ORIGINAL ARTICLE

VALIDITY AND RELIABILITY OF SHIFT WORK DISORDER QUESTIONNAIRE AMONG INDONESIAN FEMALE NURSES

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ABSTRACT

Nurses on shift work experience several symptoms such as excessive sleep, insomnia, feeling tired and fatigue. This situation could be inimical to health, **and lead to the conditions** known as shift work disorder (SWD). A tool is needed to measure shift work disorder among shift work nurses. It can be used to understand the ailment, and support strategies to prevent it. The aim of this study was to adapt SWD questionnaire for use in Bahasa. The study was a cross-sectional study among 201 female nurses who worked on shift duties at public hospital from March to April 2020. The questionnaires were self-administered via an online platform. SWD questionnaire was measured using three questions from previous study. It was used to measure sleep disorder related to work schedule. Permission to use this questionnaire was granted by original author. The process of translation and adaptation SWD questionnaire based on WHO studies. Cronbach alpha was used to measure internal consistency reliability. Exploratory factor analysis (EFA) using principal axis factor to examine construct validity. Confirmatory factor analysis (CFA) was used to assess the structural model fit of SWD. The cronbach alpha for SWD questionnaire was 0.834, which indicated adequate reliability. All of the items in SWD questionnaire had factor loading greater than 0.32, and the CR and AVE of SWD questionnaire were 0.951 and 0.751, which indicated good convergent validity. This study validates the psychometric properties of SWD questionnaire among Indonesia Female Nurses, including translation, validity, and reliability.

Keywords: psychometric, shift work disorder, validity, reliability

INTRODUCTION

Nurses on shift work experience several symptoms such as excessive sleep, insomnia,^{1, 2} tiredness and fatigue,³ and impaired health.⁴ In addition, shift worker nurses tend to have effective sleep less than eight hours per day.⁵ This may worsen existing health conditions and even cause SWD.⁶

Signs and symptoms of shift work disorder are sleeping excessively or falling asleep at work,⁷ poor performance, fatigue, and insomnia.⁸ Shift work disorder occurred due to work schedule. Prevalence of shift work disorder among nurses in Norway is 32.4% -37.6%.⁹ In Brazil, more than 50% of nurses experience severe sleep disorders.¹⁰ In Indonesia, the prevalence of sleep disorders among nurses is 52.50%.¹¹ Shift work disorder among nurses had effect on patient safety as well as work accident,¹² in addition shift work disorder among nurse had adverse effect on mental health such as depression and anxiety¹³ as well as physical health such as

cardiovascular disease and all cause specific mortality.¹⁴

To prevent negative effect on shift work disorder, a tool is needed to measure shift work disorder among shift work nurses. It can be used to understand the sleep disorder among shift workers and develop strategies to prevent shift work disorder.^{15, 16} This tool is also needed for clinical purpose, especially for rapid screening.¹⁷ Original shift work disorder (SWD) questionnaire can be used to assess shift work disorder among shift workers¹, it was consisted three items and the criteria based on International Classification of Sleep Disorder, second edition.¹⁸ However it has not been translated and adapted for use in Bahasa. Those, the aim of this study was to adapt original shift work disorder (SWD) questionnaire into Bahasa, including translation, validity, and reliability instrument.

METHODOLOGY

Ethical clearance this study was obtained from Research Ethics Committee of the Faculty of Nursing, Universitas Airlangga, Indonesia, with number 1903-KEPK. This was cross-sectional study. After obtaining the informed consent forms, we distributed online self-reported questionnaires, and only researchers who can access the questionnaires. We ensured the confidentiality of respondents. The participants were allowed to withdraw during study, and they got voucher after completing the questionnaires. Previous study suggested that minimum sample to get adequate statistic was 200¹⁹ or five cases per free parameter in the model²⁰⁻²². We had three parameters in this study, so the minimum sample in this study was 15 respondents. The data was collected from a 201 female shift work nurses who work at public hospital In Banjarmasin, South Kalimantan, Indonesia, from March to April 2020. The inclusion criteria for the participants were adult between 20-45 years old and work with shift work system (morning shift, afternoon shift, and night shift).

Shift work disorder (SWD) questionnaire was measured using three questions from previous study.¹ It was used to measure sleep disorder related to work schedule. Permission to use this questionnaire was granted by original author.¹ Original SWD questionnaire contains three items, with yes or no answer format. Shift work disorder criteria was obtained if the respondents answer “yes” to all these questions. The three questions were: 1. Difficulties with sleep or excessive sleepiness, 2. Sleep and sleepiness related to work schedule, 3. Sleep or sleepiness related to work schedule persist for at least one month.¹ This original SWD questionnaire was selected because the criteria of this questionnaire was selected based on International Classification of Sleep Disorder, second edition.^{1, 18}

The process of translation and adaptation of SWD questionnaire based on WHO studies and previous study²³. The first step was forward translation from English to Bahasa: one expert translator who knew English but mother tongue was bahasa translated the original instrument into Bahasa. Then, we conducted back translation from Bahasa to English by a professional translator, the back translator

never seen the original shift work disorder questionnaire. Then we conducted pilot study and finally we obtained final version of SWD questionnaire in Indonesian language (bahasa).^{23, 24}

SPSS was used to analyze the data. We used descriptive statistic such as mean and standard deviation for summarising continuous variables. Cronbach alpha was used to measure internal consistency using reliability analysis in SPSS. Previous studies suggest that cronbach's alpha > 0.5 is considered accepted reliability²⁵⁻²⁷. Exploratory factor analysis (EFA) using principal axis factor was employed to examine construct validity. KMO and Bartlett's test of sphericity were used to assess factor analysis.²⁸ The KMO must be greater than 0.6 and Bartlett's test of sphericity must be significant ($p < 0.05$).^{20, 29} Convergent validity was evaluated using factor loading > 0.32,³⁰ composite reliability (CR) > 0.6, and average variance extracted (AVE) > 0.4.³¹ Confirmatory factor analysis (CFA) was used to assess the structural model fit of SWD questionnaire Indonesia version. The following fit indices were evaluated using goodness-of-fit index (GFI), comparative fit index (CFI), and incremental fit indices (IFI) should be greater than 0.9.²⁹ Convergent validity was calculated using pearson correlation, by examining the relationship between each item and total score of SWD questionnaire Indonesia version.¹⁶

RESULTS

Table 1 showed the distribution of respondent characteristic. This study included 201 female shift work nurses with a mean age of 27.7 years old. Most respondents had vocational diploma of nursing (56.2%) and predominantly had work experience more than 5 years (54.2%). Most of respondents ever switch shift with others due to personal reasons (97.5%).

The quantitative data of SWD questionnaire Indonesia version: mean, standard deviation, cronbach's alpha and item total correlation coefficient were presented in Table 2.

Reliability estimate: Internal consistency

The cronbach alpha for SWD questionnaire Indonesia version was 0.834 and ranged from 0.721 to 0.853 when an item was deleted.

Table 1: Distribution of respondent characteristic

Demographic characteristics	Category	n (%)	Non Shift work disorder	Shiftwork disorder
Age (years) Mean (SD)		27.7(3.8)		
Level of Education	Vocational	113(56.2)	92	21
	Bachelor of nursing	14 (7.0)	6	8
	Registered nurse	72 (35.8)	54	18
	Master of nursing	2 (1.0)	2	0
	Total	201 (100)	154	47
Work Experience (months)	12-35	67 (33.3)	52	15
	36-60	25 (12.5)	21	4
	>60	109 (54.2)	81	28
	Total	201 (100)	154	47
Quick return	Yes	31 (15.4)	24	7
	No	170 (84.6)	130	40
	Total	201(100)	154	47
Change shift with others	Yes	196 (97.5)	150	46
	No	5 (2.5)	4	1
	Total	201 (100)	154	47

Table 2. SWD Questionnaire Analysis

SWD	Mean	SD	Cronbach's Alpha if Item deleted	Item total r
Item 1 Do you experience difficulties with sleeping or excessive sleepiness?	0.363	0.48	0.853	0.823*
Item 2 Is the sleep or sleepiness problem related to a work schedule where you have to work when you would normally sleep?	0.378	0.48	0.730	0.888*
Item 3 Has this sleep or sleepiness problem related to your work schedule persisted for at least one month?	0.338	0.47	0.721	0.890*
Global score	1.079	1.25	0.834	

*p value

Factor structure of SWD questionnaire

An exploratory factor analysis was performed to evaluate the construct validity of SWD questionnaire Indonesia version. The result of Kaiser-Meier-Olkin test was and the Bartlett's test value of sphericity was statistically significant ($p < 0.001$). All of the items in SWD questionnaire Indonesia version had factor loading greater than 0.32, which indicated good convergent validity (Table 3).

Construct validity

Table 3 showed the CR and AVE of SWD questionnaire Indonesia version were 0.951 and 0.751, respectively, which indicated acceptable convergent validity. Confirmatory factor analysis (CFA) was assessed to validate the structure of SWD questionnaire Indonesia version. Figure 1 showed the goodness of fit for the model structure with goodness-of-fit index (GFI) = 0.978, comparative fit index (CFI) = 0.922, incremental fit indices (IFI) = 0.924.

Table 3. Factor loading for explanatory factor analysis

	Factor loading	Shift Work Disorder		
		AVE	CR	
Item 1	0.656	0.753	0.951	
Item 2	0.797			
Item 3	0.806

Figure 1. The Factor structure of SWD; goodness-of-fit index (GFI) = 0.978, comparative fit index (CFI) = 0.922, incremental fit indices (IFI) = 0.924

DISCUSSION

This study evaluated the psychometric of shift work disorder (SWD) questionnaire Indonesia version consisting of translation, validity, and reliability among female shift work nurses in Indonesia. SWD questionnaire Indonesia version had adequate validity and reliability. The internal consistency of SWD questionnaire Indonesia version was adequate with cronbach's alpha = 0.834. Previous studies showed that Cronbach's alpha >0.5 was acceptable.^{25, 26}

Convergent validity of SWD questionnaire Indonesia version was good, the positive correlation between each item and total score was more than 0.2³² also it had factor loading greater than 0.32.³⁰ SWD questionnaire Indonesia version was also supported by construct validity. EFA (exploratory factor analysis) was used to analyze dimension of shift work disorder questionnaire Indonesia version and it produced one dimension. This study also conducted Confirmatory Factor Analysis (CFA) to address the construct validity. Shift work disorder questionnaire Indonesia version had adequate convergent validity based on AVE and CR in table 3. Figure 1 showed that the model structure of shift work disorder questionnaire Indonesia version had fit indices, specifically GFI, CFI, and IFI.

This study showed that SWD questionnaire Indonesia version is a stable instrument to measure shift work

disorder. This tool can be used for screening shift work disorder among female nurses.¹ In addition, this tool can be used in a research setting. The limitation of this study was we only focused on construct validity and did not compare SWD questionnaire Indonesia version to the other scales, therefore further study is needed to compare with other scale to measure shift work disorder.

CONCLUSIONS

This study evaluated the psychometric properties of SWD questionnaire Indonesia version including translation, validity, and reliability. This questionnaire can be used to assess shift work disorder among shift work nurses.

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