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Research Article

Saudi Neurology Residents' Knowledge and Attitudes toward Intravenous Thrombolysis in Patients with Acute Ischemic Stroke

Fatimah Ali Alharbi*, Nadia Magbul Maghfuri, Dalia Mohammed Abdu and Misoon Yahya Redine

Medical Intern, College of Medicine, Jazan University, Jazan, Kingdom of Saudi Arabia

***Corresponding Author:** Fatimah Alharbi, Medical Intern, College of Medicine, Jazan University, Jazan, Kingdom of Saudi Arabia.

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Abstract

Background: Although intravenous (IV) thrombolysis is an effective treatment for patients with acute ischemic stroke (AIS), it remains underused by neurologists worldwide. This study assessed the knowledge and attitudes toward IV thrombolysis in patients with AIS among neurology residents in Saudi Arabia.

Methods: An online survey was conducted using a sample of 81 neurology residents from around Saudi Arabia. Statistical analysis included descriptive studies and Chi-square or Fisher's exact test.

Results: Of the 81 respondents, 50 (61.7%) were males and 31 (38.3%) were females. Regarding IV thrombolysis use in AIS patients, 61.7% thought that they would consider it. Although the vast majority (72.8%) showed positive attitudes toward performing IV thrombolysis for AIS patients and 69.1% thought that IV thrombolysis is safe, 79.0% did not think that they have good knowledge about IV thrombolysis and 53.1% felt not confident about their ability to employ IV thrombolysis. Confidence with knowledge was associated with the residency stage (P = 0.000). Attitudes toward IV thrombolysis associated with sex (P = 0.044) and residency stage (P = 0.002). Residents from the central region were more likely to have positive attitudes (P = 0.043).

Conclusion: The surveyed neurology residents showed positive attitudes toward the safety and use of IV thrombolysis for AIS patients. However, knowledge and confidence with knowledge about the treatment are lacking. Therefore, theoretical and practical training is warranted to improve knowledge about IV thrombolysis.

Keywords: *IV Thrombolysis; Acute Ischemic Stroke; Neurology Residents; Saudi Arabia*

Abbreviations

IV: Intravenous; AIS: Ischemic Stroke; rt-PA: Recombinant tissue plasminogen activator; SCHS: Saudi Commission for Health Specialties

Introduction

Stroke, as a major public health problem and the leading cause of disability and death worldwide, imposes a heavy burden on both the health care and economic systems. The stroke-related morbidity and mortality rates are increasingly emerging every year, with the mortality rate being expected to double in the Middle East region by 2030 [1-4]. Despite the great advances in stroke diagnostic and therapeutic strategies and rehabilitation in the past decade, acute management and long-term care for stroke patients are still challenging. Intravenous (IV) thrombolysis with recombinant tissue plasminogen activator (rt-PA) is currently a level-1A therapy available for eligible

patients with acute ischemic stroke (AIS) [5,6]. Since 1996, when it was approved by the Food and Drug Administration (FDA), it has been an effective treatment for increasing numbers of patients with AIS [7]. However, despite the mounting evidence on the role of IV thrombolysis in improving functional outcomes in AIS patients, the thrombolysis rate is still extremely low, ranging from 2% to 5.2% [8,9].

Several studies have examined the IV thrombolysis in different countries and identified the main factors associated with its underuse. These factors include delayed presentation, vague symptoms timing, and strict eligibility criteria [10-12]. Patients' delayed presentation has been found by some studies to be the most important factor associated with the improper use of IV thrombolysis [13,14]. The reasons for the out-of-hospital barriers to IV thrombolysis, such as delayed presentation, include lack of public awareness of the signs and symptoms of stroke and the short time window (i.e. 4.5 hours) for stroke treatment [15]. Studies have also suggested that in-hospital barriers to proper IV thrombolysis are also important and should not be ignored. In one study from China, 37.9% of patients with AIS presented within 4 hours of the onset of symptoms and had enough time to benefit from IV thrombolysis. Given an IV thrombolysis rate of 2% in China [9], the authors concluded that more than 90% of those patients presenting within 4 hours of symptoms onset might not be offered IV thrombolysis [16]. Therefore, in addition to the out-of-hospital barriers to the underuse of IV thrombolysis in patients with AIS, investigating the in-hospital barriers is warranted.

Neurology residents are core members of the stroke team as they are the first doctors who evaluate and manage acute stroke patients. In addition to their learning objectives during the residency period, they actively participate in all stages of care for neurology patients, as well as in the decision-making process. A neurology resident who has adequate knowledge about IV thrombolysis is expected to be more confident to recommend the treatment to eligible patients than are those who have a relatively weak knowledge [7,9]. Therefore, assessing the knowledge of neurology residents and their attitudes toward the use of IV thrombolysis is part of identifying possible in-hospital factors affecting the use of IV thrombolysis.

Only a few studies have addressed the knowledge about IV thrombolysis among neurologists [7,17,18], with no published studies including neurology residents. One 2018 study used a sample of Saudi neurologists from Riyadh and Jeddah, Saudi Arabia. The study showed that only 9.9% were strictly adherent to the American Heart Association/American Stroke Association guidelines for thrombolysis administration [17]. Another study on Chinese neurologists showed that 51.4% had deficient knowledge about IV thrombolysis and 45.8% lacked confidence about their ability to use the treatment [7]. Therefore, we conducted this nationwide study to assess the knowledge and attitudes toward IV thrombolysis in patients with AIS among neurology residents in Saudi Arabia.

Materials and Methods

This observational cross-sectional study aimed at assessing the knowledge and attitudes toward IV thrombolysis in patients with AIS among neurology residents in Saudi Arabia. The study targeted all Saudi neurology residents who are currently registered with the Saudi Commission for Health Specialties (SCHS). Excluded from the study were residents in their first year of training as they are required to spend a one-year training in internal medicine. Neurologists were not included.

We employed a structured and self-administered questionnaire, which was adopted from a previous study with comparable objectives [7]. An online link to the questionnaire was sent to the target population through social media, and responses were accepted during the period from March 2019 to May 2019. The questionnaire consisted of two main parts, the first pertaining to basic sociodemographic details and the second assessed the respondents' knowledge and attitudes toward IV thrombolysis using five yes-or-no questions. The questionnaire focused on the respondents' perspective on the use of IV thrombolysis, their confidence with knowledge about IV thrombolysis, its safety, and their attitudes toward it.

The study was conducted in agreement with the principles of the Declaration of Helsinki and all participants were informed of the nature and the objectives of the study at the beginning of the survey. All responses were kept anonymous with the optimal measures of subjects' confidentiality.

Data analysis was performed using the Statistical Package of Social Sciences (SPSS) Version 21 (SPSS Inc., Chicago, IL). Categorical variables were presented as frequencies and percentages. Pearson's Chi square test or Fisher's exact test were employed to compare quantitative variables. All tests were two-tailed and associations were considered statistically significant if P value was less than .05 or less than 0.01.

Results

Eighty-one registered residents completed the study questionnaire; 50 (61.7%) of were males and 31 (38.3%) were females. Except for the northern region of the KSA, the sample consisted of neurology residents from all provinces, namely, central (38.3%), eastern (32.1%), southern (16.0%) and western (13.6%). Table 1 summarizes respondents' demographic characteristics and region of the residency program.

	Number	Percentage
Sex		
Male	50	61.7
Female	31	38.3
Residency stage		
R2	26	32.1
R3	12	14.8
R4	16	19.8
R5	27	33.3
Region in Saudi Arabia		
Central	31	38.3
Western	11	13.6
Eastern	26	32.1
Southern	13	16.0

Table 1: *Characteristics of the study respondents.*

As shown in table 2, 50 (61.7%) of the surveyed residents thought that they would consider IV thrombolysis in AIS patients. Most of the respondents (64, 79.0%) did not think that they have good knowledge of IV thrombolysis for AIS. More than two-thirds (56, 69.1%) thought that IV thrombolysis is safe. More than half (43, 53.1%) felt not confident about their ability to employ IV thrombolysis for patients with AIS. The vast majority (59, 72.8%) showed positive attitudes toward supporting hospitals in performing IV thrombolysis for AIS patients.

Table 3 summarizes respondents' perspective on using IV thrombolysis in AIS patients stratified by sex, residency stage, and region of residence. As can be seen, a statistically significant difference was detected in confidence with knowledge about IV thrombolysis, with senior residents (R5 and R4) being more likely to be confident than were junior residents (R2 and R3) (P = 0.000). There was a significant difference in attitudes toward IV thrombolysis, with males and senior residents being more likely to have positive attitudes than were females (P = 0.044) and senior residents (P = 0.002). Residents from the central region were also more likely to have positive attitudes (P = 0.043).

Discussion

The present study, for the first time, assessed neurology residents' knowledge and attitudes toward IV thrombolysis in patients with AIS and showed that 72.8% of the surveyed residents supported hospitals in using IV thrombolysis in patients with AIS. Although there

	Number	Percentage
Would you consider IV thrombolysis in AIS patients?		
Yes	50	61.7
No	31	38.3
Did you think that you have good knowledge of IV thrombolysis for AIS?		
Yes	17	21.0
No	64	79.0
Do you think that IV thrombolysis for AIS is safe?		
Yes	56	69.1
No	25	30.9
Do you feel confident about your ability to employ the treatment?		
Yes	38	46.9
No	43	53.1
Do you support hospitals in performing IV thrombolysis for AIS patients?		
Yes	59	72.8
No	22	27.2

Table 2: *Characteristics of the study respondents.*

Abbreviations: IV: Intravenous; AIS: Acute Ischemic Stroke.

	Safety concern		Confidence		Attitudes	
	Yes n (%)	**No n (%)**	**Yes n (%)**	**No n (%)**	**Yes n (%)**	**No**
Sex						
Male	36 (72.0)	14 (28.0)	27 (54.0)	23 (46.0)	40 (80.0)*	10 (20.0)
Female	18 (58.1)	13 (41.9)	15 (48.4)	16 (51.6)	18 (58.1)	13 (41.9)
Residency stage						
R2	15 (57.7)	11 (42.3)	8 (30.8)**	18 (69.2)	17 (65.4)*	9 (34.6)
R3	7 (58.3)	5 (41.7)	3 (25.0)	9 (75.0)	4 (33.3)	8 (66.7)
R4	11 (68.8)	5 (31.2)	8 (50.0)	8 (50.0)	12 (75.0)	4 (25.0)
R5	21 (77.8)	6 (22.2)	23 (85.2)	4 (14.8)	25 (92.6)	2 (7.4)
Region in Saudi Arabia						
Central	25 (80.6)	6 (19.4)	13 (41.9)	18 (58.1)	25 (80.6)*	6 (19.4)
Western	5 (45.5)	6 (54.5)	7 (63.6)	4 (36.4)	4 (36.4)	7 (63.6)
Eastern	18 (69.2)	8 (30.8)	15 (57.7)	11 (42.3)	19 (73.1)	7 (26.9)
Southern	6 (46.2)	7 (53.8)	7 (53.8)	6 (46.2)	10 (76.9)	3 (23.1)

Table 3: *Factors associated with neurology residents' perspective on using IV thrombolysis in AIS patients.*

Abbreviations: see table 2.

** Significant difference (P < 0.05).*

***Significant difference (P < 0.01).*

are no previous studies that included neurology residents in the assessment of knowledge and attitudes related to the use of IV thrombolysis, our findings are comparable with some of the existing studies reporting an increasing acceptance of IV thrombolysis among neurologists worldwide. A study by Villar-Cordova., *et al*. (1998) showed that 60% of the American neurologists would perform IV thrombolysis for eligible patients [19]. Brown., *et al*. (2005) found that 60% of the American emergency physicians would consider IV thrombolysis [20]. However, higher acceptance rates (90.1%) were found among Chinese neurologists [7]. This increased acceptance may be attributed to the increasing evidence supporting the validity and effectiveness of thrombolytic therapy [21-24].

Although 61.7% of the surveyed residents thought they would use IV thrombolysis for AIS patients, more than half (53.1%) felt not confident with their knowledge about thrombolysis therapy, a finding consistent with some of the previous studies [7]. Full mastery of knowledge is essential to perform IV thrombolysis. Studies by Moradiya, Crystal, Valsamis, and Levine, and Schumacher., *et al.* showed that physicians working in teaching hospitals were more comfortable in performing IV thrombolysis than were physicians working in other hospitals. One possible explanation is that teaching hospitals may increase the working physicians' exposure to thrombolytic therapy and keep them updated with the new advances in thrombolysis [25,26]. In this study, the confidence was significantly more likely to be reported by senior residents than by junior residents. This finding could be reasonably attributed to the amount of clinical experience, which is expectedly higher among senior residents. Moreover, increased confidence with the knowledge of thrombolysis and awareness of its safety could explain why senior residents were more likely than were junior residents to have positive attitudes toward thrombolysis in patients with AIS. Male respondents were also more likely than females regarding attitudes toward thrombolysis, but this finding needs to be further evaluated to find out whether attitudes toward thrombolysis has a sex predominance or whether there are unexplored factors affecting this association. Finally, attitudes were more likely to be positive among residents from the central region of Saudi Arabia. Although the difference is weakly significant, the analysis showed that the acceptance rate of IV thrombolysis was higher, though not significant, among respondents from this region.

As the first study to explore knowledge and attitudes of neurology residents toward IV thrombolysis, this study may serve as a paradigm for local studies on the subject. However, some limitations to the present study are noteworthy. The use of subjective self-reported questionnaire may have led to overestimation of knowledge about IV thrombolysis. Owing to the online nature of the survey, the small sample size and potential sampling bias are inevitable.

Conclusion

The surveyed neurology residents showed positive attitudes toward the safety and use of IV thrombolysis for AIS patients. However, knowledge and confidence with knowledge about the treatment are lacking. Therefore, theoretical and practical training is warranted to improve knowledge about IV thrombolysis.

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