older dwelling in the community were included. The Chinese version of Chalder Fatigue Scale (CFS) was used to assess fatigue, and socio-demographic, health-related, and gynecological data were also collected. Fatigue was defined as a total CFS score  $\geq 4$ .

**Results:** The prevalence of fatigue among women aged over 45 years was 33.9%. Multivariate logistic regression analysis identified that older age, single marital status, lower education level, the presence of chronic diseases, underweight, hospitalization in the last year, postmenopause, and a higher number of live births were associated with an increased risk of fatigue ( $P < 0.05$ ).

**Conclusions:** Our results indicated that fatigue was common in middle-aged and elderly females. Being postmenopausal and having more than three live births were the particular gynecological factors contributing to fatigue in the general population.

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### Introduction

Fatigue is viewed as an overwhelming sustained sense of 'a decreased capacity for physical and/or mental activity due to an imbalance in the availability, utilization, and/or restoration of resources needed to perform activity' [1], which differentiates pathological fatigue from a normal state in which the symptoms have a rapid onset, is of short duration, and are usually alleviated by self-regulation. There are increasing numbers of people suffering from fatigue, primarily due to strong competition, great pressure, and intense personal relationships in modern society [2,3]. Fatigue is not only a physical problem, but it is also a social issue, as it may impair individuals' quality of life and social productivity [4–7] by affecting an individual's work and home performance and function.

Fatigue, a nonspecific and widespread complaint, commonly exists in patients with various chronic diseases, such as multiple sclerosis

[8], cancer [9], and stroke [10,11]. In primary care settings, the prevalence of fatigue ranges from 2.72% to 75.7% [12]. It is also used as a sensitive indicator to evaluate the suboptimal health status in the general population. A number of studies on fatigue were conducted in the general population; it was found that the estimated prevalence of fatigue in the U.S. workforce was 37.9% [6], but it was as high as 82.1% in China [13]. The high range in prevalence rates among these studies might be due to differences between the study subjects, the measurement scales used, racial differences, diverse social environments, and the various types of fatigue examined, such as brief periods of fatigue, prolonged fatigue, and chronic fatigue. Nevertheless, fatigue is a universal symptom experienced by a substantial percentage of patients in the general population.

Several studies found that there was a higher incidence and level of fatigue in women than in men [14–16]; the underlying reasons for these gender differences in the incidence of fatigue remain unclear. It is possible that women may undergo greater stress than men as they have different physiological characteristics and social functions [17], which render them more susceptible to fatigue. In particular, in middle-aged women, increasing menopausal symptoms and reduced estrogen levels exert both physiological and psychological influences, and they also impair these women's quality of life [18]. Specifically, higher prevalence rates of cardiovascular diseases (CVDs) [19,20], metabolic syndrome

\* Corresponding author.

\*\* Correspondence to: P.-X. Wang, Institute of Public Health, School of Nursing, Henan University, Kaifeng, China.

E-mail addresses: jing53905@163.com (M.-J. Jing), wjjaji@163.com (J.-J. Wang), linweiquan0503@163.com (W.-Q. Lin), gz-leizeng@163.com (Y.-X. Lei), peixi001@163.com (P.-X. Wang).

<sup>1</sup> The first two authors contributed equally in this work.

(MetS) [21], and a loss of bone density [22] were observed in postmenopausal women when compared with their premenopausal counterparts. Depression and anxiety were also common symptoms experienced during menopausal transition and postmenopause [23]. These appear to underpin the differences in the incidence of fatigue between genders. However, it remains unclear whether there are any pre-existing risk factors, such as menstrual and reproductive history, that could predict the outcomes of chronic diseases among women. Several studies found that the number of births increased the risk of CVDs [24,25], and another study demonstrated that the risk of depression increased prominently with younger ages at menarche [26]. However, little information was available about the relationship between gynecological history and the incidence of fatigue, particularly in middle-aged and older females. In light of this, we carried out a large-scale investigation in women aged 45 years or above.

The present study aimed to explore the prevalence of fatigue in the month before study interviews in middle-aged and elderly women; it also aimed to determine the association between fatigue and socio-demographic, health-related, and gynecological characteristics. Particularly, the relationships between fatigue and history of menstruation and reproduction in these women were investigated.

## Methods

### Sampling and participants

This study was based on a cross-sectional health survey in the Shunde municipality of Guangdong province in China. The sample in this survey consisted of family members drawn from 5% of total households in this municipality. A total of 2080 households, including 6802 residents, were randomly selected using the city's household registration system via a simple random sampling method. A total of 243 individuals refused participation or did not respond, meaning that 6559 individuals took part in this survey. There were no statistical differences in the subjects' socio-demographic characteristics (i.e., gender, age, marital status, medical insurance which are offered by the city's household registration system) between the two groups. Ethical approval for this survey was obtained from the Research Ethics Board of Guangzhou Medical University, and written informed consent was obtained from each participant or their legal guardians (participants aged < 13 years, those with psychosis, or those who were communication impaired) prior to recruitment into the investigation. We then extracted the data of females aged 45 years or older from the data of all respondents; these women comprised the study sample. Excluding those with psychosis, 1272 females with neither missing data on the Chalder Fatigue Scale (CFS) nor hormone replacement therapy were subsequently included. A flowchart illustrating the selection of study participants is presented in Fig. 1.

### Procedures

The interviewers (medical students from Guangzhou Medical University and Guangzhou Pharmacy College, as well as healthcare staff from local Community Health Service Agencies) underwent survey-specific training on introduction of this survey, questionnaire contents, confidentiality, and communication skills, and they were provided with full sets of written instructions to standardize the data collection and recording procedures. All interviews took place in the participants' homes and all interview groups were composed of at least two trained medical students, as well as a nurse or a physician. All research data were collected through face-to-face interviews using structured study questionnaires. Initially, each group was accompanied by a supervisor to ensure that the interviews were properly conducted. Subsequently, routine supervision was randomly performed in a certain group.

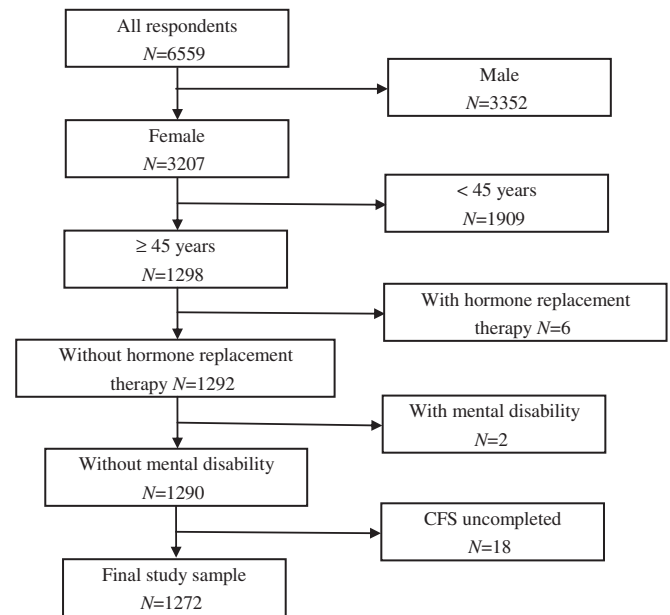


Fig. 1. Flow chart in the selection of study subjects.

### Measurements

#### Socio-demographic characteristics

Socio-demographic variables included age, marital status, educational status, occupational status, medical insurance, and living arrangement.

#### Health-related variables

Current smoking status, alcohol intake, physical activity, self-reported morbidity (hypertension, diabetes, and other chronic diseases), body mass index (BMI), blood pressure (BP), random capillary plasma glucose (RCPG), and hospitalization in the last year. Current smoking status was defined as smoking one or more cigarettes or pipes per day for at least 6 months. Alcohol intake was defined as regularly drinking alcohol for an average of more than once a week within the last year. Physical activity was defined as any exercise (walking, jogging, tai chi, square dancing, etc.) regularly performed for more than 20 min at a time each day, except for routine office and house work. BMI was calculated as weight (in kg) divided by the square of height (in m<sup>2</sup>), and participants were categorized as "underweight" (<18.5), "normal weight" (18.5–23.9), "overweight" (24.0–27.9), and "obese" (≥28.0), according to the Chinese BMI reference standards [27]. Arterial BP was measured on the right arm while the subject was in a seated position after at least a 10-minute rest, using a mercury sphygmomanometer with the cuff maintained at the heart level. BP was measured three times on one visit during each survey, and the mean of the three readings was used in the analysis. The RCPG was measured in fresh capillary blood samples obtained from fingertip pricking using glucose oxidase impregnated strips.

#### Gynecological history

Age of menarche, menopause status, age of primiparity, and number of live births.

#### Fatigue measurement

Fatigue was measured with the 11-item CFS, which was found to be reliable (physical fatigue [PF]:  $r = 0.85$ ; mental fatigue [MF]:  $r = 0.82$ ; total fatigue [TF]:  $r = 0.89$ ) [28], valid, and culturally sensitive [29,30]. The CFS items were designed to measure fatigue severity, assess changes in clinical treatment, and screen cases of fatigue in epidemiological studies [28]. The CFS had also been widely employed to assess PF and MF in both the general and clinical populations with good reliability

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