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ATTITUDES AND KNOWLEDGE OF PARAMEDICS ABOUT RECOGNITION OF ACUTE STROKE AND PRE-HOSPITAL STOKE CARE IN NORTHERN CYPRUS*
KUZEY KIBRIS'TA PARAMEDİKLERİN AKUT İNMENİN TANINMASI VE HASTANE ÖNCESİ YAKLAŞIM İLE İLGİLİ BİLGİ VE TUTUMLARI

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ABSTRACT

A Stroke is defined as a sudden dysfunction caused by the interruption of blood flow to the brain. Timely intervention is vital, making rapid and effective paramedic response critical. In this study, our purpose is to evaluate the knowledge and behaviors of paramedics toward pre-hospital stroke care in Northern Cyprus. In this descriptive study, an online questionnaire that was prepared by researchers was distributed to paramedics in Northern Cyprus. The data from the survey were analyzed with descriptive statistics and chi-square tests by using SPSS v26. The value of $p<0.05$ is accepted as statistically significant. 36 out of 50 active paramedics participated in the study. 63.9% of paramedics work in public hospitals. Although 72.2% of paramedics are educated in stroke, 61.1% of paramedics could not estimate the exact time period for the initiation of thrombolytic therapy. Paramedics who have stroke education have higher knowledge of the pre-hospital diagnosis scale ($p=0.004$). Private hospital paramedics have significantly less knoeledge of pre-hostpital diagnosis scale and about the hospitals with stroke unit.

Multi-categorical evaluations demonstrated inadequate knowledge andpre-hospital management of stroke among paramedics. Periodic education must be held for

ÖZ

İnme, beyne giden kan akışının kesilmesinden kaynaklanan ani bir işlev bozukluğu olarak tanımlanır. Zamanında müdahale hayati önem taşımaktadır. Akut inme vakalarında hızlı ve etkili paramedic müdahalesi oldukça kritiktir. Bu çalışmadaki amacımız, Kuzey Kıbrıs'taki paramediklerin hastane öncesi inmeye yönelik bilgi ve davranışlarını değerlendirmektir. Bu tanımlayıcı çalışmada, Kuzey Kıbrıs'taki paramediklere araştırmacılar tarafından hazırlanmış bir çevrimiçi anket uygulanmıştır. Anketten elde edilen veriler, SPSS v26 kullanılarak tanımlayıcı istatistikler ve ki-kare testleri ile analiz edildi. $p<0.05$ değeri istatistiksel olarak anlamlı kabul edildi. Bu çalışmaya ülkede aktif olarak çalışan 50 paramedikten 36'sı katılmıştır. Paramediklerin %63.9'u devlet hastanelerinde çalışmaktadır. Paramediklerin % 72.2'si inme konusunda eğitimli olmasına rağmen, % 61.1'i trombolitik tedavinin başlaması için uygun süreyi bilememiştir. İnme eğitimi olan paramediklerin hastane öncesi tanı skalasına ilişkin bilgileri daha yüksektir ($p=$ 0.004). Özel hastanelerde çalışan paramedikler hastane öncesi tanı ölçeği ve inme ünitesi olan hastaneler hakkında istatistiki olarak anlamlı olarak daha az bilgiye sahiptir.

Çok kategorili değerlendirilmeler sonucunda, para-

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paramedics to improve their knowledge about pre-hospital stroke care and treatment.

Keywords: Acute stroke, Cyprus, paramedics, pre-hospital stroke care.

mediklerin inme hakkındaki bilgilerinin ve hastane öncesi yönetimlerinin yetersiz olduğu gösterildi. Paramediklerin akut inme ve tedavisi hakkındaki bilgilerini arttırmak için periyodik eğitimler düzenlenmelidir.

Anahtar kelimeler: Akut inme, Kıbrıs, paramedikler, hastane öncesi inme tedavisi

INTRODUCTION

Stroke is specified as an unusual abrupt dysfunction caused by the blood flow interruption to the brain structures. Stroke is a prevalent neurological disorder resulting in worldwide morbidity and mortality. Globally, 5 million people die as a result of stroke, and the number of disabilities can reach up to millions. Ischemic strokes cover roughly 85% while the remainder is hemorrhagic.[1,2] Community and healthcare professionals' perception is crucial in stroke regulation. For most acute stroke patients first medical contacts are paramedics. Paramedics play a crucial role in acute stroke identification and treatment. Timely intervention is vital, making rapid and effective action taken by the paramedic critical. The importance of knowledge about stroke for paramedics was to diagnose the stroke patients accurately, and then transport them to the hospital rapidly, thus acute stroke therapy could be delivered in time. Patients should be transported to a hospital with an acute stroke unit rather than the closest one if any stroke event is suspected.[3,4]

Currently, the proven treatment for early-period strokes is the application of thrombolytic (tPA) treatment which was approved for use in the United States by the Food and Drug Administration in 1996 and works well if administered within the first 4,5 hours.[5] Studies show that the efficiency of this treatment is based on how early it is applied. The effectiveness of initial treatment is quite important as it can limit brain damage and vastly improve outcomes.[3,4]

Since 2011, this treatment has been utilized in Northern Cyprus for acute stroke patients. Stroke is also a public health problem in Northern Cyprus. Stroke incidence rates have been reported as 48.9- 73.3 per 100.000 of the population with an increasing trend between the years 2009-2011. The same study indicated that stroke was the main mortality reason in 21.6% of these patients.[6] Cyprus is an island in the Mediterranean Sea and there are three hospitals equipped for stroke cases in Northern Cyprus. The stroke centers are located in the center of the island and a possible stroke patient can be transferred to these centers within 1 hour all around the island. Thus prehospital recognition and management have an important role.

In this study, the purpose is to evaluate the knowledge and behaviors of paramedics towards acute stroke in Northern Cyprus in the 10th year of the start of treatment on the island.

MATERIAL AND METHODS

A descriptive study approved by Ethical Committee was conducted in Northern Cyprus, between November 2020 and May 2021. The population of this research includes all active 50 paramedics working in both state and private health institutions in Northern Cyprus. An online questionnaire consisting of 20 questions that was prepared by researchers was distributed to paramedics through Google Forms, via social platforms. The questionnaire had 4 parts. The first part included demographic questions, the second and third parts respectively related to the evaluation of knowledge about stroke and pre-hospital stroke management, and the final part is about thrombolytic therapy. The data from the survey was imported to Microsoft Excel and analyzed with descriptive statistics and chi-square tests by using SPSS v26. the value of $p<0.05$ is accepted as statistically significant.

RESULTS

36 actively working paramedics out of 50 (72%) responded to the survey. The range for age is between 21 and 43. The mean age was calculated as 28.92±5.67 years. The female-to-male ratio was 1.12 in this study. The majority of the permanent paramedics in Northern Cyprus have an associate degree which corresponds to 86.1% while the remaining have bachelor's degrees and post-graduation. Among 36 paramedics 63.9% of them are working in state health institutions while 36.1% of paramedics are working in private health institutions. The period after their graduation was between 1 year-4 years in 47.2% and 5-9 years in 36.1% of all the population. 66,6% of the paramedics have been working in this situation for 1 year-9 years. 13.9% of paramedics are working for less than 1 year and 19.4% are working for more than 10 years. 72.2% of paramedics indicated that they were educated on stroke. 60% of uneducated paramedics were working in private health institutions. 61% of paramedics encountered 1 case-4 cases in a month, whereas 27.8% did not encounter any stroke cases monthly. 80% of this group who haven't observed any stroke cases in a month work in private health institutions.

86.1% of all paramedics could define the stroke correctly and 94.4% stated the correct organ affected by stroke. Additionally, 88.8% of paramedics knew that there are 2 types of stroke and 72.2% of them were able to specify these types of stroke which are hemorrhagic and ischemic.

Among the given answers regarding stroke symptoms, 19.4% of paramedics indicated 4 or fewer correct symptoms while 80.5% of them knew 5 or more correct symptoms. Also, 83.3% of the participants chose incompatible symptoms of stroke together with the correct symptoms.

63.8% of paramedics stated that they know the treatment of acute stroke and 58.3% of them stated that they are aware of pre-hospital stroke scales. However, 47.8% of paramedics could know the right time period of thrombolytic therapy and only 28.5% of them indicated correct pre-hospital stroke scales used globally. The

majority of paramedics working in state hospitals indicated knowledge of the pre-hospital diagnosis scale which corresponds to 83% whereas only 15.3% of the employee paramedics in private health institutions indicated knowledge of the pre-hospital diagnosis scale for acute stroke. Moreover, 76.9% of the paramedics working at private health institutions did not know the time period of thrombolytic therapy whereas this percentage is 52.2 in paramedics working at state health institutions.

88.9% of paramedics categorized acute stroke patients as urgent and the remaining 11.1% categorized it as important. Additionally, 97.2% of paramedics mentioned that they informed the hospital about the stroke patient before the arrival. 94% of paramedics indicated that the patient suffering from acute stroke must be transferred to the closest hospital with a stroke unit, and the rest 6% of paramedics indicated the closest hospital regardless of a stroke unit. However, when asked about their daily routine in stroke suspected patients, the closest health institution was selected as a target for stroke-suspected patients by 53% of paramedics which corresponds to the approximate sum of the percentage of paramedics who selected a hospital with neurology and radiology facilities along with a hospital with a stroke unit that has a percentage of 23% and 25% respectively.

30% of paramedics identified all the hospitals that supply thrombolytic therapy correctly. 11.1% of paramedics could not state any hospital in Northern Cyprus that supplies thrombolytic therapy.

The comparison statistics didn't reveal any significant relationship between the identification of 5-7 symptoms for acute stroke and paramedics' educational status, workplace, previous stroke education, duration of work as a paramedic, and the stroke cases encountered in a month. Although it wasn't significant, paramedics with bachelor's and postgraduate degrees and who encountered at least 1 stroke case in a month had more knowledge on the pre-hospital diagnosis scale. Moreover, there were significant associations between workplace, previous stroke education, working duration, and knowledge on the pre-hospital diagnosis scale (p values < 0.05). The paramedics who are employed in state hospitals and who have stroke education and longer work duration had a better understanding of the pre-hospital diagnosis scales. Additionally, mainly stroke-educated paramedics, paramedics who have worked 5 or more years, and the ones who encountered more stroke cases in a mouth indicated 2-3 hospitals out of 3 with a stroke unit in North Cyprus (p values >0.05). However, the paramedics from state health institutions significantly had more knowledge of hospitals with a stroke unit (p value < 0.05). The majority of all paramedics answer falsely the question about time period for thrombolytic therapy. Additionally, statistical analysis did not reveal any significant relationship between knowledge about time period for thrombolytic therapy and the workplace, and having stroke education.

All these results are summarized in Table 1.

Table 1: Relationship between demographical characteristics of permanent paramedics and time period of thrombolytic therapy application after the onset of symptoms, identification of acute stroke symptoms, knowledge on pre-hospital diagnosis scale for

		Identification of Symptoms of Acute Stroke		*p-value**	Knowledge on Pre-Hospital Diagnosis Scales for Acute Stroke		*p-value**	Knowledge of Hospitals with a Stroke Unit in Northern Cyprus		*p-value**	Time Period of Thrombolytic Therapy Application After the Onset of Symptoms		*p-value**
	Total n(%)	0-4 Symptoms *n* (%)	5-7 Symptoms *n* (%)		Yes *n* (%)	No *n* (%)		0-1 Hospitals *n* (%)	2-3 Hospitals *n* (%)		True *n* (%)	False *n* (%)	
Gender													
Male	17 (47.2)	4 (23.5)	13 (76.5)	***0.647***	9 (52.9)	8 (47.1)	***0.535***	8 (47.1)	9 (52.9)	***0.540***	5 (29.4)	12 (70.6)	***0.270***
Female	19(52.8)	4 (15.7)	16 (84.3)		12 (63.1)	7 (36.9)		5 (26.3)	14 (73.7)		9 (47.3)	10 (52.7)	
Health Institution													
State Health Institutions	23(63.9)	3 (13)	20 (87)	***0.708***	19(82.6)	4 (17.4)	***<0.001***	4(17.4)	19 (82.6)	***0.005****	11 (47.8)	12 (52.2)	***0.143***
Private Health Institutions	13(36.1)	4 (30.7)	9 (69.3)		2 (15.4)	11 (84.6)		9 (69.2)	4 (30.8)		3 (23.1)	10 (76.9)	
Stroke Education													
Yes	26(72.2)	5 (19.2)	21 (80.8)	***0.608***	19 (73)	7 (27)	***0.004***	8 (30.7)	18 (69.3)	***0.089***	11 (42.3)	15 (57.7)	***0.497***
No	10(27.8)	2 (20)	8 (80)		2 (20)	8 (80)		5 (50)	5 (50)		3 (30)	7 (70)	
Duration of work as paramedic													
<1 Year	5(13.9)	2 (40)	3 (60)	***0.285***	-	5 (100)	***0.012***	4 (80)	1 (20)	***0.167***	1 (20)	4 (80)	***0.298***
1-4 Years	12(33.3)	1 (8.3)	11 (91.7)		6 (50)	6 (50)		5 (41.7)	7 (58.3)		3 (25)	9 (75)	
5-9 Years	12(33.3)	3 (25)	9 (75)		9 (75)	3 (25)		2 (16.7)	10 (83.3)		7 (58.3)	5 (41.7)	
>10 Years	7(19.4)	1 (14.3)	6 (85.7)		6 (85.7)	1 (14.3)		2 (28.6)	5 (71.4)		3 (42.9)	4 (57.1)	
Stroke cases encountered in a month													
None	10(27.8)	4 (40)	6 (60)	***0.454***	3 (30)	7 (70)	***0.093***	8 (80)	2 (20)	***0.071***	1 (10)	9 (90)	***0.091***
1-4 Cases	22(61.1)	3 (13.6)	19 (86.4)		14 (63.6)	8 (36.4)		5 (22.7)	17 (77.3)		12 (54.5)	10 (45.5)	
>5 Cases	4(11.1)	-	4 (100)		4 (100)	-		-	4 (100)		1 (25)	3 (75)	

* p-value is obtained from Chi-Square

The value of $p<0.05$ is statistically significant

DISCUSSION

All current guidelines for acute stroke management include not only treatment protocols as well as evidence for pre-hospital management. Early admission to the hospital positively affects the treatment process in acute stroke.[7]

It was emphasized that even in centers with highly developed in-hospital stroke organizations, delays in the pre-hospital period negatively affect both access to treatment and treatment response.[5,8] A study which is conducted after the 8th year of the approval of thrombolytic treatment by the FDA in the US noted that only 3% to 8.5% of stroke patients received the treatment. Two major reasons for this really low percentage were delays in the pre-hospital period and not transporting the patients to suitable centers for acute stroke treatment.[5] The inability to recognize stroke-related symptoms and confounding symptoms was identified as the most important reason for the delay in the pre-hospital period, and the importance of education on scales to screen for stroke was emphasized.[8]

In our study, although the majority of paramedics gave correct answers to general questions such as the definition of stroke, the organ it affects, and its types, it is not acceptable that even such general questions not be answered to a certain extent among first responders of such a vital disease. More than 5% of paramedics could not know the affected organ in the stroke and nearly 15% could not define the stroke. Although some studies that evaluate more superficial information showed that paramedics have good general knowledge like our study.[9-11] There are studies from different countries that include detailed questions, showing the insufficient level of knowledge. Lack of knowledge is also associated with a lower rate of stroke recognition.[12-16] In the study of Shire et al., the rate of knowing the basic symptoms of stroke was similar to our study. In the same study, it was stated that the majority of paramedics had problems recognizing symptoms that could mimic stroke.[13] Although most of the participants in our study identified most of the stroke-related symptoms, similarly most of them indicated incompatible symptoms besides the correct ones. 83.3% of the participants chose incompatible symptoms of stroke together with the correct symptoms.

Furthermore, in our study, we also questioned the details of stroke diagnosis, scales, treatment, and centers besides the self-assessment of the participants. The results revealed that in their self-assessment, 63.8% of paramedics stated that they know the treatment of acute stroke and 58.3% of them stated that they are aware of pre-hospital stroke scales. However, 47.8% of paramedics could know the right time period of thrombolytic therapy and only 28.5% of them indicated correct pre-hospital stroke scales used globally. Because the scales are easy to learn and can be used quickly, they are important in cases where early diagnosis is important, such as stroke.[8] On the contrary, a review emphasized that just using scales isn't enough for the diagnosis of stroke and starting the action earlier.[17] More complete knowledge and improvement of screening tools are needed for better management of stroke.[17-19] The good level of knowledge of paramedics and the use of appropriate scales and guidelines not only enable them to recognize stroke but also enable them to be forwarded to the right centers and warn these centers before admission.[5,7,9,19,20] Surveys and guidelines indicated the importance of giving information to the hospital with high priority and using stroke code.[7,21,22] In our study, 88.9% of paramedics categorized acute stroke patients as urgent, and 97.2% of paramedics indicated that they informed the hospital about the stroke patient before their arrival. Another important point in this research is that nearly all the paramedics theoretically knew that the patient suffering from an acute stroke must be transferred to the closest hospital with a stroke unit. However, when asked about their daily routine in stroke suspected patients, the closest health institution was selected as a target for stroke suspected patients by half of the paramedics. Additionally, only 30% of paramedics identified all the hospitals that supply thrombolytic therapy in this study. 11.1% of paramedics could not state any hospital in Northern Cyprus that supplies thrombolytic therapy. These findings show us that regarding the theoretical knowledge about the right transfer center, lack of knowledge about the stroke centers, and most probably the routine transport chain on the island may affected their action.

In studies that examined the factors affecting the level of knowledge, some studies found a relationship between knowledge and working experience, as well as studies that did not.[12,13] Additionally, it was determined in a study that academic education was also related to awareness about stroke but it was not related to the level of knowledge.[12] A study held in Dubai with the participation of 274 Emergency medical service workers showed a relation between seniority level and poor stroke knowledge on tissue plasminogen activator therapy and symptoms of stroke.[13]

In our study, the paramedics who are employed in state hospitals and who had stroke education and longer work experience had a better understanding of the pre-hospital diagnosis scales. Additionally, mainly stroke-educated paramedics, paramedics with bachelor's and post-graduate degrees, paramedics who worked 5 or more years, the ones who encountered more stroke cases in a mouth, and paramedics from state health institutions significantly had more knowledge on hospitals with a stroke unit. It was noteworthy that workplaces, whether private or state, had an impact on paramedics' general knowledge of stroke in this present study. This could be an indirect relationship. Our study revealed that 72.2% of paramedics were educated on stroke. 60% of uneducated paramedics were working in private health institutions. 61% of paramedics encountered 1 case-4 cases in a month, whereas 27.8% did not encounter any stroke cases monthly. 80% of this group who haven't observed any stroke cases in a month work in private health institutions. These two factors may explain the reason for better knowledge in state hospital paramedics.

The importance of education of paramedics was emphasized in lots of studies and guidelines. Education positively affects the rapid identification of stroke cases, arrival time to the right hospital, and providing better pre-hospital care.[13,17,19,23]

Paramedics can change, treatment protocols can be improved, and training can be forgotten, so repetitive

education programs will be useful for improving pre-hospital stroke care. Additionally, it is stated that not only educating paramedics but also giving immediate feedback about the stroke cases they are interested in may increase their motivation.[22] Furthermore national organizations depend on the globally accepted guidelines important for improving stroke care at every step also in the pre-hospital period.[5,7,9]

Our study have some limitations about the limited number of actively working paramedics in this small country and additionally the response rate was %63.7 in the study.

CONCLUSION

Multi-categorical evaluations demonstrated inadequate knowledge and poor pre-hospital management of stroke among paramedics. Paramedics who work in state health institutions had a greater knowledge regarding hospitals with stroke units and pre-hospital scales compared to those working at private health institutions. Event hough the majority of paramedics in North Cyprus are educated about acute stroke, more than half of them don't know the critical treatment period for acute stroke. Periodic education must be held for paramedics to improve their knowledge about acute stroke and treatment.

Ethics Committee Approval: Ethics committee approval was received for this study from the Health Subcommittee of Research and Publication Ethics Board of Eastern Mediterranean University University (Date: 2021, Number: ETK00-2021-0090).

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