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Sleep Hygiene Index: reliability and validity of the Persian version in the male population

Original Article

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Abstract

Introduction: Inadequate sleep hygiene may result in difficulties in daily functioning; therefore, reliable scales are important to measure sleep hygiene. The purpose of this study was to assess the psychometric properties of the Persian version of Sleep Hygiene Index (SHI) in the male population.

Methods: In this study, 787 men, who were selected by cluster random sampling, filled out the SHI, Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), and Insomnia Severity Index (ISI). A subset of the participants (20%) completed SHI after a 4–6 week interval to measure test–retest reliability. Then, the Pearson product–moment correlation coefficients of SHI against PSQI, ESS, and ISI were computed to demonstrate the construct validity of SHI. The factor structure of SHI was evaluated by explanatory factor analysis.

Results: The interclass correlation coefficient was 0.85, and SHI was found to have a good test–retest reliability ($r = 0.86$, $p < 0.01$). The SHI was positively correlated with the total score of PSQI ($r = 0.62$, $P < 0.01$), ESS ($r = 0.63$, $P < 0.01$) and ISI ($r = 0.61$, $P < 0.01$). Exploratory factor analysis extracted three factors, namely "sleep–wake cycle behaviors" (four items), "bedroom factors" (three items), and "behaviors affecting sleep" (six items).

Conclusion: The Persian version of SHI can be considered a reliable tool for evaluating sleep hygiene in the male population in Persian countries.

Introduction

Sleep, a basic and essential need for human growth and development, is one of the most important processes to optimize physical, emotional and cognitive functioning and to maintain a good quality life [1, 2]. Sleep is the best form of resting and refreshing, and a good quality sleep is necessary for a healthy life [3].

It has been shown that maturational changes occur in adolescents' sleep biology, including a circadian phase delay [4]. In combination with multiple biological and psychosocial factors (such as late bedtime and increased technology use), humans' sleep may be associated with some problems, including short sleep duration, decreased sleep quality, shifts in sleep–wake patterns, and differences in sleep duration at weekends versus weekdays [4-10].

Impaired sleep quality has been shown to cause mental and physical illness, poor concentration, reduced energy levels, and increased risk of anxiety or depression [3]. In recent decades, there has been increased attention to sleep quality and sleep hygiene. Sleep hygiene may be described behavioral and environmental practices that promote sleep and avoid behaviors that interfere with sleep [7, 11, and 12]. In the 2014 revised edition of the International Classification of Sleep Disorders (ICSD), inadequate sleep hygiene is classified as a subtype of chronic insomnia. Inadequate sleep hygiene, as stated in the ICSD, is presumed to result from or be sustained by daily living activities that are inconsistent with the maintenance of good-quality sleep and normal daytime alertness [13].

The diagnostic criteria for Inadequate Sleep Hygiene in ICSD are as follows: The patient has a persistent insomnia or excessive sleepiness for one month with at least one of the following evidence: i) improper sleep schedule (e.g. frequent daytime napping, highly variable bedtimes or rising times, or spending excessive time in bed; ii) routine use of alcohol, nicotine, or caffeine, especially before bedtime; iii) mentally stimulating, physically activating, or emotionally upsetting activities close to bedtimes; iv) frequent use of the bed for non-sleep activities (e.g. watching television, reading, studying, eating, thinking, planning; and v) lack of a comfortable sleeping environment [13].

The instruments designed to assess sleep hygiene included Sleep Hygiene Awareness and Practice Scale (SHAPS) [14], Sleep Hygiene Self-Test (SHST) [15],

and Sleep Hygiene Index (SHI) [11]. The first two instruments have been found to have relatively low internal consistency compared to SHI (Cronbach's alpha = 0.47 for SHAPS, 0.54 for SHST and 0.66 for SHI). Moreover, SHAPS and SHST appeared to be developed with absence of clear rationale for item selection [11, 16], while the SHI was developed from the diagnostic criteria for inadequate sleep hygiene as described in ICSD [12, 15]. SHI has shown moderate internal consistency and good two-week test-retest reliability ($r = 0.71$, $p < .001$) and been associated with sleep quality and daytime sleepiness in a nonclinical sample [11]. SHI was shown to have acceptable validity and reliability in a sample of patients with chronic pain in Korea [16] and among clinical and non-clinical Turkish samples [3]. Chehri et al. have already shown acceptable validity and reliability of SHI in an Iranian female population [17]. However, there is lack of measurement for reliability and validity of SHI in Iranian male population. The aim of the current study was to evaluate the psychometric properties of the Persian version of SHI in the male population.

Materials and Methods

This population-based study was conducted in Kermanshah, a central province located in the west Iran, between April 2014 and May 2015. All procedures were approved by the institutional ethics committee of Kermanshah University of Medical Sciences (KUMS), and written informed consents were obtained from the participants. Fifty random clusters from different areas of the city were selected according to the statistical information acquired from the Kermanshah Health Center on the households. From each cluster, 15–20 men aged >20 years were included. If there was more than one individual in a family aged >20 years, we included all, if they were available, in our study. The exclusion criteria consisted of having underlying diseases (e.g. diabetes, cardiovascular) and psychiatric or mental disorders. Also, the subjects were excluded if they did not speak Persian. For those who did not want to participate, we recruited individuals from the next household. Finally, 787 men were enrolled in this study.

After a brief explanation about the study objectives, the study participants completed the questionnaires. Data were collected from the study participants using Sleep Hygiene Index (SHI), Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), and Insomnia Severity Index (ISI). A subset of participants (20%) completed SHI after a 4–6 week interval to measure test–retest reliability.

Translation

A standard forward–backward translation method was used. Two physicians translated the English version of SHI into Persian (Iran's official language). A sleep medicine fellow compared these translations, and a single version of the translated SHI was obtained. Then, two professional translators who were blinded to the original questionnaire translated it back into English. These translations were assessed by a bilingual physician; only two mistakes were found in the translations, and ultimately, a single English version was finalized. Ten expert physicians in the Sleep Medicine and Psychiatric departments evaluated the content validity. Twenty patients were asked to fill out the questionnaire, and a debriefing interview was performed to assess its face validity.

Instruments

Sleep Hygiene Index

SHI is a 13-item self-report index developed by Mastin et al. to assess the presence of sleep hygiene behaviors. The items constructing Sleep Hygiene Index were derived from the diagnostic criteria for inadequate sleep hygiene in ICSD. Participants were asked to show how frequently they engaged in specific behaviors (always, frequently, sometimes, rarely, never). Each item is rated on a five-point Likert scale (ranging from 0 [never] to 4 [always]). The total scores ranged from 0 to 52, with higher scores revealing more maladaptive sleep hygiene status. The scale has an internal consistency of 0.66 and a good test-retest reliability of 0.71, $P < 0.01$ [11].

Pittsburgh Sleep Quality Index

PSQI is a self-report instrument with 28 items that can be used to assess sleep quality over a 1-month period in clinical and nonclinical populations. The scores range from 0 to 21, with higher scores indicating poorer sleep quality. PSQI has been confirmed to have good internal reliability, stability over time, and acceptable validity [18]. We used an Iranian version of PSQI that has been shown to have acceptable reliability and validity [19].

Epworth Sleepiness Scale

ESS is a self-administered eight-item questionnaire. The total scores range from 0 to 24, with scores greater than 10 suggesting significant daytime sleepiness [20]. We used an Iranian version of ESS which has been shown to have acceptable reliability and validity [21].

Insomnia Severity Index

ISI is a short, subjective instrument for measuring insomnia symptoms and consequences. This instrument comprises of seven items, and each item is rated on a scale ranging from 0 (not at all) to 4 (very much). The total scores range from 0 to 28, with higher scores indicating greater severity of insomnia [23, 24]. It has been shown that the Iranian version of ISI has acceptable validity and reliability [25].

Statistical analyses

After descriptive statistics, to explore the factor structure of the Persian version of SHI, we performed the varimax-rotated principal component analysis. Then, we computed Pearson product–moment correlation coefficient for SHI with PSQI, ESS, and ISI to demonstrate the construct validity of SHI.

Results

From 811 participants, 787 filled out the questionnaires completely. A total of 24 datasets were excluded due to skipped items or illegible handwriting. Table 1 shows the participants' characteristics (with a mean age of 31.2±8.7 years). Mean SHI score was 38.5±6.2 with a range of 19-48.

Reliability

Of the participants, 20% (a total of 157, with mean age of 34.9±8.2) completed SHI after 4–6 weeks (median 31 days) to measure the test–retest reliability.

The results revealed an interclass correlation coefficient of 0.89, and SHI was found to have good test–retest reliability (r = 0.86, P < 0.01).

Validity

SHI was positively correlated with all the components of PSQI scores (P < 0.05). SHI was positively correlated with the total score of PSQI (P < 0.01), ESS (P < 0.01), and ISI (P < 0.01). Pearson correlation coefficients for SHI with PSQI, ESS, and ISI were 0.62, 0.63, and 0.61, respectively (P < 0.01).

Exploratory Factor Analyses

We performed exploratory factor analyses to assess the construct validity of the Persian version of SHI. All the item discrimination indices were greater than 0.02 in terms of item-total correlation coefficients, with the exception of items 1 ("I take daytime naps lasting two or more hours") and 9 ("I use my bed for things other than sleeping or sex"). Factor loadings for exploratory factor analyses are shown in Table 2.

The Kaiser–Meyer–Olkin (KMO) measure of the sampling adequacy was 0.87. We calculated a Bartlett's chi-square value of 855.990 (P < 0.01), which indicates

appropriateness of the data for analyses. The exploratory factor analyses of SHI using the extraction method of principal components indicated that three factors with eigenvalues >1 had to be retained because they accounted for 67% of the total sample variance (F1 = 44.52%, F2 = 14.69%, and F3 = 7.96%). The first factor, namely "sleep–wake cycle behaviors," was composed of four items (1, 2, 3, 5); the second factor, namely "bedroom factors," was composed of three items (8, 9, 10); and the third factor, namely "behaviors that affect sleep," was composed of six items (4, 6, 7, 11, 12, 13) (Table 3).

Table 1. Characteristics of the sample (N = 787)

Characteristics		Frequency	Percentage(%)
Marital status	Married	428	54.38
	Single	359	45.62
Education	Illiterate	82	10.42
	Elementary	154	19.57
	High school	202	24.67
	College or higher	349	44.34

Table 2. Factor loadings for explanatory factor analyses.

Sleep Hygiene Index				
	Mean	SD	Item Total	φ
Item 1	1.37	0.71	0.06	0.08
Item 2	3.32	1.32	0.44	0.56
Item 3	1.91	1.31	0.32	0.43
Item 4	1.71	1.09	0.28	0.32
Item 5	2.35	1.29	0.41	0.54
Item 6	2.61	1.25	0.48	0.51
Item 7	3.21	1.29	0.44	0.69
Item 8	3.12	1.13	0.41	0.62
Item 9	2.34	1.39	0.21	0.29
Item10	2.51	1.41	0.39	0.41
Item 11	1.87	1.09	0.26	0.31
Item 12	1.81	1.32	0.34	0.49
Item 13	2.62	1.31	0.39	0.41

φ= Unrotated item factor loading of explanatory factor analyses

Table 3. The results of factor analysis for each factor of SHI in the male population.

Factors	α Cronbach's	% cumulative	%of variance	Eigenvalue
1 (Items 1,2,3,5)	/85	44/54	44/54	5/9
2 (Items 8,9,10)	/82	59/31	14/68	1/8
3 (Items 4,6,7,11,12,13)	/83	67/13	7/91	1/02

Discussion

In this study, we translated SHI into Persian language and assessed its reliability and validity for the male population. In test–retest analyses, we found that 86% of the participants had the same score after a 4–6 week interval, which suggested SHI had good temporal stability in our samples. Mastin et al. assessed the test–retest reliability of SHI, with 141 (55 males and 86 females, mean age 23.9 years) participants completing SHI 4–5 weeks after the initial test. The authors found a good test–retest reliability for SHI (r = 0.71) [11]. Further, studying the patients with chronic pain, Cho et al. reported higher test–retest reliability of SHI than that of the study by Mastin et al. [16]. Additionally, Ozdemir et al. indicated an acceptable reliability after a 3-week interval in terms of intra-correlation coefficients (r = 0.62, P < 0.01) in a Turkish sample [3]. Chehri et al. reported interclass correlation coefficient of 0.83 and good test-retest reliability (r = 0.84, P<0.01) in an Iranian female population. Their findings showed that SHI was positively correlated with the total scores of Pittsburgh Sleep Quality Index (r=0.61, P< 0.01), Epworth sleepiness scale (r=0.63, P<0.01) and Insomnia Severity Index (r=0.62, P<0.01) [17]. Thus, the reliability of SHI in our study and other studies shows that the sleep hygiene behaviors measured by SHI are stable over time in nonclinical populations.

Both the subscale and total scores of SHI were positively correlated with sleep quality measured by PSQI, which confirms the findings of previous studies indicating sleep hygiene is strongly correlated with sleep quality [3, 11, and 25]. Some studies have found that sleep quality is strongly associated with sleep hygiene behaviors [26, 27]. As expected, we found that poor sleep hygiene was related to perceptions of increased daytime sleepiness, which is consistent with the findings of other studies [3, 11]. Our findings showed a positive correlation between sleep hygiene and insomnia severity measured by ISI, which is also in line with previous studies [3, 23]. Associations of SHI scores with poor sleep quality, sleepiness, and insomnia severity were all predictive of the construct validity of the scale. Our

results show that the Persian version of SHI has acceptable validity and reliability in the male population.

Our item analyses demonstrated that items 1 and 9 had relatively low item reliability and validity. Few studies have been conducted on item analyses for SHI. However, Odzemir et al. suggested that item 4 has relatively low item reliability and validity [3]. Therefore, these items may need to be revised in future studies. As mentioned, we found three factors whose items were significantly correlated with each other. These factors were similar to the three factors extracted by Adan et al. from Sleep Beliefs Scale [28]. Odzemir et al. found that four pairs of items were significantly correlated with each other [3]. Item analysis in these studies indicates that much shorter SHI measure can be designed with comparable psychometric features relative to this 13-item version.

Conclusion

The Persian version of SHI is an easy-to-use questionnaire that can be considered a reliable and valid tool for evaluating sleep hygiene in nonclinical male populations. Further research is needed to assess the reliability and validity of the Persian version of SHI in general population (men and women) and clinical settings.

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