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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

AKUT İNME SONRASI YATAN HASTA REHABİLİTASYONU VE EV TABANLI REHABİLİTASYON UYGULAMALARININ KARŞILAŞTIRILMASI: PROSPEKTiF KONTROLLÜ BİR ÇALIŞMA

COMPARING INPATIENT REHABILITATION AND HOME-BASED REHABILITATION PRACTICES FOLLOWING ACUTE STROKE: A PROSPECTIVE CONTROLLED STUDY

Şükran GÜZEL[1], Azize SERÇE[2], Ebru KARACA UMAY[2], İbrahim GÜNDOĞDU[2]

[1]Başkent Üniversitesi Tıp Fakültesi, Fiziksel Tıp ve Rehabilitasyon Ana Bilim Dalı
[2]Sağlık Bilimleri Üniversitesi Ankara Dışkapı Yıldırım Beyazıt Eğitim ve Araştırma Hastanesi, Fiziksel Tıp ve Rehabilitasyon Kliniği

ÖZET

AMAÇ: Bu çalışmanın amacı, akut inmeli hastalarda ev temelli rehabilitasyonun yatan hasta rehabilitasyonu kadar etkili olup olmadığını değerlendirmek ve rehabilitasyon sırasında yüksek mortalite/morbidite riski taşıyan hastaları belirlemektir.

GEREÇ VE YÖNTEM: Bu çalışmaya, nöroloji servisi ve yoğun bakım ünitelerinden yatan hasta rehabilitasyonu (n=28) veya ev egzersiz programlarına (n=36) yönlendirilen akut inmeli 64 hasta dahil edildi. Tedavi öncesi ve tedaviden 12 hafta sonra tüm hastaların Brunnstrom motor evreleri, Fonksiyonel Bağımsızlık Ölçeği (FBÖ) ve İnme Etki Ölçeği (İEÖ) skorları kaydedildi. Değerlendirme parametreleri 2 grup arasında karşılaştırıldı. Rehabilitasyon süresince gelişen morbidite/mortalite varlığı kaydedildi. Daha sonra tüm hastalar yatan hasta, ev egzersiz ve mortalite/morbidite grubu olarak üç gruba ayrıldı ve tedavi öncesi değerlendirme parametreleri gruplar arasında karşılaştırıldı.

BULGULAR: Üçüncü ayda, ev egzersiz grubunda yaşam kalitesi ölçeklerinin tüm alt gruplarında anlamlı bir değişiklik olmazken, yatarak rehabilitasyon grubunda yaşam kalitesi ölçeklerinin bellek ve duygu alt ölçekleri dışında anlamlı iyileşme saptandı. 12. haftanın sonunda; ev egzersiz grubunda 36 hastanın 5'i (%13,90) öldü ve 5'inde (%13,90) yeni bir serebrovasküler hastalık gelişti. Mortalite/morbiditesi olan 10 hastanın bellek, iletişim ve duygu alt ölçek puanları, mortalite/morbiditesi olmayan diğer iki hasta grubundan anlamlı olarak daha düşüktü.

SONUÇ: Zor klinik durumları daha iyi yönetmek için hekimin yatan hasta rehabilitasyonu veya ev egzersiz grubuna yönlendirilecek akut inme hastalarını iyi belirlemesi gerekir. Hekimler hastaları bir rehabilitasyon programına yönlendirirken morbidite/mortalite ile ilgili olabilecek hafıza, iletişim ve emosyonel durum skorlarını göz önünde bulundurabilirler.

ANAHTAR KELİMELER: Evde bakım, Rehabilitasyon, İnme, Yaşam kalitesi

ABSTRACT

OBJECTIVE: The aim of this study is to evaluate whether home-based rehabilitation (HBR) is as effective as inpatient rehabilitation in patients with acute stroke as well as to identify patients at increased risk of mortality/morbidity during rehabilitation.

MATERIAL AND METHODS: The present study included 64 patients with acute stroke who were referred from the neurology service and intensive care units to an inpatient rehabilitation unit (n=28) or HBR programs (n=36). Brunnstrom motor stages, Functional Independence Measure and Stroke Impact Scale scores of all patients were recorded before treatment and 12 weeks after therapy. Evaluation parameters were compared between 2 groups. The presence of any morbidity/mortality that developed during rehabilitation period were recorded. Afterward, all the patients were divided into 3 groups as inpatient, HBR and patients with mortality/morbidity and evaluation parameters before therapy were compared among the groups.

RESULTS: At third month, while there was no significant change in all quality of life subscales following HBR, the improvement in all quality of life subscales following inpatient rehabilitation, except for the memory and emotion subscales were significant. At the end of 12th week; 5 (13.90%) of the 36 patients were died, and another 5 (13.90%) had developed a new cerebrovascular disease in HBR group. The memory, communication and emotion subscales scores of 10 patients with mortality/morbidity were significantly lower than the patients without mortality/morbidity in other 2 groups.

CONCLUSIONS: To better manage difficult clinical encounters, the physician needs to well identify acute stroke patients who will be referred to inpatient rehabilitation or home exercise group. When choosing a rehabilitation program, physicians may also consider the mortality/morbidity related to memory, communication and emotional scores.

KEYWORDS: Home care, Rehabilitation, Stroke, Quality of life

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Yazışma Adresi / Correspondence: Dr. Şükran GÜZEL
Başkent Üniversitesi Tıp Fakültesi, Fiziksel Tıp ve Rehabilitasyon Ana Bilim Dalı
E-mail: sukranguzel@windowslive.com
Orcid No (Sırasıyla): 0000-0001-9852-0917, 0000-0001-5340-6969, 0000-0002-4137-7731, 0000-0002-8891-8822
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INTRODUCTION

Stroke is the second leading cause of death worldwide and a major cause of chronic neurological disability in adult populations (1). The prevalence of stroke increases with the increase in life expectancy, and prevalence rates of disability in stroke survivors range from 36%~45% (2).

Disability seen after stroke may occur depending on the nature of the disease, as well as secondary problems that occur over time in the post-stroke period such as spasticity and contractures.

Although rehabilitation programs applied after stroke have been reported to provide physical functional improvement (3), stroke patients should be provided early and continuous rehabilitation training to prevent disability and secondary complications.

After acute care, stroke survivors are typically discharged to either hospital-based inpatient rehabilitation or to the community (i.e. outpatient rehabilitation, long-term care, or the home). Outpatient rehabilitation may include hospital-based or home-based rehabilitation depending on service availability and patient need (4). Home-based rehabilitation is a form of service delivery where rehabilitation services are provided at the patient's home. Patients learn and apply the functional skills in their home environment (5). Home-based rehabilitation programs are psychosocioeconomically excellent approaches, as they have no cost and included treatment of the patient at home comfort. Previous studies on home-based rehabilitation outcomes showed inconsistent results, and few meta-analyses were performed to clarify the issues. (6). There is limited knowledge about the mechanisms behind home-based rehabilitation facilitating improved functional outcomes compared to standard treatments. The differences in interventional characteristics such as the number of home visits, interventions performed by an individual practitioner (caregiver, etc.) or a multidisciplinary team, and types of rehabilitation, including exercise, activities of daily living training, and physiotherapy and occupational therapy may account for the limited knowledge (7). In any event, comparability is difficult when trying to justify home-based versus inpatient rehabilitation services. Are home programs effective alternatives to inpatient rehabilitation programs? Do they have an impact on post-stroke mortality and morbidity as well as recovery, which is the main goal of rehabilitation? Can we estimate peri-treatment mortality and morbidity when choosing the therapy? These questions are still unanswered in the literature.

Hence, this study was designed aiming to evaluate whether home-based rehabilitation is as effective as inpatient rehabilitation following acute stroke as well as to estimate peri-treatment mortality and morbidity when deciding on a rehabilitation program.

MATERIAL AND METHODS

Patients

The present study examined 101 patients who had a stroke diagnosis, aged between 18 and 80 years, and had a first-ever ischemic stroke between January 1, 2018 and June 1, 2019 were included in this study. Patients who were discharged from the neurology outpatient clinic and referred to the stroke outpatient clinic or who were referred to the inpatient rehabilitation clinic within the first month (≤30 days) after the completion of their acute treatment in the intensive care unit or acute neurology were included.

Patients with; stroke onset >30 days, hypoxic anoxic brain damage, traumatic-non-traumatic intracranial hemorrhage, known pre-existing dementia/Alzheimer's disease and/or severely impaired cognitive function, known progressive neurological disease or peripheral nerve involvements such as polyneuropathy, decompensated heart disease and/or severe bleeding diathesis, severe hepatic or renal failure, history of psychiatric disease or malignancy, trauma, fracture, fixed joint contracture, amputation or phlebitis at the affected side and medical complications causing interruption of rehabilitation program more than 1/week, were excluded from the study.

101 patients who met the inclusion and exclusion criteria were included in the study. 42 patients were (intervention group) referred to the inpatient treatment unit and 59 patients

admitted to the stroke outpatient clinic (control group) were evaluated for the study. During the study, ; 14 patients who were included in an intervention (inpatient rehabilitation) group were excluded from the stud since less than 4 weeks of inpatient therapy is given. Twenty-three patients in the control group (home-based rehabilitation program) were excluded from the study because they were admitted to another inpatient treatment program.

The study was completed with a total of 64 patients (intervention group, n: 28, control group, n: 36) **(Figure 1)**.

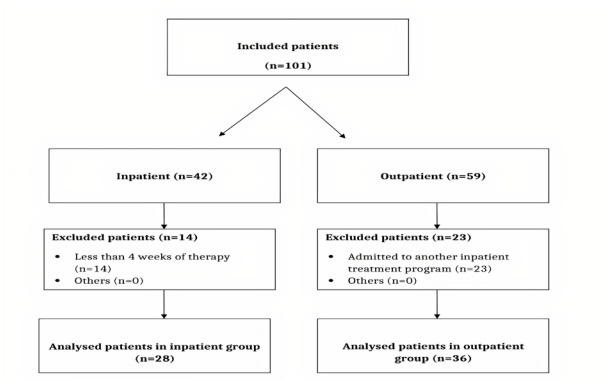

Figure1: Flow Chart

The patients and their relatives (at least one of their family members/relatives) were informed about the study and their written consents were obtained. The study was conducted in accordance with the Declaration of Helsinki Criteria.

Demographic Characteristics

Demographic features of the patients including age, gender and educational status were recorded.

Disease Characteristics

The length of stay in the intensive care unit or neurology clinic (days), hemiplegic side, and stroke classification were recorded. The stroke classification system we used is was the Bamford's classification Bamford's classification relies exclusively on clinical findings to classify the stroke according to the brain territory involved. This clinical tool categorizes stroke syndromes into 4 subtypes: total anterior circulation infarcts (TACI), partial anterior circulation infarcts (PACI), lacunar infarcts (LACI), and posterior circulation infarcts (POCI) (8).

The Brunnstrom stages of motor recovery were applied to assess motor function. Brunnstrom is a six-stage evaluation tool with three different parts concerning the upper extremity, hand, and lower extremity (Stages 1–6, 1: no activity of the limb; 2: spasticity appears, and weak basic flexor and extensor synergies are present; 3: spasticity is prominent; muscle activation is all within the synergy patterns; 4: patient begins to activate muscles selectively outside the flexor and extensor synergies; 5: spasticity decreases; most muscle activation is selective and independent from the limb synergies; 6: isolated movements in smooth, well-coordinated manner) (9).

The Stroke Impact Scale (SIS) used in the study is a stroke-specific outcome measurement tool. SIS is a 59-item stroke-specific measure of function. The SIS consists of eight domains: strength, hand function, instrumental activities of daily living, mobility, communication, memory, emotion and thinking, and social participation. Each item is scored from 'not difficult at all' to 'cannot do at all' on a 5-point scale. (10) The reliability and validity of the Turkish version of the SIS were conducted by Hantal et al. (11).

Functional disability was assessed with the Functional Independence Measure (FIM). FIM provides a measure of disability and an indication of independence in activities of daily living by assessing cognitive and motor functioning. The FIM consists of 18 items that are scored on a 7-points scale, with higher scores indicating a greater level of independence (1=total assistance, 7=total independence; total=126) (12).

Inpatient Rehabilitation / Home-Based Rehabilitation

Patients for inpatient rehabilitation treatment, defined as the intervention group, were hospitalized for 4 weeks and then given a home program for 8 weeks. Patients for the outpatient stroke unit, defined as the control group, were given a 12-week home program.

The Inpatient Rehabilitation Program (intervention group)

included; a range of motion, flexibility, stretching, strengthening, walking, balance, activities of daily living exercises for at least 60 minutes per day, 5 days per week, for 4 weeks, and

electrical stimulation to the required muscles. The patients were discharged from the hospital after 4 weeks of inpatient rehabilitation treatment, and these patients were given an 8-week home program.

Home-Based Rehabilitation Programs

Included the same exercise program (range of motion, flexibility, stretching, strengthening, walking, balance, activities of daily living exercises) for at least 60 minutes per day, 5 days per week, for 12 weeks. The exercise program was explained by the same physiotherapist on the first day to the control group, who was only included in the home-based program.

In order to control the exercise compliance of the patients, they were asked to create a chart where they could mark whether they did daily exercises or not. Both groups were called once a week for control and the accuracy of the exercises was confirmed under the supervision of the same physiotherapist.

The Study protocol and Comparisons

Brunnstrom motor stages, FIM total score, and SIS scores of all patients were recorded before treatment and after 12 weeks by the same physician. Both groups (inpatient/home-based rehabilitation) were compared in terms of these parameters.

In addition, the presence of any morbidity (new SVO or re-hospitalization due to clinical problems) and mortality were recorded during this period. Then, patients with mortality/morbidity were grouped separately; those who received a home-based program and those who received an inpatient program were compared in terms of evaluation parameters.

Ethical Committee

Ethics committee approval of the study was obtained from the Ethics Committee of Diskapi Research and Training Hospital with the date of 16.02.2015 and the number of 20/01.

Statistical Analysis

Data analyses were performed by Statistical Package for the Social Sciences (SPSS) 22.0 for Windows. The Shapiro Wilk test was used to determine if they were different from the normal distribution and descriptive statistics were described as median (minimum-maximum) for continuous variables and frequencies and percentages (%) for nominal variables. Statistically significant differences in repeated measurements within group 2 were evaluated with the Wilcoxon Signed Rank test. Parameters were compared between groups with the Mann-Whitney U test and among the groups with the Kruskal Wallis test and $p<0.05$ scores were accepted as significant.

RESULTS

The median age of patients was 68.5 years (range 49-78 years), and 51.56% were male. Twenty-eight (43.75%) of patients were receiving inpatient rehabilitation program and thirty-six (56.25%) were receiving a home-based exercise program.

Demographic and disease characteristics of both groups were similar ($p> 0.05$) **(Table 1)**.

Table 1: The distribution and comparison of demographic/disease characteristics according to the groups

Evaluated parameters	Home exercise group n=36	Inpatient group n=28	p values
Gender n(%)			
Female	16 (44.44)	15 (53.57)	0.477
Male	20 (55.56)	13 (46.43)	
Age (years) median (Min-max)	69.50 (49-78)	67.50 (56-77)	0.158
Education n(%)			
5 years	18 (50)	18 (64.29)	
8 years	10 (27.78)	4 (14.29)	0.223
11 years	3 (8.33)	3 (10.71)	
More than 11 years	5 (13.89)	3 (10.71)	
Hemiplegic Side n (%)			
Right	22 (61.11)	21 (75)	0.324
Left	14 (38.89)	7 (25)	
Bamford Classification n (%)			
Total anterior	24 (66.67)	17 (60.71)	
Partial anterior	4 (11.11)	6 (21.43)	0.564
Lacunar	2 (5.55)	1 (3.57)	
Posterior	6 (16.67)	4 (14.29)	
Length of Stay (day) median (Min-max)	7.50 (4-14)	10 (1-18)	0.057

** Min-max: minimum-maximum, A value of $p<0.05$ was considered statistically significant.

In the inpatient group, limb motor functional scores and functional disability scores were lower. In terms of quality of life; emotion, communication, and memory subscale scores were similar and other quality of life scores were lower in the inpatient rehabilitation group **(Table 2)**.

Table 2: Distribution and comparison of results of quality of life and functional disability of groups in before therapy

Evaluated parameters median (min-max)	Home exercise group n=36	Inpatient group n=28	p values
Brunnstrom stage (1-6)			
Hand	6 (1-6)	1 (1-6)	**0.001***
Upper extremity	6 (1-6)	1 (1-6)	**0.001***
Lower extremity	6 (1-6)	2 (1-6)	**0.001***
FIM Total score (18-126)	90 (22-126)	64 (36-93)	**0.003***
SIS (0-100)			
Strength	82.50 (20-100)	9.37 (0-87.50)	**0.001***
Hand Function	67 (20-100)	5 (0-60)	**0.001***
Mobility	63 (20-100)	6.90 (0-72.20)	**0.001***
DLA	73 (20-100)	20 (15-50)	**0.001***
Memory	71.50 (0-100)	80.30 (53.50-100)	0.813
Communication	80.50 (0-100)	69.60 (28.50-100)	0.091
Emotion	58 (0-100)	45.80 (22.20-83.30)	0.272
Social participation	39 (20-100)	3.10 (0-68.70)	**0.001***
Physical domain**	72 (10-90)	10 (0-60)	**0.001***

**Min-max: minimum-maximum; FIM: Functional Independence Measure; SIS: Stroke Impact Scale; DLA: daily activity of living. **physical domain occurs combination strength, hand function, activities of daily living, and mobility. A value of $p<0.05$ was considered statistically significant.

At the end of the 12th week, 5 (13.89%) of the 36 patients (home-based program) died, and another 5 (13.89%) had developed a new cerebrovascular disease. Therefore, 12th week controls were completed with 26 patients in the home-based rehabilitation group.There was no increase in mortality and morbidity within the intervention group.

In 26 patients who received a home exercise program, the change in the 12th week scores was not significant, but the improvement in all quality of life subscales was significant in the inpatient group, except for the memory and emotion subscales **(Table 3)**.

Table 3: Comparison of the results before and after treatment according to the groups

Parameters median (min-max)	Home exercise group n=26			Inpatient group n=28		
	Before therapy	12th week	p	Before therapy	12th week	p
FIM Total score (18-126)	93 (22-126)	90 (18-126)	0.362	64. (36-93)	84 (56-102)	0.017
SIS						
Strength	87.50 (20-100)	95 (0-100)	0.098	9.37 (0-87.50)	53.10 (6.20-100)	0.001*
Hand Function	68 (20-100)	78 (0-100)	0.709	5 (0-60)	12.50 (0 -85)	0.016*
Mobility	66.50 (20-100)	88 (0-100)	0.052	6.90 (0-72.20)	47.20 (19.40-88.80)	0.001*
DLA	73 (20-100)	77 (0-100)	0.904	20 (15-50)	31.25 (17.50-85)	0.025*
Memory	75.50 (0-100)	90 (0-100)	0.274	80.30 (53.50-100)	89.20 (60.70-100)	0.158
Communication	84.50 (0-100)	100 (0-100)	0.188	69.60 (28.50-100)	89.20 (46.40-100)	0.021*
Emotion	60 (0-100)	60 (0-100)	0.996	45.80 (22.20-83.30)	52.75 (27.70-88.80)	0.164
Social participation	40 (20-88)	58 (0-100)	0.156	3.10 (0-68.70)	32.75 (9.30-93.70)	0.001*
Physical domain**	75 (10-90)	80 (0-100)	0.302	10 (0-60)	50 (20-90)	0.001*

** Min-max: minimum-maximum; FIM: Functional Independence Measure; SIS: Stroke Impact Scale; DLA: daily activity of living. **physical domain occurs combination strength, hand function, activities of daily living, and mobility. A value of p<0.05 was considered statistically significant.

Improvement was more significant in the group who received inpatient treatment with regard to functional disability and quality of life **(Table 4)**.

Table 4: Distribution and comparison of results of quality of life and functional disability of groups in change with therapy

Evaluated parameters median (min-max)	Home exercise group n=26	Inpatient group n=28	p
FIM total score (18-126)	0 (-6-111)	15 (3-46)	**0.001***
SIS (0-100)			
Strength	0 (-20-100)	25 (0-56.25)	**0.001***
Hand Function	0 (-32-80)	11.50 (0-55)	**0.001***
Mobility	1 (-52-91)	36.15 (13.90-66.70)	**0.001***
DLA	5 (-20-80)	13.75 (2.50-42.50)	**0.015***
Memory	0 (-60-100)	10.75 (7.20-25)	**0.012***
Communication	0 (-17-100)	17.80 (0-39.30)	**0.003***
Emotion	0 (-33 -67)	6.95 (13.90-25)	**0.025***
Social participation	5 (-40 -40)	23.45 (9.30-56.20)	**0.004***
Physical domain**	0 (-20-90)	40 (20-55)	**0.001***

**Min-max: minimum-maximum; FIM: Functional Independence Measure; SIS: Stroke Impact Scale; DLA: daily activity of living. **physical domain occurs combination strength, hand function, activities of daily living, and mobility. A value of p<0.05 was considered statistically significant.

A comparison of 10 patients with increased mortality and morbidity in inpatient and home-based rehabilitation program groups is shown in **(Table 5)**.

Table 5: Distribution and comparison of results of quality of life and functional disability of home exercise, inpatient and mortality-morbidity groups before therapy

Evaluated parameters median (min-max)	Home exercise group n=26	Inpatient group n=28	Mortality/mobidity group n=10	p			
				Among groups	Home-IP	Home-MM	IP-MM
FIM Total score (18-126)	93 (22-126)	64 (36-93)	66.20 (43-126)	0.011*	0.001*	0.003*	0.891
SIS (0-100)							
Strength	87.50 (20-100)	9.37 (0.-87.50)	80 (60-100)	0.005*	0.001*	0.495	0.001*
Hand Function	68 (20-100)	5 (0-60)	65 (20-100)	0.001*	0.001*	0.782	0.001*
Mobility	66.50 (20-100)	6.90 (0-72.20)	55.50 (20-100)	0.001*	0.001*	0.789	0.001*
DLA	73 (20-100)	20 (15-50)	65 (20-100)	0.001*	0.001*	0.817	0.001*
Memory	75.50 (0-100)	80.30 (53.50-100.)	55 (0-100)	0.001*	0.193	0.038*	0.001*
Communication	84.50 (0-100)	69.60 (28.50-100)	55.50 (0-100)	0.001*	0.171	0.001*	0.033*
Emotion	60 (0-100)	45.80 (22.20-83.30)	24.50 (0-78)	0.001*	0.390	0.001*	0.025*
Social participation	40 (20-88)	3.10 (0-68.70)	20 (0-100)	0.001*	0.001*	0.026*	0.004*
Physical domain**	75 (10-90)	10 (0-60)	45 (30-90)	0.001*	0.001*	0.018*	0.016*

**Min-max: minimum-maximum; FIM: Functional Independence Measure; SIS: Stroke Impact Scale, DLA: daily activity of living; IP: inpatient group, MM: Mortality/morbidity group. **physical domain occurs combination strength, hand function, activities of daily living, and mobility. A value of p<0.05 was considered statistically significant.

DISCUSSION

Most stroke patients experience persistent difficulty with daily tasks as a direct consequence of stroke. It has been reported that 2/3 of stroke patients were receiving acute and post-acute rehabilitation services (13). Despite advances in modern medicine, most stroke patients remain with residual functional deficits. It causes a serious economic burden worldwide and is a global epidemic problem (14). It has been reported that inpatient stroke rehabilitation programs increase the burden and cost of illness (15). Therefore, implementing home based rehabilitation programs instead of inpatient rehabilitation services may provide a serious economic benefit. Based on this hypothesis, in the present study; home-based stroke rehabilitation after accelerated hospital discharge and early inpatient stroke rehabilitation were investigated with a broad spectrum of outcomes, such as death, readmissions to hospital, health-related quality of life and functional disability.

In the literature, the results of home based rehabilitation programs are contradictory. Some studies examined the effects of home-based rehabilitation on the functional outcome of patients with stroke. Björkdahl et al. reported benefits in physical function, balance, and walking after three different models of stroke rehabilitation such as early supported discharge in a day unit or at home, and traditional treatment (16). Chi et al., a meta-analysis of data from 49 studies showed that performing home-based rehabilitation can exert moderate improvements in physical function in home-dwelling patients

with a stroke (6). However, it has been shown to be ineffective in some studies (17). In a randomized, controlled trial, forty-two patients received early hospital discharge and home-based rehabilitation, and forty-four patients continued with conventional rehabilitation care after randomization. Anderson et al. have reported although patients received multidisciplinary home-based rehabilitation that was specifically targeted toward their individual needs, the program had no significant impact on their general health or physical or psychological outcomes and the program had an adverse impact on caregivers (17).

As a result of our work, improvements were significantly greater in patients receiving inpatient rehabilitation than home-based rehabilitation patients in the motor recovery and functional disability areas as well as the stroke impact scores. In the current study, the change in the 12th -week scores was not significant among the home exercise group, but the improvement in all quality of life subscales was significant in the inpatient group, except for the memory and emotion subscales. Despite these results, according to our general knowledge, patients with stroke have more spontaneous recovery in the first 3 months. Even if we do not give inpatient treatment to some of our patients, we may think that they will recover on their own. Unfortunately, it is not possible to distinguish between them as of now. However, studies in the literature reported that early rehabilitation increases cortical reorganization and neural plasticity, as in our study. (18). In addition, 5 (13.89%) of the 36 patients (home exercise program) died, and another 5 (13.89%) had developed a new cerebrovascular disease at the end of 12th week. Mortality rates from inpatient data did not increase during the 12 weeks. In addition, there were no complications secondary to treatment in inpatient patients. In the literature, although the rates vary regionally, the early period of stroke is the period with the highest mortality and morbidity (19). We think that inpatient treatment in the early period may be necessary due to the neural plasticity effect of the treatments given in this period and the chance to intervene in medical problems that may cause possible mortality and morbidity. Because although we included medically stabilized patients in our study, morbidity and mortality may increase secondary to the treatments applied to the patients, immobilization, or intervening infections during the post-stroke period (20).

To the best of our knowledge, our study is one of the first in the literature to show the difference in morbidity and mortality between two home-based and inpatient rehabilitation programs. In our study, treatment at the rehabilitation center was found to be more effective, but an important point is the early treatment.

In the studies carried out, it was found that the majority of patients with stroke were not eligible for early supported discharge due to disease severity, and discharge home was not realistic because of the disability severity (21). Adversities are often unrecognized during hospitalization and may only become evident after returning home. Moreover, the home-based rehabilitation program did achieve early discharge from the hospital and a marked reduction in the total length of stay. According to our results, the median length of hospital stay was 7.50 days and it was compatible with the literature (22). Another interesting result of our work is lower values on communication, emotion and social participation domains of the SIS in the patients who developed mortality and morbidity than that for both groups.

Lima et al. described an inversely proportional relationship between the severity of the stroke, disability and QoL. They found that QoL (the most affected domains were as follows: Work/ Productivity, Social Roles, Personality, Energy and Family Roles) was negatively correlated with the values of the Rankin and NIHSS scales (23). The NIHSS (National Institutes of Health Stroke Scale). total score was significantly associated with only the family role subscale of the 15 HRQoL (Health-related quality of life) subscales and total scores under investigation in another study (24).

On the other hand, Törnbom et al. investigated the self-assessed physical, emotional, and cognitive impact of stroke and associations of participation and stroke severity in the early stage and they found that participants with a more severe stroke perceived greater problems and

scored lower on all domains of the SIS, although scores of the emotion, memory, thinking and communication domains were high regardless of stroke severity (25).

To better manage difficult clinical encounters, the physician needs to identify patients who receive inpatient rehabilitation or home-based rehabilitation. We need to implement home-based rehabilitation programs for patients who can and will engage and benefit. Further studies are needed to define patients who may specifically benefit from the home rehabilitation program. Additionally, future research aimed to facilitate social participation and communication can be beneficial to improve the mortality and morbidity rate of stroke patients.

The present study has limitations. We think that our most important limitation is the small sample size. Unfortunately, it was not possible to increase the number because the same program was applied to all patients by the same physiotherapist in order to ensure homogeneity and there was a long follow-up period of 90 days with weekly follow-ups. In addition, home-based rehabilitation is inappropriate for patients with severe disabilities. Therefore, participants with poor physical functioning were included in the inpatient group. As the functional disability and quality of life scores before the treatment were not similar between the groups, it may have affected the rate of improvement among the treatment of groups. Registrations of activities among home-based group patients were not performed between baseline and 90 days post-stroke. The frequency of daily training may differ among patients, which may be considered another limitation.

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