

ORIGINAL ARTICLE

Psychometric Evaluation of Regensburg Insomnia Scale (RIS)-indonesia Version Among Flood Victims

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ABSTRACT

Introduction: Insomnia often occurs in victims of natural disasters, such as floods. Objective: The aim of this study was to evaluate psychometric testing of Regensburg Insomnia Scale (RIS) Indonesia version, including translation, validity, reliability, and receiver operating characteristic (ROC). **Materials and methods:** This study used a cross-sectional and correlational design and a self-report questionnaire. Data was collected from people who live on the riverbanks and have experienced flood disaster, in Banjar Regency, South Kalimantan, Indonesia. We collected the data from May to September 2023. This study has 10 parameters. The number of samples in this study was 98 respondents. The sampling technique was simple random sampling. The inclusion criteria of this study were aged between 19-65 years, living on the riverbank, their house had been flooded during the rainy season. The RIS was translated into Bahasa Indonesia based on World Health Organization guideline. Construct validity was evaluated using exploratory factor analysis (EFA). Convergent validity is evaluated using factor loading and Cronbach's alpha was addressed to examine reliability. **Results:** The result of construct validity was adequate, with the Kaiser-Meyer-Olkin value of 0.67 and the Bartlett's test of sphericity was statistically significant. the Cronbach's alpha of RIS Indonesia version was acceptable. According to ROC curve analysis, the cut-off point at a score 13.5 indicated the best sensitivity and specificity. **Conclusion:** The RIS Indonesia version showed valid and reliable to assess insomnia among flood victims.

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INTRODUCTION

Sleep disorders often occur in victims of natural disasters, such as floods (1). Flood waters entered some households can lead on short sleep duration (i.e., 5 hours or less than 5 hours) (2). In addition, Flood contributed to properties and house damage (3), and it can lead to sleep disturbance because their house was destroyed (4), difficult to initiate sleep, waking up in the middle of the night, waking up too early and being tired throughout the day, furthermore the quantity of sleep is also reduced. These symptoms refer to insomnia (5). The number of sleep disorders among natural disasters, such as floods, is twice as high as in the general population (1). The data also showed that more than 50% of victims of natural disasters, including floods, also report insomnia (6). Indonesia is one of the most vulnerable countries to natural disasters, such as floods (7), especially in South Kalimantan Province.

Sleep disorders such as insomnia are a global health problem, often unreported, and a financial burden. Unresolved insomnia in flood victims will cause physical and mental health problems (8) such as anxiety (9), depression, and post-traumatic stress disorder (PTSD) (10). One of the predictor of PTSD was insomnia (11). However, people affected by flood disasters are often unaware of the symptoms and health care provider, such as community health nursing need tool for screening this problem quickly. Based on the data among the flood victims the nursing diagnosis that related on sleep is insomnia (00095). Nursing diagnosis is clinical judgment about human responses to health condition that a nurse can address (5). Subjective self-report questionnaires are needed to measure insomnia in people living on riverbanks and affected by flood disaster for rapid screening, and clinical purposes such as establishing a nursing diagnosis. Furthermore, the results of initial screening can be used as a strategy to resolve insomnia in this community.

The questionnaire for measuring insomnia is the Regensburg Insomnia Scale (RIS) (12). This questionnaire is valid and reliable. In our best knowledge, there

has only been one psychometric test of an insomnia questionnaire in Indonesian on street children (13), and not on communities who lives in river bank and affected by flood disaster. Based on these phenomena, it is needed for adaptation, translation and psychometric testing of the Indonesian version of the Regensburg Insomnia Scale (RIS) among people affected by flood disasters.

MATERIALS AND METHODS

Research Design

This study used a cross-sectional and use self-report questionnaire. Data was collected from people who live on the riverbanks and have experienced flood disaster, in Banjar Regency, South Kalimantan, Indonesia (14) from May to September 2023. We conducted psychometric evaluation of the Regensburg Insomnia Scale (RIS) Indonesian version among people affected by flood disasters, including translation, validity, reliability, and receiver operating characteristic.

Population, Sample Size, and Sampling Technique

This study has 10 parameters. Psychometric testing of questionnaires requires a minimum of 5 samples for each parameter (15, 16), so the minimum sample recommended in this study is 50 respondents. The number of samples in this study was 98 respondents, to overcome missing data (17). The sampling technique was simple random sampling, samples were taken from 8 cluster in 2 villages. The inclusion criteria of this study were aged between 19-65 years (18), living on the riverbank, their house had been flooded during the rainy season, no history of psychiatric or nervous disorders in 2023. The exclusion criteria in this study were people who did not agreed to join in this study, cannot read, write, and speak in Bahasa Indonesia.

Instrument

The Regensburg Insomnia Scale (RIS) is a self-report questionnaire designed in Germany, used to measure cognitive, emotional and behavioral aspects of psychophysiological aspects of insomnia over a period of 4 weeks and consists of 10 items. Item 1 asks about sleep latency, namely the time to sleep with a score of 0 (1-20 minutes), 1 (21-40 minutes), 2 (41-60 minutes), 3 (61-90 minutes), 4 (91 minutes or more). Meanwhile, item 2 asks about sleep duration, namely 4 (7 hours or more), 3 (5-6 hours), 2 (4 hours), and 1 (0-2 hours). While items 3 to 10 (sleep continuity, early awakening, easy awakening, sleepless nights, thinking about sleep, fear of insomnia, impaired daytime, and hypnotic intake) the scoring for this item is 0 for never, 1 rarely, 2 sometimes, 1 often, and 0 for very often (12).

Zung self-anxiety scale (SAS) Indonesia version is used to measure anxiety (19). It was adapted and translated

among Indonesia people. This questionnaire consist of 20 items and each question is scored on a Likert-type scale of 1-4. Total score of SAS range between 20-80. The cut off score more than 36 indicated anxiety (20).

Data collection and procedure

All of procedure of this study was granted by ethical clearance from Institutional Review Board from Medical Faculty, Universitas Lambung Mangkurat number 170/KEPK-FK ULM/EC/VII/2023. We get permission from the heads of Sungai Rangas and Sungai Rangas Tengah villages to collect the data. We also obtained permission from the original author to adopt this questionnaire into Bahasa. The questionnaire was adopted according to WHO guidelines (21). We carried out forward translation: translating the questionnaire from English (original questionnaire) into Indonesian by an expert who understands English but whose mother language is Indonesia. Then we conducted expert panel. The next stage was back translation: translating the questionnaire from Indonesia to English. Afterward, we conducted a pilot study to check whether the language for the questionnaire can be understood among potential respondents. We distributed the questionnaire to 10 potential respondents. In this study, there was limitation in the method design such as we did not conduct test-retest due to we already measured Cronbach alpha.

Data analysis

All data were analyzed using SPSS and we analyzed missing data. Descriptive statistic was used to measure minimum and maximum value, mean and standard deviation (SD), frequency, and percentage of characteristic of respondent. We tested construct validity, convergent validity and reliability with internal consistency. Cut-off score was analyzed using receiver operatic characteristic (ROC) with the Zung Self Anxiety Scale (SAS) Indonesia (20). Previous study mentioned that insomnia related with anxiety (22). Construct validity was evaluated using exploratory factor analysis (EFA), with principal components extraction and varimax rotation (23) with Kaiser-Meyer-Olkin (KMO) indicators and Bartlett's test of sphericity. KMO must be greater than 0.5 and Bartlett's test of sphericity must be significant ($p < 0.05$) (24). Convergent validity is evaluated using factor loading. The value of factor loading > 0.32 (25).

RESULTS

Characteristic of Respondents

Table I showed the characteristic of respondents. Most of respondents was predominantly by age between 20-30 years old (34.7%) and the mean age of respondents was 38.91 years old. Regarding the gender, 45.9% was male and 54.1% was female.

Table I: Characteristic of respondents (n = 98)

Characteristic	Mean	N	%
Age (years)	38.91		
20-30		34	34.7%
31-40		24	24.5%
41-50		21	21.4%
51-60		15	15.3%
61-70		4	4.1%
Gender			
Male		45	45.9%
Female		53	54.1%

Score Regensburg Insomnia Scale (RIS) Indonesian version

Table II showed the average score of RIS Indonesia version items. The mean score of RIS was 12.61 (5.372). The highest mean value was item 4 “early awakening” 2.47 (1.262). And the lowest score was item 10 “hypnotic intake” 0.46 (1.007).

Table II: Average score of RIS Indonesia version items

Item RIS	Scale Item	Min	Max	Mean	SD
Sleep Latency <i>Perlu berapa menit bagi Anda untuk bisa tertidur?</i>	Item 1	0	4	0.85	0.866
Sleep duration <i>Berapa jam biasanya Anda tidur pada malam hari?</i>	Item 2	0	4	0.84	0.796
Sleep continuity <i>Tidur saya terganggu</i>	Item 3	0	4	1.64	1.028
Early awakening <i>Saya bangun terlalu pagi/cepat</i>	Item 4	0	4	2.47	1.262
Easy awakening <i>Saya terbangun bahkan dari suara paling kecil</i>	Item 5	0	4	1.74	1.204
Sleepless nights <i>Saya merasa bahwa saya tidak tidur sepanjang malam</i>	Item 6	0	4	1.19	1.198
Thinking about sleep <i>Saya sering memikirkan tentang tidur saya</i>	Item 7	0	4	1.30	1.229
Fear of insomnia <i>Saya takut untuk tidur karena tidur saya terganggu</i>	Item 8	0	4	0.87	1.136
Impaired daytime <i>Saya merasa bugar/sehat di siang hari</i>	Item 9	0	4	1.26	1.115
Hypnotic intake <i>Saya meminum obat tidur untuk bisa tidur</i>	Item 10	0	4	0.46	1.007
Total score		2	40	12.61	5.372

Reliability dan correlation coefficient item

Reliability was measured using internal consistency with Cronbach’s alpha. The Cronbach alpha of RIS Indonesia version was 0.650 with item deleted between 0.578-0.668 (table III). Meanwhile, Item total correlation RIS Indonesia version (table III) showed that there was significant relationship between each item and total score and r more than 0.2. In addition, RIS Indonesia version was related with total score of Zung SAS (p < 0.05) (table V).

Table III: Correlation coefficient item and Cronbach’s alpha RIS

ITEM RIS	Cronbach Alpha if item deleted	Correlation coefficient item	p value
Item 1	0.668	0.215	< 0.05
Item 2	0.651	0.303	< 0.05
Item 3	0.607	0.563	< 0.05
Item 4	0.637	0.482	< 0.05
Item 5	0.578	0.668	< 0.05
Item 6	0.651	0.411	< 0.05
Item 7	0.578	0.670	< 0.05
Item 8	0.590	0.628	< 0.05
Item 9	0.640	0.433	< 0.05
Item 10	0.635	0.437	< 0.05
Total	0.650	0.437	< 0.05

Table IV: Correlation coefficient item Regensburg Insomnia Scale after varimax

RIS	Factor Loading	Eigen values	Cumulative Variance explained (%)
Dimension 1		2.581	25.808
RIS 3	0.768		
RIS 4	0.454		
RIS 5	0.756		
RIS 8	0.683		
Dimension 2		1.239	12.386
RIS 6	0.747		
RIS 7	0.650		
Dimension 3		1.135	11.349
RIS 2	0.670		
RIS 9	0.678		
RIS 10	0.525		
Dimension 4		1.089	10.890
RIS 1	0.719		
KMO	0.677		
Bartlett’s test of sphericity	127.049	P value < 0.001	

Table V: Correlation total score RIS and SAS

	Total SAS
Total RIS	0.401 *

*p < 0.05

Factor structure

Exploratory factor analysis (EFA) was used to analyze 10 items of RIS Indonesia version and to evaluate construct validity. Kaiser–Meier–Olkin was 0.67 and the Bartlett’s test value of sphericity was p < 0.001. Table V showed principal component after varimax and it was produced 4 factor model with eigenvalue more than 1. Factor loading of RIS Indonesia version was > 0.32. It indicates favorable convergent validity (table IV). First factor had four items with explained variance: 25.808 , second factor had 2 items with explained variance: 12.38, third factor had 2 items with explained variance: 11.349 and fourth factor had 1 item with explained variance: 10.890.

Cut-off point determination

Receiver-operating characteristic (ROC) curves was used to measure cut-off point (Figure 1). Area below 0.673

indicated below global score of RIS Indonesia version was 13.5. This score had sensitivity and specificity for measuring insomnia among flood victims.

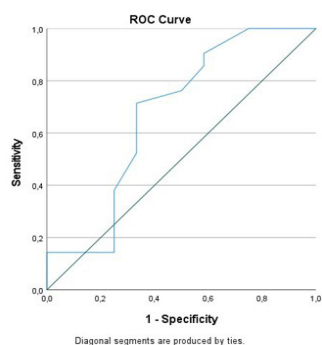


Figure 1: ROC. Notes area below the ROC curve 0.673, standard error 0.404; lower bound 0.460; dan upper bound 0.885

DISCUSSION

The aim of this study was to psychometric testing of the Regensburg Insomnia Scale (RIS) Indonesian version among flood victims. In our best knowledge, this is the first study in Indonesia. The results were consistent with a previous study of psychometric evaluation in patients and healthy people (26). The study showed that RIS Indonesia version has adequate validity and reliability. Reliability was used internal consistency with Cronbach's alpha. The Cronbach alpha of Indonesia RIS was 0.650. Item total correlation RIS Indonesia version showed that there was significant relationship between each item and total score and r more than 0.2. Construct validity was evaluated using exploratory factor analysis (EFA), with the Kaiser-Meyer-Olkin value of 0.67 and the Bartlett's test of sphericity was statistically significant. According to ROC curve analysis, the cut-off points of RIS at a score 13.5 indicated the best sensitivity and specificity. Limitation in this study should be considered. This study only focuses on flood victims, so implication for other population must be applied carefully.

Indonesia is one of the most vulnerable countries to natural disasters, such as floods (7), especially in South Kalimantan Province. One of the districts in South Kalimantan that is affected by flooding every year is Banjar District. Several villages in Banjar Regency are located on the riverside, if the weather is extreme and high rainfall, they often experience flooding (27). Previous study mentioned that the prevalence of insomnia among people living in riverside areas and affected by flood disaster, in the Martapura, Banjar Regency, Indonesia showed that 52% wake up at night, 33% had difficulty falling asleep and 31% complained of not getting deep sleep (28). Tool is needed to screen this problem quickly.

The Indonesian RIS demonstrated validity and reliability for screening insomnia in flood victims, similar to the original version (12). The reliability of RIS Indonesia

version was acceptable, the convergent validity of RIS Indonesia version was also acceptable with the SAS Indonesia version. Previous study mentioned that the relationship between insomnia and anxiety is recognized interactive (29).

We evaluated reliability using internal consistency using Cronbach alpha. Cronbach alpha of RIS Indonesia version was 0.650 indicating acceptable internal consistency. The Cronbach alpha of original RIS showed good (12). This study was similar with previous studies among Lebanese people (30). The convergent validity of RIS Indonesia version was satisfactory. It showed the positive correlation between each item and total score and the result was more than 0.2 (12). Further there is relationship between insomnia and anxiety, most people with anxiety had sleep disturbance such as insomnia (29).

We also tested Exploratory Factor Analysis (EFA) to measure construct validity. Kaiser–Meier–Olkin was 0.67 and the Bartlett's test value of sphericity was $p < 0.001$. KMO must be greater than 0.5 and Bartlett's test of sphericity must be significant ($p < 0.05$) (24). RIS Indonesia version produced 4 item dimensions with 10 items. First dimension produced four items (Item 3, item 4, item 5, and item 8), it was measured sleep continuity, early awakening, easy awakening, and fear of insomnia. Second dimension produced two items (Item 6 and item 7), it was measured sleepless night and thinking about sleep. Third dimension produced three items (Item 2, item 9, and item 10), it was measured sleep duration, impaired day time, and hypnotic intake, and fourth dimension produced one item (Item 1), it was measured sleep latency. The factor loading more than 0.32 (31). The dimension of this study was similar with original RIS, however several dimensions produced different items. It was happened due to different population and phrases that was used (32).

Receiver operating characteristic curve analysis exhibited that the cut-off mean of RIS Indonesia version value was 13.5. This study was similar with original RIS with cut off score more than 12 indicated insomnia. This study suggested the value >13.5 indicated insomnia and the value < 13.5 addressed not insomnia. The cut -off score can assist to interpret insomnia among people who live on the riverbanks and have experienced flood disaster.

The Indonesian RIS can be used to assess insomnia among flood victims quickly. Screening insomnia for disaster victim is suggested to prevent adverse effect such as anxiety depression, and PTSD, because insomnia is predictor of PTSD (33). Hence, it is needed valid tool. In addition, the cut off score is needed to interpret insomnia. This interpretation can be used as a strategy to resolve insomnia. Further study is needed to compare RIS with smart watch that can measure sleep

disorder objectively.

CONCLUSION

The results of this study supported the validity and reliability of RIS Indonesia version. It can be used to screen insomnia among people who live in riverbank side and had experienced of flood disaster. RIS Indonesia version had 10 items with 4 dimensions, and the cut off score showed that total score >13.5 indicated insomnia.

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