Validity and Reliability Studies of the Indonesian Version of Arrhythmia-Specific Questionnaire in Tachycardia and Arrhythmia (ASTA)

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ABSTRACT

Background: *The Arrhythmia-Specific Questionnaire in Tachycardia and Arrhythmia (ASTA) was developed in Sweden using English which may pose cultural and language barriers for Indonesian patients. As such, we aimed to translate the original ASTA into Indonesian, then assess its validity and reliability.* ***Methods:*** *Translation of the ASTA from English to Indonesian was done using forward and backward translation. The final version was then validated with the Short Form-36 (SF-36) questionnaire. Test-retest reliability study was done in a 7-14-day interval.* ***Results:*** *The Indonesian version of ASTA was deemed acceptable by a panel of researchers with Cronbach's α of 0.816 and Intraclass Correlation Coefficient (ICC) ranging from 0.856-0.983. In a comparison to the SF-36, the medication utilization domain was poorly correlated with role limitations due to physical health (r:0.384; p<0.01) and pain (r:-0.317; p<0.05). The arrhythmia-specific symptoms domain was poorly correlated with role limitations due to emotional problems (r:0.271; p<0.05). In addition, the health-related quality of life (HRQOL) domain was poorly correlated with role limitations due to physical health (r:0.359; p<0.01) and emotional problems (r:0.348; p<0.01), also total SF-36 score (r:-0.367; p<0.01). The ASTA total score was poorly correlated with role limitations due to physical health (r:0.37; p<0.01), and emotional problems (r:0.376; p<0.01), also total SF-36 score (r:-0.331; p<0.01).* ***Conclusion:*** *The Indonesian version of ASTA has good internal and external validity as well as good reliability. Both the physical and mental domains of ASTA are correlated with role limitations due to emotional problems and SF-36 total score.*

Keywords**:** *Atrial fibrillation, reliability, validity, quality of life.*

INTRODUCTION

The most common form of tachyarrhythmia is atrial fibrillation (AF), which is found in 2-4% of the world's population. The prevalence increases with age.[1] Morillo et al. reported that AF is the most common type of arrhythmia found in clinical practice, as well as a significant global burden, closely followed by comorbidities which increase disability and mortality rates. As a chronic condition, AF leads to healthcare and medication utilization which increases the economic burden on individuals, as well as nations. The burden of AF is also related to complications, such as stroke, in which one- third of cases have AF.[2]

Taheri et al. reported a gradual decrease in AF patients QOL due to psychosocial distress and hemodynamic instability, which induces dyspnea, palpitations, and fatigue. Increased risk of heart failure, myocardial infarction, venous thromboembolism, and stroke, as well as increased hospitalization length of stay also play a role in QOL reduction.[3,4] Jones et al. reported that patients with AF experienced major lifestyle changes after diagnosis, including role limitations and need for health services, which may decrease QOL in the family or caregivers.[4] Vintila et al. reported that QOL is lower in permanent AF compared to persistent and paroxysmal AF.[5]

QOL evaluations can be used to determine management strategy and treatment success in clinical practice.[6] In addition to objective parameters such as ECG and echocardiography, Patient-Reported Outcomes (PROs) should be considered in order to assess patient welfare. However, the majority of PROs questionnaires for the arrhythmia population were designed exclusively for AF.[7] The Arrhythmia-Specific Questionnaire in Tachycardia and Arrhythmia (ASTA) was the first questionnaire developed to evaluate arrhythmia-specific symptoms and QOL in patients with different types of arrhythmia, including AF.[1] ASTA was first introduced in Sweden in the English language, which may pose language and cultural barriers to Indonesians.[7] As such, we aimed to translate ASTA into Indonesian and analyze the reliability and validity of this Indonesian version of ASTA.

METHODS

We conducted this cross-sectional study in March - April 2022. The inclusion criteria of this study were patients diagnosed with AF according to their medical records, aged ≥18 years, and fluent in the Indonesian language. Patients with a history of cardiac

surgery or hospitalization due to acute or severe chronic conditions within the previous 30 days, physical handicap, or mental or psychiatric disorders were excluded.

The European Heart Rhythm Association (EHRA) score and duration of AF was recorded during history taking. Other general characteristics (gender, age, highest education level attained, and marital status) and clinical characteristics (ejection fraction/EF in the previous 3 months, as well as AF etiology and type) were taken from medical records.

The ASTA and Short Form-36 (SF-36) questionnaires were filled independently in two stages, as the test and retest, respectively. The retest was taken 7-14 days after the test. This study was approved by the Health Research Ethics Committee, Faculty of Medicine Universitas Indonesia, Cipto Mangunkusomo Hospital, with approval number KET-/054/UN2. F1/ETIK/PPM.00.02/2021.

Translation

We conducted this study in two phases. The first phase was translation and cultural adaptation of ASTA from the original English to Indonesian. The translation process was conducted after obtaining permission from Walfridsson et al., the original authors of ASTA. The second phase was assessment of the reliability and validity of the Indonesian version of ASTA. The translation and cultural adaptation of ASTA was done in several steps. First, forward translation from English to Indonesian was conducted by 2 translators: one medical and one non-medical translator. Both translators were certified and experienced in translation and interpretation. After the translation process, they discussed and combined their translations into the Indonesian Synthesis Translation. This version then underwent backward translation (Indonesian to English) performed by two native English speakers

who both had nearly ten years of experience in interpreting and translating between English and Indonesian. Both backward translations were compared to the original version of ASTA. Any differences were reviewed by the research team before the pre- final questionnaire was distributed to participants. This questionnaire was first pre-tested by 30 participants, then edited based on patient feedback, forming the final questionnaire. The final questionnaire was then used for the second phase.

Questionnaire

The ASTA consists of 3 parts: the medication utilization domain consisting of 2 questions, the arrhythmia-specific symptoms consisting of 8 questions, and HRQOL

consisting of 13 questions. The first part evaluates the most recent episode of symptoms and medication utilization. The second part evaluates symptom burden, including the average duration, longest duration, frequency, symptoms, precipitating factors, and severity scale of arrhythmia. The scale has a 4-point range from 0 (not relevant) to 3 (yes, a lot). A lower score indicates milder symptoms of arrhythmia. The third part of ASTA (HRQOL) consists of 7 questions referring to the physical domain and 6 questions referring to the mental domain. Each HRQOL question also has a 4-point scale, from 0 (not relevant) to 3 (yes, a lot). A lower score indicates better QOL related to tachyarrhythmia.[8]

Data Analysis

We analyzed the data using SPSS Statistics 26.0 software and are presented in tables. General and clinical characteristics are presented as frequency and percentage. We performed normality test using Kolmogorov-Smirnov test (n>50). Normally distributed data (p>0.05) were analyzed by Pearson's test, while non-normally distributed data (p<0.05) were analyzed by Spearman's test. The ASTA score was first converted to a 0-100 scale and reversed as needed to balance the scores between questions.

We assessed the reliability using test-retest reliability analysis, resulting in Cronbach's α and Intraclass Correlation Coefficient (ICC) between the first test and the retest. Cronbach's α values were interpreted as low (<0.6), acceptable (0.6-0.8), or very good internal consistency (>0.8).[9] ICC values were considered to have poor (<0.5), moderate (0.5-<0.75), good (0.75-<0.9), or excellent (>0.9) reliability.[10] The validity test was conducted using bivariate correlation analysis of the inter-item correlation and total score.

Analyses of each domain in ASTA and SF-36, as well as clinical parameters were done to evaluate the concordance between the two questionnaires. The degrees of correlation were defined as very low (r:0.00-0.199), low (r:0.20-0.399), moderate (r:0.40- 0.599), high (r:0.60-0.799), and very high (r:0.80-1.00).

RESULTS

General and Clinical Characteristics

In the second phase, 60 participants were recruited. Most participants were elderly (31.67%), male (53.33%), and had EF ≥50% (76.67%), as shown in **Table 1**. The prevalence of AF increased with age. The almost half of participants (40%) were not

troubled by AF symptoms. More than half (53.33%) of our subjects were diagnosed with valvular disease based on echocardiography.

Table 1. General and Clinical Characteristics.

Characteristics	(N=60)	%
Gender		
Male	32	53.33
Female	28	46.67
Age group in years		
≤40	5	8.33
41-50	8	13.33
51-60	17	28.33
61-70	19	31.67
>70	11	18.33
Education		
Primary or less	6	10.00
Junior high	6	10.00
Senior high	22	36.67
University	26	43.33
Marital Status		
Single	6	10.00
Married	50	83.33
Widow/widower	4	6.67
EHRA		
I	4	6.67
IIa	24	40.00
IIb	18	30.00
III	12	20.00
IV	2	3.33

Ejection fraction (%)		
<40	5	8.33
40-49	9	15.00
>50	46	76.67
Duration of diagnosis		
<1 year	2	3.33
1-5 years	50	83.33
>5 years	8	13.33
AF etiology		
Valvular	32	53.33
Non-valvular	28	46.67
AF type		
Paroxysmal	11	18.33
Persistent	9	15.00
Longstanding persistent	2	3.33
Permanent	36	60.00

Reliability and Validity of the Indonesian Version of ASTA

Indonesian version of ASTA had a very good internal consistency as suggested by Cronbach's α of 0.816 (**Table 2**). The ICC values for each domain were more than 0.33 (r: 0.856-0.983; p<0.01). The medication utilization domain, arrhythmia-specific symptoms domain, and HRQOL domain were all reliable, based on Cronbach's α values (0.629-0.789; p<0.01). Based on total score correlation, our version of ASTA was considered to be valid (p<0.01).

The medication utilization domain had a low correlation with total ASTA score (r: 0.378; p<0.01). The arrhythmia-specific symptoms domain was moderately correlated with total HRQOL domain (r: 0.491; p<0.01) and highly correlated with total ASTA score (r: 0.721; p<0.01). The HRQOL domain was very highly correlated with total ASTA score (r: 0.934; p<0.01).

Correlation between the Indonesian Version of ASTA and SF-36

The analysis of our version of ASTA and SF-36 as the gold standard is shown in **Table 3**. The medication utilization domain was poorly correlated with role limitations due to physical

Table 2. Reliability and Validity of Indonesia Version of ASTA.

	Correlations					
Variables	**Medication Utilization**	**Arrythmia-Specific Symptoms Domain**	**HRQOL Domain**	**Total Score**	**ICC D1 and D8-14**	**Cronbach's α**
Total Medication Utilization Domain	1	0.039	0.232	0.378**	0.949**	0.789**
SI_1	0.982**	0.022	0.245	0.378**	0.942**	
SI_2	0.558**	0.092	0.124	0.342**	0.953**	
Total Arrythmia-Specific Symptoms Domain	0.039	1	0.491**	0.721**	0.944**	0.629**
SII_1	-0.11	0.146	-0.441*	-0.389**	0.901**	
SII_2	-0.044	0.093	-0.388**	-0.349**	0.915**	
SII_3	-0.662**	0.047	-0.431**	-0.420**	0.929**	
SII_5	-0.043	0.412**	0.128	0.332**	0.951**	
SII_6a	0.116	0.383**	0.422**	0.462**	0.955**	
SII_6b	-0.025	0.485**	0.631**	0.619**	0.871**	
SII_6c	0.241	0.699**	0.381**	0.573**	0.977**	
SII_6d	0.225	0.466**	0.556**	0.609**	0.966**	
SII_6e	0.378**	0.514**	0.604**	0.691**	0.872**	
SII_6f	0.418**	0.451**	0.529**	0.623**	0.868**	
SII_6g	0.046	0.607**	0.466**	0.561**	0.962**	
SII_6h	0.085	0.609**	0.418**	0.535**	0.910**	
SII_6i	0.216	0.501**	0.542**	0.610**	0.970**	
SII_7	0.095	-0.09	-0.482**	-0.384**	0.956**	
SII_8	0.01	0.451**	-0.016	0.346**	0.913**	
Total HRQOL	0.232	0.491**	1	0.934**	0.973**	0.766**

* Significant correlation in α = 0.05 (2-tailed)
** Significant correlation in α = 0.01 (2-tailed)

Table 3. Analysis of the Indonesian Version of ASTA and SF-36.

Domain Variables	Medication Utilization Domain	Arrythmia- Specific Symptoms Domain	HRQOL Domain	Total score
Physical functioning	0.056	0.114	0.146	0.156
Role limitations due to physical health	0.384**	0.113	0.359**	0.370**
Role limitattions due to emotional problems	0.225	0.271*	0.348**	0.376**
Energy/fatigue	0.065	-0.081	0.040	0.012
Emotional well-being	0.183	-0.031	0.024	0.042
Social functioning	0.108	0.112	-0.003	0.060
Pain	-0.317*	-0.199	-0.167	-0.254
General health	0.097	-0.098	-0.020	-0.031
Total score	-0.188	-0.043	-0.367**	-0.331**

All data were analyzed using Pearson's test
* Significant correlation in α = 0.05 (2-tailed)
** Significant correlation in α = 0.01 (2-tailed)

health (r: 0.384; p<0.01) and pain (r: -0.317; p<0.05). Arrhythmia-specific symptoms domain was poorly correlated with role limitations due to emotional problems (r: 0.271; p<0.05). HRQOL domain was poorly correlated with role limitations due to physical health (r: 0.359; p<0.01), role limitations due to emotional problems (r: 0.348; p<0.01), and total SF-36 score (r: -0.367; p<0.01). The total score of the Indonesian version of ASTA was poorly correlated with role limitations due to physical health (r: 0.37; p<0.01), role limitations due to emotional problems (r: 0.376; p<0.01), and total SF- 36 score (r: -0.331; p<0.01). The lower total score of the HRQOL domain and total ASTA (better QOL) was correlated with higher SF-36 score.

The physical HRQOL domain was poorly correlated with role limitations due to emotional problems (r: 0.342; p<0.01) and moderately correlated with total SF-36 score (r: -0.456; p<0.01). While mental HRQOL domain was moderately correlated with role limitations due to emotional problems (r: 0.492; p<0.01) and total score (r: -0.512; p<0.01) as shown in **Table 4**. This poor correlation indicates that these domains are useful for assessing different aspects of a patient's life, such as the physical or emotional, with little overlap, as they were devised to do.

Table 4. Analysis of the HRQOL domain of the Indonesian Version of ASTA and SF-36.

Domain Variables	HRQOL Domain (Physical)	HRQOL Domain (Mental)
Physical functioning	0.229	0.006
Role limitations due to physical health	0.202	0.080
Role limitations due to emotional problems	0.342**	0.492**
Energy/fatigue	0.031	0.044
Emotional well-being	0.023	0.021
Social functioning	0.076	-0.097
Pain	-0.129	-0.184
General health	0.000	-0.041
Total score	-0.456**	-0.512**

All data were analyzed using Pearson's test
* Significant correlation in α = 0.05 (2-tailed)
** Significant correlation in α = 0.01 (2-tailed)

Correlation between the Indonesian Version of ASTA, Ejection Fraction and EHRA

There were no correlations between medication utilization domain, arrhythmia-specific symptoms domain, HRQOL domain, or ASTA total score and other clinical parameters such as EF and EHRA in our study.

DISCUSSION

AF symptoms are the main reason for hospital admission, although Rienstra et al. reported that 15-30% of AF is asymptomatic. AF may present as palpitations, chest discomfort, and reduced exercise capacity. Approximately two-thirds of AF patients who visit the emergency department end up hospitalized.[11]

The Cronbach's α of our Indonesian version of ASTA was slightly lower (0.816) than the Brazilian version (0.88) or the Swedish version (0.91). The Cronbach's α in the physical domain was lower in our study than in the Swedish version (0.87 vs. 0.89, respectively), while the Cronbach's α in the mental domain was higher in our study (0.86 vs 0.79, respectively). The difference may have been due to our smaller sample size (60 participants) compared to the Brazilian (172 participants) and Swedish (185 participants) versions.[1,8]

Our ICC ranged from 0.856 to 0.983, which was considered to be good or excellent reliability. Between the test and retest of 7-14 days, there were no major changes in AF patient symptoms. This finding was supported by Lindberg et al., who stated that AF is a chronic lifelong condition which requires regular medical control. Prevention of complications, such as stroke, and routine medical treatment demand regular clinic visits, diet and alcohol restriction, and regular evaluation of bleeding or drug interactions.[12]

In our study, higher SF-36 score (better QOL) was poorly correlated with lower ASTA total score (r: -0.331; $p<0.01$) and moderately correlated with the physical HRQOL domain (r: -0.456; $p<0.01$). Higher HRQOL domain score was also significantly correlated with inability to perform daily activities due to both physical health (r:0.359; $p<0.01$) and emotional problems (r: 0.348; $p<0.01$). Barbaglia et al. stated that disability has become an important component of disease burden, with cardiovascular disease contributing to one of nine disability-causing health conditions.[13] These limitations might be caused by AF symptoms such as lack of energy (92%), dyspnea (76%), and palpitations (70%) due to lack of atrial contraction and irregular diastole leading to decreased stroke volume, cardiac output, and blood pressure.[14,15] Concomitant diseases such as coronary artery disease (35.6%), heart failure (12.7%), and thyroid disease (7.6%) may contribute to both physical and emotional limitations.[14]

Rienstra et al. reported that more than half of AF patients present with reduced exercise capacity, with shortness of breath as the main complaint. Rapid ventricular rate and atrioventricular dyssynchrony impair diastolic filling, which may result in cardiac output reduction. Diastolic dysfunction also increases left ventricular pressure, which may predispose patients to development of subclinical pulmonary edema. Rapid atrial rate and changes in cardiac pressure give rise to structural changes, which lead to worsening AF symptoms and reduced physical capacity.[11] However, there was no correlation between any ASTA domains and EF in our study, which might have been due to the small sample size.

Psychological complications of AF may be exacerbated by lack of social understanding, feeling isolated, and inadequate social support, which result in frustration and a feeling of helplessness.[16] In our study, the arrhythmia-specific symptoms domain (r:0.271; $p<0.05$) and HRQOL domain (r:0.348; $p<0.01$) were poorly correlated with role limitations due to emotional problems. Kupper et al. reported an elevation of anxiety (35%) and depression (20%) prevalence in AF patients in relation to chronic use of medication, drug side effects, fear of worsening symptoms, symptom emergence during activity, and planned intervention to control symptoms.[14] Gayman et al. reported that pain, physical limitations, chronic stress, and daily social discriminations were all correlated with daily activity limitation.[17] Ironically, Lampert et al. also reported that anger and stress increased the risk of AF due to sympathetic nerve system activation.[18]

EF and EHRA score were not significantly correlated with any ASTA domain. These parameters were correlated with physical functioning and exercise tolerance. Both physical and mental domains affect total ASTA score in our study. However, mental domain has a stronger affects the total score.[19] The limitation of this study was the small sample size, which may have affected the degree of statistical significance.

CONCLUSION

The Indonesian version of ASTA has good internal and external validity as well as good reliability to evaluate the QOL of individuals with AF. The Indonesian version of ASTA can be used to assess QOL changes over time, as severity and treatment evaluations. Both the physical and mental domains of ASTA are correlated with role limitations due to emotional problems and SF-36 total score.

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