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Original Article

Demographic and clinical characteristics of inpatient stroke patients in Turkey

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ABSTRACT

Objectives: This study aims to assess the stroke rehabilitation facilities provided by university hospitals (UHs) and training and research hospitals (TRHs) and to evaluate the geographical disparities in stroke rehabilitation.

Patients and methods: Between April 2013 and April 2014 a total of 1,529 stroke patients (817 males, 712 females; mean age: 61.7±14.0 years; range, 12 to 91 years) who were admitted to the physical medicine and rehabilitation clinics in 20 tertiary care centers were retrospectively analyzed. Demographic, regional and clinical characteristics, details of rehabilitation period, functional status, and complications were collected.

Results: The median duration of stroke was five (range, 1 to 360) months. The ratio of the patients treated in the TRH in the Marmara region was 77%, but only 25% of the patients were living in the Marmara region. Duration of hospitalization was longer in the TRHs with a median of 28 days compared to those of UHs (median: 22 days) ($p<0.0001$). More than half of the patients (55%) were rehabilitated in the Marmara region. Time after stroke was the highest in the Southeast region with a median of 12 (range, 1 to 230) months and the lowest in the Aegean region with a median of four (range, 1 to 84) months.

Conclusion: This study provides an insight into the situation of stroke rehabilitation settings and characteristics of stroke patients in Turkey. A standard method of patient evaluation and a registry system may provide data about the efficacy of stroke rehabilitation and may help to focus on the problems that hinder a better outcome.

Keywords: Rehabilitation, stroke, Turkey.

Stroke survivors suffer from severe functional disabilities and 30% need to be rehabilitated to achieve the best possible recovery. Burden of cerebrovascular diseases as measured by disability-adjusted life years (DALYs) is on the third row of the 10 leading causes of DALYs.[1] During the past decade, stroke has been increasingly recognized as an important medical and social problem.[2] Many developed countries have performed stroke registration.[3-13] Such a registry system is needed not only for a standardized approach, evaluation and follow-up regimens, but also to help policy makers to develop appropriate strategic plans and budgeting for rehabilitation services in the country.[14]

In Turkey, stroke rehabilitation is mostly provided by Physical Medicine and Rehabilitation (PM&R) departments of university hospitals (UHs), training and research hospitals (TRHs) and, to a much lesser degree, by private daily care units. The common missions of both UHs and TRHs are to provide education, research and professional medical service. Although TRHs are affiliated with University of Health Sciences for four years, the regulation and system remain unchanged. While medical service is expected from the experts in TRHs in the foreground, the experts in UHs are expected to contribute to education and scientific research, the contribution to the medical service comes later. This diversity may lead to heterogenity of the care delivered to the stroke patient. To the best of our knowledge, there is not a national stroke rehabilitation registry system or available data on stroke rehabilitation in Turkey. In addition, the extent, adequacy, and the efficacy of stroke rehabilitation has not been documented previously. Registries have the advantage of greater inclusiveness and generalizability than single hospital studies.[15] They also provide comparative data that enables physicians and policymakers to allocate the resources to improve the outcome of stroke rehabilitation.

In the present study, we aimed to assess the stroke rehabilitation facilities provided by UHs and TRHs and to compare the patient characteristics. To the best of our knowledge, this is the first multi-center study to investigate the characteristics of stroke rehabilitation units' facilities in Turkey.

PATIENTS AND METHODS

This multi-center, retrospective, cohort study was conducted at 20 tertiary care centers including 11 UHs and nine TRHs between April 2013 and April 2014. Ten of the hospitals were in the Northwestern (Marmara region), four hospitals in the Central Anatolia, two hospitals in the south (Mediterranean region), and two hospitals were in the southeastern (the southeast region). The Aegean region was represented by three hospitals. A written informed consent was obtained from each participant. The study protocol was approved by the Yeditepe University Faculty of Medicine Ethics Committee (date no: 15.03.2013/307). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Data of 1,529 stroke patients (817 males, 712 females; mean age: 61.7±14.0 years; range, 12 to 91 years) who were admitted to the PM&R clinics during the previous year were searched retrospectively via the International Classification of Diseases, Ninth Revision, principal diagnosis code of stroke. At each participating hospital, Physical

Medicine and Rehabilitation specialists collected information by using a standardized questionnaire and coded it according to the instructions provided by the working group. They also formatted the data for statistical analysis which was also provided by the working group. All the participants agreed that the data would be used for research purposes with the permission of the working group. Demographic data (age, sex, body mass index [BMI], education, marital status, occupation, discharge destination, caregiver, reasons for referral, comorbidities, risk factors) geographic regional (region of destination and region where rehabilitation service was received) and clinical characteristics (stroke side, stroke type, number of recurrence, speech disturbances, Brunnstrom Stage for upper extremity, hand and lower extremity, spasticity according to Ashworth, cognitive status according to Mini-Mental Test (MMT), details of the rehabilitation period (time after stroke, length of hospital stay, functional status according to Functional Impairment Measurement [FIM] and Barthel Index [BI] and Functional Ambulation Scale [FAS] both at admission and discharge, complications and interventions (orthosis prescription, Botulinum toxin injections, and walking aid) were documented.

The primary outcome measures were to report the general profile of the inpatient stroke rehabilitation patients and to compare the patient profile in two different inpatient rehabilitation settings.

Statistical analysis

Statistical analysis was performed using the SPSS for Windows version 15.0 software (SPSS Inc., Chicago, IL, USA). Descriptive data were expressed in mean ± standard deviation (SD), median (min-max) or number and frequency, where applicable. Comparisons between two independent groups were made using the Student t-test, when the numerical variables met the normal distribution condition, and the Mann-Whitney U test if it did not. Comparisons of independent numerical variables with more than two groups were made using one-way analysis of variance (ANOVA) test when the normal distribution condition was met, and with the Kruskal-Wallis test when the normal distribution condition was not met. Subgroup analyses were performed using the Tukey test in parametric test, Mann-Whitney U test in non-parametric test, and interpreted with the Bonferroni correction. Since the differences of the variables in the dependent group comparisons did not meet the normal distribution condition, the comparisons of two groups were made using the Wilcoxon test and the Friedman test. Subgroup analyses were performed using the Wilcoxon test and interpreted with the Bonferroni correction. The ratios of categorical variables between the groups were tested using the chi-square test. A p value of <0.05 was considered statistically significant.

RESULTS

Sociodemographic characteristics

The study population was 1,529 stroke patients hospitalized in the UHs and TRHs. The median duration of stroke was five months (range, 1 to 360 days). The majority (40.8%) of the patients were overweight. While 19.7% of the patients were illiterate, 47.3% were educated for five to eight years. Most (79.3%) of the patients were married. The included patients were mostly housewives (38.9%) and retired (39.4%). Totally 98.7% were being cared at home by the spouse (52.4%) or children (30.1%). Most of the patients (27.4%) were born in the Marmara region. More than half of the patients (52.6%) were rehabilitated in the Marmara region, followed by the Aegean, Central Anatolia, Mediterranean, South East and East Anatolia. Comparison of the UHs and TRHs is given in Table 1.

Rehabilitation facilities

The main reason for referral was for being rehabilitated as an inpatient (71.2%). Reason for referral to the PM&R department was to be rehabilitated as inpatient in 65.4% and as outpatient in 16.4%. The major region at which the patients received rehabilitation was the Marmara region with a ratio of 53.1% followed by the Aegean region with a ratio of 22.5%. The majority of the patients were born in the Marmara region (27.3%) which was followed by the Central Anatolia (20.8%). A total of 719 (47%) patients were treated in the UHs and 816 (53%) were treated in TRHs. In the Marmara region, 77% of the patients were rehabilitated in TRH compared to 23% treated in UHs. Similarly, in the Central Anatolia, the patients rehabilitated in the TRHs were more than those rehabilitated in the UH (28% *vs.* 4%). In the Aegean region, a very low percent (0.01%) of the patients were treated in the TRHs. Totally 46% and 23% of the patients rehabilitated in the UHs received this therapy in the Aegean and Marmara regions, respectively. Compared to the UH setting, the reason for referral to the TRH was inpatient hospitalization in 90% of the patients (p=0.002). Referral to a UH was mostly for outpatient rehabilitation purposes (33.9% *vs.* 1.9%). The most common living region was Marmara (32%), but the treatment region was

Aegean with a ratio of 46% for the patients treated in UHs. The ratio of the patients treated in the TRH in the Marmara region was 77%, but only 25% of the patients were living in the Marmara region. Patients requiring inpatient rehabilitation were mostly (90%) treated in the TRHs, while those accepted by the UHs usually received outpatient rehabilitation. While the Marmara region provided treatment in both institutes, UHs were almost the only place for stroke rehabilitation in the Aegean region. Among 20 stroke rehabilitation centers included in the study, TRHs in the Marmara region provided the highest rate of treatment facilities. Totally 99% of the patients were treated in their first admission service in TRHs and 80% in UHs. ($p<0.0001$). Post-discharge place of almost all (>97%) patients were home from both institutes. While the caregiver was mostly the spouse in patients rehabilitated in UHs, it was the siblings in patients rehabilitated in TRHs. More than half of the patients were rehabilitated in the Marmara region (55%). Reason for admission was hospitalization for all patients in the Mediterranean region and was outpatient rehabilitation for 98% patients in the Southeastern region. Time after stroke was the highest in the Southeastern region with a median of 12 (range, 1 to 230) months and the lowest in the Aegean region with a median of four (range, 1 to 84) months. Time since rehabilitation was the highest in the Central Anatolia with a median of 66 days and the lowest in the Marmara region with a median of four days. Duration of hospitalization was the highest in the Central Anatolia with a median of 30 (range, 1 to 107) days and the lowest in the Aegean region with a median of 17 (range, 1 to 90) days. Rehabilitation type was 100% inpatient in the Mediterranean region and 100% home exercise

TABLE 1
Sociodemographic characteristics of patients

	University Hospital (n=712)		Training and Research Hospital (n=817)		
	%	Mean±SD	%	Mean±SD	*p*
Age (year)		59.8±14.9		63.4±13.1	<0.0001
Sex					0.098
Female	44		48		
Male	56		52		
Region of Birth					<0.001
Marmara	29.1		25.6		
Agean	15.7		9.7		
Mediterranean	21.7		2		
Central Anatolia	3.7		28.5		
East Anatolia	5.7		11.8		
Southeastern Anatolia	16.1		6.7		
Black Sea	8		15.7		
Education					0.602
Illiterate	19		19		
Literate	12		9.8		
5-8 years of education	44.7		48.4		
8-12 years of education	18.7		15.9		
University and higher	5.7		6.0		
Occupation					<0.001
Retired	40		39		
Housewife	34.2		41.3		
Officer	4.7		1.1		
Worker	9.3		2.3		
Other	11.8		16.2		
Marital status					<0.001
Married	81.8		78.1		
Single	8.3		4.3		
Divorced /widow	9.9		17.6		

SD: Standard deviation.

program in the Southeastern region. Eighty-four patients received inpatient rehabilitation in different centers within one year. Comparisons between UH and TRH are given in Table 2.

Stroke characteristics

The median time period spent at home before rehabilitation was 30 (range, 1 to 6,840) days. The median days of hospitalization was 27.1 (range, 1 to 107) days. A total of 72% patients had ischemic stroke and 18.9% had hemorrhagic stroke. In addition, 48.9% had left hemiplegia. Totally 9.3% of the patients had a previous stroke and 17.7% of the patients had aphasia. Duration of hospitalization was longer in the TRHs with a median of 28 days compared to those in the UHs (median: 22 days) ($p<0.001$). The median duration of time after stroke (11 months) was not significantly different between the two institution types. Time from stroke to receiving rehabilitation was longer in TRH patients (median: 15 days *vs.* 45 days, respectively). The comparison of stroke characteristics is shown in Table 3.

Risk factors and comorbidities

Number of patients having these risk factors were significantly more among stroke patients in the TRHs than in UHs. Osteoarthritis was the most

TABLE 2
Comparison of rehabilitation facilities

	University Hospital (n=712)	Training and Research Hospital (n=817)	
	%	%	*p*
Reason of admission			<0.001
Inpatient rehabilitation	51	90	
Outpatient rehabilitation	33.9	1.9	
Medical treatment	11	5.9	
Medical board report	2.7	2.6	
Region of residence			<0.0001
Marmara	32	25	
Agean	15	10	
Mediterranean	21	2	
Central Anatolia	4	28	
East Anatolia	5	12	
Southeastern Anatolia	15	7	
Black Sea	8	16	
Region of treatment			<0.001
Marmara	23	77	
Agean	46	0,01	
Central Anatolia	4	20	
East Anatolia	2	1.2	
Southeastern Anatolia	6	0.5	
Black Sea	0.4	0.8	
Place of accommodation			0.002
Home /Family	99.7	97.8	
Nursing home	0,3	2.2	
Caregiver			<0.001
Spouse	66	42.1	
Sibling	22.9	35.7	
Relatives	4.4	10.7	
Others	6.7	11.4	
First institution	80	99	<0.0001
Treatment option offered by the institution			<0.0001
Inpatient rehabilitation			
Outpatient rehabilitation	48	89	
Home exercises	25	1.9	
	27	7.1	

SD: Standard deviation.

TABLE 3
Comparison of stroke characteristics

	University Hospital (n=712)				Training and Research Hospital (n=817)				
	n	%	Median	Min-Max	n	%	Median	Min-Max	*p*
Time since stroke (month)			5	1-230			4	1-360	0.498
Time after stroke to rehabilitation (day)			45	1-600			15	1-1460	<0.0001
Duration of hospitalization (day)			22	1-107			28	1-90	0.037
Etiology									0.439
Ischemic	475	78.5			624	80.2			
Hemorrhagic	130	21.5			154	19.8			
Ischemic subgroups									<0.001
Thrombotic	154	63.4			466	84.7			
Embolic	76	31.3			78	14.2			
Lacunar	13	5.3			6	1.1			
Hemorrhagic subgroups									0.825
Intracerebral	59	79.7			115	81			
Subarachnoid/aneurysm	15	20.3			27	19			
Injury site									0.252
Intracerebral	491	93			596	90.3			
Brain stem	26	4.9			46	7			
Cerebellum	11	2.1			18	2.7			
Involved hemisphere									0.011
Right	315	48			433	54.7			
Left	341	52			358	45.3			

TABLE 4
Comparison of risk factors and comorbidities in patients

	University Hospital (n=712)		Training and Research Hospital (n=817)		
	n	%	n	%	*p*
Risk factors					
Atrial fibrillation	48	8.6	100	15.0	0.001
Congestive heart disease	129	20.6	218	31.7	<0.001
Hypertension	380	59.7	585	77.1	<0.001
Dyslipidemia	156	25	262	36.5	<0.001
Diabetes	179	29.6	261	36.7	0.003
Oral contraceptive usage	11	2	11	2	>0.05
History of TIA	20	3.2	33	4.9	0.137
Malignancy	20	3.6	21	3.1	0.658
Comorbidities					
Osteoarthritis	266	43.3	242	36.4	0.013
Endocrinologic disorder	85	15.1	133	20	0.027
Depression	75	12.2	173	26.0	<0.001
Osteoporosis	161	26.2	148	23.4	0.252
Neurologic disorder	52	9.1	113	16.9	<0.001
Renal disease	18	3.3	34	5.1	0.114
Chronic obstructive lung disease	34	6.1	38	5.7	0.745

TABLE 5
Comparison of functional evaluation scores

	University Hospital (n=712)		Training and Research Hospital (n=817)		
	n	Mean±SD	n	Mean±SD	*p*
Minimental test	135	25.0±6.4	109	19.0±6.9	<0.001
Brunnstrom upper extremity		3.1±1.7		2.8±1.6	<0.001
Brunnstrom hand		3.0±1.8		2.5±1.7	<0.001
Brunnstrom lower extremity		3.6±1.6		3.2±1.4	<0.001
p		<0.001		<0.001	
Ashworth upper extremity		1.2±1.1		0.9±1.1	<0.001
Ashworth lower extremity		1.1±1.1		0.9±1.1	<0.001
p		0.051		0.220	
FIM initial	93	72.5±22.9	278	72.2±27.6	0.903
FIM final	78	78.9±22.1	139	76.8±24.9	0.784
p		<0.001		<0.001	
Barthel initial	244	64.9±14.6	150	48.4±25.4	<0.001
Barthel final	207	70.2±14.5	93	59.9±24.8	0.044
p		<0.001		<0.001	
FAS initial	427	2.8±1.5	155	1.4±1.5	<0.001
FAS final	242	3.0±1.5	539	2.3±1.5	<0.001
p		<0.001		<0.001	

FIM: Functional independence measurement; FAS: Functional ambulation scale.

TABLE 6
Comparison of the types and rates of post-stroke complications

	University Hospital (n=712)		Training and Research Hospital (n=817)		
	n	%	n	%	*p*
Hemiplegic shoulder	184	31.0	261	36.0	0.055
Gleno humeral subluxation	114	19.2	109	15.1	0.045
Bicipital tendinitis	13	2.2	21	2.9	0.420
Rotator cuff syndrome	27	4.6	53	7.3	0.036
Adhesive capsulitis	54	9.1	38	5.2	0.006
Not classified	27	4.6	81	11.2	<0.001
Complex regional pain syndrome	22	4.5	49	8.1	0.015
Heterotopic ossification	6	1.0	2	0.3	0.154
Pressure ulcer	13	2.2	25	3.7	0.131
Deep vein thrombosis	10	1.9	13	1.9	0.995
Contracture	27	5.2	30	4.9	0.854
Dysphagia	48	7.9	28	4.7	0.019
Neglect	15	2.6	17	2.5	0.938
Depression	91	16.3	42	8.4	<0.001
Bladder dysfunction	65	10.5	114	16.2	0.003
Bowel dysfunction	37	6.0	65	9.5	0.019
Delirium	0	0.0	3	0.5	0.250
Seizures	14	2.4	35	5.8	0.003
Neuropathic pain	59	10.2	42	7.0	0.047
Number of complications (Mean±SD)	1.04±1.31		1.02±1.23		0.704

SD: Standard deviation.

common comorbidity. Comorbidities were higher in the patients treated in TRHs. Major complication during the inpatient period was hemiplegic shoulder in 31.9% of the patients. Comparison of risk factors and comorbidities are given in Table 4.

Functional evaluation

Functional status of 244 patients was evaluated by the FIM and of 150 patients by the BI. The mean MMT score was evaluated in 244 patients. Accordingly, stroke patients in the TRHs had more lower scores in cognition as evaluated by the MMT and Brunnstrom stages. The BI and FAS scores were also lower in TRH patients. Regarding the pre- and post-treatment scores, the patients in both institutions improved after the inpatient rehabilitation period. Functional evaluation of the patients is shown in Table 5.

Complications

Post-stroke complications experienced by the patients are shown in Table 6. Among them, shoulder problems had a high frequency. Depression and bladder dysfunction were the other common complications. When we compared patients according to sex, females were found to be older than males ($p<0.0001$), and the number of comorbid diseases was higher ($p=0.008$) in females compared to those of males. There were no significant differences in the number of risk factors ($p=0.918$), number of recurrence ($p=0.129$), etiology ($p=0.666$), and caregivers ($p=0.077$).

DISCUSSION

In this one-year, multi-center, retrospective study, we found that stroke patients preferred to receive inpatient rehabilitation program, particularly in the Western regions of the country. The majority of the caregivers are family members. Most of the patients were male. Furthermore, we found that risk factors, demographic properties, comorbidities and type of stroke, time after stroke and attendance reason were well-documented. On the other hand, there was a lack of follow-up registry. The MMT, FIM or BI scores were not documented properly. In previous studies, admission functional state was shown to be an important predictor of hospital stay.[16]

In the current study, we identified that 47.3% of the patients were educated for five to eight years. The patients were mostly housewives (38.9%) and retired (39.4%). The patients in this study had low educational levels and income according to occupation. Similar to our study, Zhang et al.[17] found that 41.9% of the patient's education level were junior middle school. Xing et al.[18] found that 25.1% of the participants had an education level of primary school or lower, and 8.0% of the participants had low income. In another study conducted by the same authors, patients with low educational levels and income received inadequate medical care far below the evidence-based standards.[19] Kefale et al.[20] emphasized that stroke patients with a low level of education might trigger having worse information about their health status, worse economic situation, worse awareness about managing risk factors of stroke. They may disregard self-management behavior and adherence to their medications.

The main medical history and risk factors of the present study results were hypertension, diabetes mellitus (DM), hyperlipidemia, and smoking. This finding indicates that modification of such major cardiovascular risk factors is needed.[15] Therefore, public concern of stroke precaution by modifying lifestyle behavior should be strongly emphasized.[14]

Concerning the pathology of stroke, 75.7% of the patients had ischemic stroke and less (19.9%) hemorrhagic stroke. The ratio is similar to the Western countries.[7-13] It may be concluded that hemorrhagic stroke survived less and could not reach rehabilitation, since hemorrhagic stroke is a devastating form of stroke.

In the present study, we found that initiation of rehabilitation was 30 days after stroke. This is relatively late compared to other countries.[21,22] Langhorne and Pollock[21] showed that two-thirds of stroke units initiated rehabilitation within three days. Hayes and Carroll[22] indicated that stroke patients who received very early rehabilitation were likely to have a better recovery. Late admission may be due to inadequate accessibility to such services. Twenty hospitals which could provide an inpatient rehabilitation program were participated in this study. In a retrospective study including stroke patients between 2008 and 2013, the stroke prevalence in Turkey was calculated as 2%.[23] On average, 20% of the survivors remain in an institution, while 80% return home.[24] More rehabilitation services are needed.

One of the main findings of this study is that the majority of the patients received rehabilitation in urban areas. It reflects that stroke rehabilitation is given in urban areas. Therefore, the government should obtain new hospitals distributed in the country. On the other hand, we were not able to observe functional improvement status of patients with stroke, as there was a lack of registration of FIM and/or BI.

Almost all of the patients had family support. This result may be due to the strong relationship and support in the Turkish population. However, we are aware of the burden of the caregivers. Burden of the caregivers should be concerned and minimized. A further study should be done to evaluate the burden of the caregivers. On the other hand, this result showed us the importance of education of families to handle patients, to teach home exercise programs, and to avoid musculoskeletal injuries.

In the current study, the main reason for admission for most of the patients was to receive inpatient rehabilitation in TRHs compared to UHs. This may be due to the lack of outpatient services of TRHs. The government may obtain more staff to resolve this problem. Although most of the patients were living in the Marmara region, the majority of the patients received rehabilitation in the Aegean region in UHs. The majority of the patients were living in the Central Anatolia, but received rehabilitation in the Marmara region in TRHs. This result may reflect the fact that stroke rehabilitation is obtained in Marmara, particularly in Istanbul. Five of the TRHs which recruited the study were in Istanbul. Another reason should be that patients prefer to receive treatment in urban areas. Most of the patients' first admission was to TRHs. The availability of TRHs should be easier compared to UHs. University hospitals obtain more outpatient rehabilitation programs. Another reason for these results should be that the majority of the patients admitted to TRHs for hospitalization, since they have more inpatient services and rehabilitation units than those of UHs.

When we compared hospital facilities according to regions, we observed that, in the Southeastern Region, time after stroke of the patients was as long as ≥12 months. All patients, except for one, received the outpatient program. There should be a lack of inpatient rehabilitation services in that region. Time since rehabilitation was the highest in the Central Anatolia followed by the Mediterranean and Southeastern Anatolia regions. The reason for the higher admission ratios of patients to the Marmara Region should be that the acceptance of patients in the Central Anatolia takes so long time due to capacities. Duration of hospitalization was the highest in the Central Anatolia, followed by the Marmara region.

Due to the retrospective nature of the study, there are some limitations. We cannot consider exactly the reason for this heterogenicity of the regional differences among hospitals. We do not know if the patients needed to stay in hospital longer in the Central Anatolia due to the medical needs and observed improvements or the general approach of those hospitals. Further studies should be planned to examine the needs for the regions, particularly rehabilitation services, staff, and equipment per population.

In the literature, there are a few studies comparing sex differences of stroke patients. Similar to the results of recent studies, we found that females were older than males.[15,25,26] Gargano et al.[15] found that females likely to have a history of heart diseases and DM. A difference in stroke subtype was found by Gargano et al.,[15] evident that females having a larger proportion with TIA. Santalucia et al.[25] found that females were reported to experience more aphasic disorders than men. Men have more likely to have cerebellar and brainstem symptoms. They found higher prevalence of atrial fibrillation (AF) in females compared to males.

Petrea et al.[26] found that females did not significantly differ with respect to the presence of cardiovascular diseases, DM, AF, smoking or hypertension. We found significant differences in BMI, number of comorbid diseases such as osteoporosis, osteoarthritis, and endocrine disorders. Atrial fibrillation and congestive heart failure were found more frequent in females compared to males. However, stroke type, number of risk factors, and recurrence rate and other risk factors and comorbid diseases did not significantly differ. There is not enough study which evaluates sex-specific rates of stroke incidence, stroke mortality, and post-stroke disability outcomes. Therefore, it is difficult to make inferences by comparing the results of the existing studies.

In conclusion, this study provides an insight into the situation of stroke rehabilitation units and characteristics of stroke patients in Turkey. There is no standard examination and evaluation system among units. A standard method of patient evaluation and registry system may provide data about the efficacy of the stroke rehabilitation and may help to focus on the problems that hinder a better outcome. Such a registry system may guide us to improve quality care and reduce disability, to monitor progress in reducing the incidence of stroke. We believe that it would be useful for understanding clinical characteristics of stroke related to geographical or environmental differences.

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