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Original Research

Reliability and Validity Test of the Indonesian Version of the Hamilton Anxiety Rating Scale (HAM-A) to Measure Work-related Stress in Nursing

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ABSTRACT

Introduction: Specific work characteristics have placed nurses as one of the professions with a high level of work-related stress. If not managed properly, work-related stress can cause adverse effects. Signs of stress can be seen in people's behavior, thinking or physical symptoms. One of a subjective measurement tool that is widely used to measure work-related stress is the Hamilton Anxiety Rating Scale (HAM-A), however, the literature that discusses the results of the HAM-A translation, validity and reliability test in the nurse profession is still limited. This study aims to translate HAM-A into the Indonesian version, then test its validity and reliability in nurses.

Methods: A Cross-sectional study with stratified random sampling method was conducted on 98 nurses from July to August 2018. The English version of HAM-A consists of 14 items has been a translation into Indonesian version. Pearson Product Moment Correlation was used to evaluate the construct validity and Cronbach's alpha scores were used to assess the internal consistency reliability of the Indonesian version of HAM-A.

Results: Item construct validity based on the Pearson correlation ranged from 0.529 to 0.727, Cronbach's alpha reliability was obtained at 0.756.

Conclusion: The Indonesian version of the HAM-A fulfills the criteria of a reliable (fair acceptable criteria) and valid (good criteria) assessment tool to assess the work-related stress in the nursing profession.

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INTRODUCTION

Work-related stress is the response people may have when presented with work demands and pressures that are not matched to their knowledge and abilities and which challenge their ability to cope (World Health Organization, 2007)(International Labour Organization, 2016). Previous research concluded that work-related stress is associated and increase an individual's vulnerability to burnout, job satisfaction and physical as well as mental health outcomes (Piko, 2006; Pillay, 2009). Other health problems related to the effects of work stress include: cardiovascular disorders (Li, Loerbroks, Bosma, & Angerer, 2016), gastrointestinal disorders (Huerta-Franco, 2013), musculoskeletal disorders (Nafeesa, Vidhya, Vijayalakshmi, & Rajkumar, 2017), anxiety and depression (Fan, Blumenthal, Watkins, & Sherwood, 2015), work fatigue (Rose et al., 2017), insomnia (Deguchi et al., 2017), alcohol abuse (Moore, Sikora, Grunberg, & Greenberg, 2007), decrease marital quality (Obradović & Čudina-Obradović, 2013) and disruption of social interaction (La Torre et al., 2018).

Specific work characteristics such as working time, length of interaction with patients, emotional nature of patient demands and inter-professional relationships are prone to conflict (Khamisa, Peltzer, Ilic, & Oldenburg, 2017). Sources of work-related stress of nursing consist of working environment (physical, psychological and social environment factors), interpersonal relationships, nature of nursing, organizational factors, role characteristics and individual characteristics (Moustaka & Constantinidis, 2010). Work-related stress if not

managed properly can cause adverse effects, including emotional disturbances, behavioral problems, biochemical and neurohormonal changes, presenting added risks of mental or physical illness. Conversely, well managed work-related stress will create a feeling of mastery and self-confidence; increases motivation, working capacity and satisfaction; and improves health (Vernekar & Shah, 2018).

Signs of stress can be seen in people's behavior changes. Acute responses to stress may be in the areas of feelings (for example, anxiety, depression, irritability, fatigue), behavior (for example, being withdrawn, aggressive, tearful, unmotivated), thinking (for example, difficulties of concentration and problem solving) or physical symptoms (for example, palpitations, nausea, headaches). If stress persists, there are changes in neuroendocrine, cardiovascular, autonomic and immunological functioning, leading to mental and physical ill health (for example anxiety, depression, heart disease) (Michie, 2002). Anxiety symptoms are serious and critical problems in the occupational context and they can be associated with stress (Vignoli, Muschalla, & Mariani, 2017).

One subjective measurement tool that is often used to measure work-related stress is the Hamilton Anxiety Rating Scale (HAM-A) (Thompson, 2015). HAM-A was one of the first rating scales developed to measure the severity of anxiety symptoms, being considered one of the most popular assessment instruments widely used rating scales both clinical and research settings/general health psychology, has been widely translated into various languages in the world and is widely used to measure work stress in various types of work (López-Pina, Sánhez-Meca, & Rosa-Alcázar, 2009; Thompson, 2015). Research using HAM-A to assess work-related stress among others: Karanikola et al (2016) who examined anxiety symptoms and quality of interaction among Greek oncology nurses, and Craiovan (2015) which examines burnout, depression, and quality of life among the Romanian employees working in non-governmental organizations. The HAM-A has been translated into Cantonese for China, French, Urdu, and Spanish, however, the literature that discusses the results of the HAM-A translation, validity and reliability test in the nurse profession in the Indonesian version is still limited.

To make the HAM-A accessible for the use in an Indonesian setting, especially in the nursing profession, this study aims to translate HAM-A into the Indonesian version, then test its validity and reliability among nurses in Indonesia.

MATERIALS AND METHODS

Design of Study and Participants

A Cross-sectional study was conducted among 98 nurses at one of the government hospitals in East Kalimantan from July to August 2018. The research sample was taken stratified randomly from all departments (operation room, hemodialysis room, emergency room, internist room, pulmonary room, surgery care room, medical checkup, and polyclinics). Determination of respondents using random sampling method (Singh & Masuku, 2014). All members of the nurse population are given a serial number, the serial number is written on small paper and rolled up, then inserted into a closed glass which is given a small hole, the researcher then shakes the glass, each number that comes out is made a respondent.

Instruments

The English version of Hamilton Anxiety Rating Scale (HAM-A) consists of 14 items, each defined by a series of symptoms, and measures both psychic anxiety (mental agitation and psychological distress) and somatic anxiety (physical complaints related to anxiety) (Hamilton, 1959; Maier, Buller, Philip, & Heuser, 1988).

The dimension of HAM-A consist of: (1) Anxious mood: Worries, anticipation of the worst, fearful anticipation, irritability; (2) Tension: Feelings of tension, fatigability, startle response, moved to tears easily, trembling, feelings of restlessness, inability to relax; (3) Fears: Of dark, of strangers, of being left alone, of animals, of traffic, of crowds; (4) Insomnia: Difficulty in falling asleep, broken sleep, unsatisfying sleep and fatigue on waking, dreams, nightmares, night terrors; (5) Intellectual: Difficulty in concentration, poor memory; (6) Depressed mood: Loss of interest, lack of pleasure in hobbies, depression, early waking, diurnal swing; (7) Somatic (muscular): Pains and aches, twitching, stiffness, myoclonic jerks, grinding of teeth, unsteady voice, increased muscular tone; (8) Somatic (sensory): Tinnitus, blurring of vision, hot and cold flushes, feelings of weakness, pricking sensation; (9) Cardiovascular symptoms: Tachycardia, palpitations, pain in chest, throbbing of vessels, fainting feelings, missing beat; (10) Respiratory symptoms: Pressure or constriction in chest, choking feelings, sighing, dyspnea; (11) Gastrointestinal symptoms: Difficulty in swallowing, wind abdominal pain, burning sensations, abdominal fullness, nausea, vomiting, borborygmi, looseness of bowels, loss of weight, constipation; (12) Genitourinary symptoms: Frequency of micturition, urgency of micturition, amenorrhea, menorrhagia, development of frigidity, premature ejaculation, loss of libido, impotence; (13) Autonomic symptoms: Dry mouth, flushing, pallor, tendency to sweat, giddiness, tension headache, raising of hair; (14) Behavior: Fidgeting, restlessness or pacing, tremor of hands, furrowed brow, strained face, sighing or rapid respiration, facial pallor, swallowing, etc.

Each item is scored on a scale of 0 (not present) to 4 (severe), with a total score range of 0–56, where <17 indicates mild severity, 18–24 mild to moderate severity and 25–30 moderate to severe(Maier et al., 1988). HAM-A is comprised of a psychic and a somatic subscale. The psychic subscale (items 1-6 and 14)

addresses the more subjective cognitive and affective complaints of anxiety (e.g., anxious mood, tension, fears, difficulty concentrating), and is particularly useful in assessing the severity of general anxiety disorders (GAD). The somatic component (items 7-13) emphasizes the features of GAD such as autonomic arousal, respiratory, gastrointestinal and cardiovascular symptoms (Katherine Shear et al., 2001).

Cross-cultural Process of Daptation and Translation

The questionnaire was translated according to the guidelines for cross-cultural adaptation of self-report measures by Beaton et al (2000). The guidelines consists of five stages: (1) Translation by two bilingual translators (native Indonesian), then they discuss and identify the selection of appropriate words so that they can reflect clinical symptoms and the language used by the general population; (2) Synthesis, both translators and an observer discuss to get a combined translation; (3) back translation by two bilingual translators (native English), the results of a combined translation in Indonesian are translated back into English by two translators with the aim of checking the validity of the translation process and ensuring the translated version reflects the same meaning as the original version; (4) evaluation by a team of experts consisting of forward and backward translators, epidemiologists and health professional experts, this was intended to consolidate all versions of the instrument and develop a prefinal version of the instrument for use in field testing; (5) pre-testing in a group of 98 nurses in operation rooms, hemodialysis rooms, emergency rooms, internist rooms, pulmonary rooms, surgery care rooms, medical checkups, and polyclinics. The final results of the HARS translation into Indonesian can be seen in table 2. pre-testing in a group of 98 nurses in operation room, hemodialysis room, emergency room, internist room, pulmonary room, surgery care room, medical checkup, and polyclinics. The final results of the translation into Indonesian can be seen in table 2.

Statistical Analyses

Data were analyzed by the Statistical Package for the Social Sciences (SPSS ver. 21, Chicago, IL, USA), in order to describe continuous and qualitative variables, mean, standard deviation (SD) and percentage frequency were used respectively. The minimum, maximum and variance were also reported for each item of the questionnaire.

Validity and Reliability

Pearson product moment correlation was used to evaluate the construct validity of each item to the total score. HAM-A test correlations were considered as 'good to excellent' when r ≥ 0.75, as 'good' when r ranged between 0.5 and 0.7, as 'fair' when r ranged between 0.25 and 0.50, and as 'little or no relationship' when r was less than 0.25 (Kline, 2000; Portney & Watkins, 2009; Terwee et al., 2007). Cronbach's alpha scores with split half method were used to assess the internal consistency reliability of the HAM-A questionnaire. A value below 0.70, the questionnaire is 'unacceptable' a value between 0.70 and 0.79 is considered 'fair', a value between 0.80 and 0.89 considered 'good', and a value 0.90 and above considered 'excellent' (Cicchetti, 1994; Nunnally & Bernstein, 1994; Michalopoulos et al. 2015; Taber, 2018).

RESULTS

Respondent characteristics

The majority of respondents in this study were 20-30 years old (46.9%), the majority of respondents were women (77,6%), mostly married (82.7%), worked more than 5 to 10 years (45.9%) and mostly graduated from diploma III in nursing (80.6%) (table 1).

The result of validity and reliability test of HAM-A Indonesian version

As is shown in table 3, the mean of the total HAM-A score was 10,58 (± 5,82). The 4th item on "Insomnia (difficulty in falling asleep, broken sleep, unsatisfying sleep and fatigue on waking, dreams, nightmares, night terrors)" showed the highest score (1,11, ± 0,73), whereas the 10th item on "Respiratory symptoms (pressure or constriction in chest, choking feelings, sighing, dyspnea)" had the lowest score (4,1 ± 0,64). The largest and smallest variance was also observed in item 2 and item 4 (0,53) and item 1 (0,37), respectively. The smallest Pearson correlation value is 0.529 (item number 11 on "Gastrointestinal symptoms (difficulty in swallowing, wind abdominal pain, burning sensations, abdominal fullness, nausea, vomiting, borborygmi, looseness of bowels, loss of weight, constipation)", and the largest Pearson correlation is 0.727 (item number 6 on "Depressed mood: loss of interest, lack of pleasure in hobbies,

Table 1. Characteristics of respondents (n=98)

Characteristics	n	%
Ages		
20-30	46	46.9
>30-40	43	43.9
>40-50	9	9.2
Gender		
Male	22	22.4
Female	76	77.6
Marital Status		
Married	81	82.7
Not married	15	15.3
Ever married	2	2
Working Experience		
0-5	35	35.7
>5-10	45	45.9
>10-15	13	13.3
>15-20	5	5.1
Level of Education		
Diploma III in nursing	79	80.6
Strata 1 in nursing	19	19.4
Total	98	100

Table 2. The Hamilton Anxiety Rating Scale (HAM-A): Original (English)(Hamilton, 1959) and Translated (Indonesian) Version.

	Original version	Indonesian version
Item 1	Anxious mood (Worries, an anticipation of the worst, fearful anticipation, irritability)	Perasaan cemas (merasa khawatir, firasat buruk, takut akan fikiran sendiri, lekas marah atau mudah tersinggung)
Item 2	Tension (Feelings of tension, fatigability, startle response, moved to tears easily, trembling, feelings of restlessness, inability to relax)	Ketegangan (merasa tegang, merasa lelah, respon yang mengejutkan, mudah meneteskan air mata, merasa gemetar, merasa gelisah, tidak mampu untuk bersantai)
Item 3	Fears (Of dark, of strangers, of being left alone, of animals, of traffic, of crowds)	Ketakutan (takut terhadap gelap, takut terhadap orang asing, takut ditinggalkan sendirian, takut pada hewan, takut pada keramaian lalu lintas, takut pada kerumunan orang banyak)
Item 4	Insomnia (Difficulty in falling asleep, broken sleep, unsatisfying sleep and fatigue on waking, dreams, nightmares, night terrors)	Insomnia (kesulitan tidur, tidur tidak memuaskan, merasa lelah saat bangun, mimpi buruk, terbangun tengah malam)
Item 5	Intellectual (Difficulty in concentration, poor memory)	Intelektual (sulit berkonsentrasi, sulit mengingat)
Item 6	Depressed mood (Loss of interest, lack of pleasure in hobbies, depression, early waking, diurnal swing)	Perasaan depresi (kehilangan minat, kurangnya kesenangan dalam hobi, perasaan bersedih, sering terbangun dini hari saat tidur malam)
Item 7	Somatic (muscular) (Pains and aches, twitching, stiffness, myoclonic jerks, grinding of teeth, unsteady voice, increased muscular tone)	Gejala somatik (otot) (nyeri atau sakit otot, kedutan, otot terasa kaku, gigi gemertak, suara tidak stabil, tonus otot meningkat)
Item 8	Somatic (sensory) (Tinnitus, blurring of vision, hot and cold flushes, feelings of weakness, pricking sensation)	Somatik (sensorik) (Telinga terasa berdenging, penglihatan kabur, muka memerah, perasaan lemah, sensasi ditusuk-tusuk)
Item 9	Cardiovascular symptoms (Tachycardia, palpitations, pain in chest, throbbing of vessels, fainting feelings, missing beat)	Gejala-gejala kardiovaskular (takikardi, palpitasi, nyeri dada, denyut nadi meningkat, perasaan lemas/lesu seperti mau pingsan, denyut jantung serasa berhenti sekejap)
Item 10	Respiratory symptoms (Pressure or constriction in chest, choking feelings, sighing, dyspnea)	Gejala pernapasan (nafas terasa sesak/dada terasa ditekan, perasaan tercekik, sering menarik nafas dalam, nafas pendek/tersengal-sengal)
Item 11	Gastrointestinal symptoms (Difficulty in swallowing, wind abdominal pain, burning sensations, abdominal fullness, nausea, vomiting, borborygmi, looseness of bowels, loss of weight, constipation)	Gejala gastrointestinal (kesulitan menelan, nyeri perut, perut terasa kembung, sensasi terbakar, perut terasa penuh, merasa mual, muntah, sukar buang air besar/BAB, kehilangan berat badan, konstipasi)
Item 12	Genitourinary symptoms (Frequency of micturition, urgency of micturition, amenorrhea, menorrhagia, development of frigidity, premature ejaculation, loss of libido, impotence)	Gejala genitourinari (frekuensi berkemih meningkat, tidak dapat menahan air seni, tidak datang bulan, darah haid lebih banyak dari biasanya, gairah sex menurun, ejakulasi dini, kehilangan libido, impotensi)
Item 13	Autonomic symptoms (Dry mouth, flushing, pallor, tendency to sweat, giddiness, tension headache, raising of hair)	Gejala otonom (mulut kering, muka kemerahan, muka pucat, sering berkeringat, merasa pusing, kepala terasa berat, merasa tegang, rambut terasa menegang)
Item 14	Behavior (Fidgeting, restlessness or pacing, tremor of hands, furrowed brow, strained face, sighing or rapid respiration, facial pallor, swallowing, etc.)	Tingkah laku (gelisah, tidak tenang/sering mondar-mandir, tangan gemetar, alis berkerut, wajah tegang, sering mendesah atau pernapasan cepat, wajah pucat, sering menelan ludah, dll.)

depression, early waking, diurnal swing"). Based on the previous criteria, it can be concluded that all of the HAM-A items in Indonesian version are declared "fair" or in this study called as a valid because Pearson correlation (r) ranged between 0.5 and 0.7.

If item question number 2 "Tension: Feelings of tension, fatigability, startle response, moved to tears easily, trembling, feelings of restlessness, inability to relax" is deleted this can increase Cronbach's alpha coefficient by 0.753, If item question number 12 "Genitourinary symptoms (frequency of micturition, urgency of micturition, amenorrhea, menorrhagia, development of frigidity, premature ejaculation, loss of libido, impotence)" is deleted this can increase Cronbach's alpha coefficient by 0.745 and if item question number 5 "Intellectual (difficulty in concentration, poor memory)" is deleted this can increase Cronbach's alpha coefficient by 0.744.

To get the Indonesian version of HAM-A with the highest level of reliability, it is recommended that item number 2 "Tension: Feelings of tension, fatigability, startle response, moved to tears easily, trembling, feelings of restlessness, inability to relax" be omitted so that Cronbach's Alpha coefficient becomes 0.753. But in general, the combination of all 14 items of HAM-A has shown the fair reliability (or

Table 3. Descriptive Characteristics and the Pearson Correlation of Each Data for Internal Consistency of Indonesian Version of the HAM-A Questionnaire (n=98)

Item	Mean	SD	Pearson correlation (r)	p	Corrected item/total correlation	Cronbach's alpha if item deleted
Item 1	0.64	0.613	0.599	0.000	0.586	0.743
Item 2	0.96	0.731	0.697	0.000	0.702	0.753
Item 3	0.66	0.657	0.537	0.000	0.574	0.742
Item 4	1.11	0.731	0.600	0.000	0.587	0.740
Item 5	0.87	0.715	0.550	0.000	0.565	0.744
Item 6	0.86	0.603	0.727	0.000	0.750	0.743
Item 7	0.88	0.703	0.672	0.000	0.673	0.738
Item 8	0.72	0.662	0.629	0.000	0.640	0.738
Item 9	0.46	0.715	0.629	0.000	0.702	0.738
Item 10	0.41	0.645	0.562	0.000	0.651	0.741
Item 11	0.83	0.589	0.529	0.000	0.618	0.741
Item 12	0.82	0.626	0.693	0.000	0.526	0.745
Item 13	0.82	0.648	0.569	0.000	0.714	0.737
Item 14	0.55	0.628	0.569	0.000	0.562	0.743
Total score	10.58	5.82	1		-	-

in this study called as a reliable) with Cronbach's alpha coefficient of 0,756. This result generally shows the Indonesian version of HAM-A is reliable to measure work-related stress in nurses.

DISCUSSION

Validity expresses the degree to which a measurement measures what it purpose to measure. Validity tests are categorized into two broad components namely; internal and external validities. Internal validity refers to how accurately the measures obtained from the research was actually quantifying what it was designed to measure whereas external validity refers to how accurately the measures obtained from the study sample described the reference population from which the study sample was drawn (Bolarinwa, 2015). Reliability is the extent to which a measurement of a phenomenon provides stable and consist result (Taherdoost, 2016), and Cronbach's alpha is an accurate estimate of reliability and the Spearman-Brown formula is an accurate method to calculated reliability coefficient (Eisinga, Grotenhuis, & Pelzer, 2013). According to Ursachi, Horodnic, & Zait (2015), the Cronbach Alpha coefficient between 0.6-0.7 indicates an acceptable level of reliability, and 0.8 or greater a very good level.

The finding of the present study indicates that the Indonesian version of the HAM-A has a high enough internal and external validity, which can reveal the causal relationship between independent and dependent variables related to work-related stress in nursing with generalized results. This can be seen from the correlation coefficient (r) of the Pearson Product Moment between the item score and the total score ranging from 0.529 (min) to 0.967 (max) with a significant positive correlation (p = 0.000). In accordance with Bryman's (2001) opinion that internal validity is common to refer to the factor that has a causal impact as the independent variable and the effect as the dependent variable, and Mc Dermot's (2011) opinion that external validity refers to the generalizability of findings from a study, or the extent to which conclusions can be applied across different populations, settings, treatments, and outcomes

In this study, the English version of HAM-A was translated into Indonesian language and the reliability and validity of the Indonesian version of the HAM-A were investigated using a representative sample of nurses from various aspect i.e department/care rooms, age, marital status, educational level, and work experience, the finding indicates that the HAM-A in Indonesian version has satisfactory psychometric properties with adequate validity and reliability, so that it can be used to measure work-related stress on nurses.

Similar to this study, translation of HAM-A into another language version has been done several times and getting valid and reliable results. In clinical research settings, HAM-A is a reliable and valid measure for the assessment of global anxiety in the adolescent population (Clark & Donovan, 1994); HAM-A are reliable and valid instruments that can be used among end-stage renal disease (ESRD) patients undergoing hemodialysis (HD)(Gencoz, Gencoz, & Soykan, 2007); HAM-A is a valid and reliable instrument for the assessment of depression in the Urdu language (Hashmi, Naz, Asif, & Khawaja, 2016); In Indian language with video recorded interview, HAM-A inter-rater reliability has found excellent to asses patients with major depressive disorder (MDD) (Prasad et al., 2009).

In general/workers setting, this study supports the results of previous studies, among others: HARS in the Arabic version is valid and reliable to measure work-related stress among working women in Gaza Strip (Aqel & Thabet, 2017), the HAM-A showed good internal consistency to assess the Romanian employees working in non-governmental organizations (Craiovan, 2015), HAM-A can be used globally and is valid and reliable to measure work-related stress on students (Gupta et al., 2014), HAM-A has a high-reliability index to measure anxiety oncology nursing in Athens, Greece (Karanikola et al., 2016) and the HARS in Greek language was reliable to assess work-related stress in emergency nursing

personnel in Greece (Stathopoulou, Karanikola, Panagiotopoulou, & Papathanassoglou, 2011).

CONCLUSION

The result of the study demonstrates that the Indonesian version of the HAM-A fulfils the criteria of a reliable (fair acceptable criteria) and valid (good criteria) assessment tool to assess the work-related stress in the nursing profession. This scale showed good psychometric properties in the nursing profession with different education, gender, work experience, and different department. The high internal consistency and construct validity support the application of the HAM-A as an easy-administered tool to asses work-related stress in the nursing profession.

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