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Original Article

The Assessment of Stroke Patients Using the Functional Independence Measurement Scale

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ABSTRACT

Background: The objectives of this study are; evaluating hemiplegic patients using the "Functional Independence Measurement Scale (FIM)", assessing the long-term daily life activities of patients receiving and not receiving rehabilitation based on FIM scale, emphasizing the prognostic importance of functional status assessment, and establishing the routine use of this scale in our clinic.

Material and Methods: The study conducted at Şişli Etfal Hospital used the Functional Independence Measurement Scale (FIM) to assess the functional independence of patients with cerebrovascular hemorrhage or ischemia. The patients were evaluated at different time points, including admission, discharge, and six months after the event. The FIM scale consists of 18 items in six categories, and each item is evaluated based on specific criteria. The study aimed to assess the effectiveness of a conventional rehabilitation program on the functional independence of the patients. $p<0.05$ was assumed statistically significant at 95% CI.

Results: The study suggests that patients who received rehabilitation showed significant motor function improvement over time compared to those who did not receive rehabilitation. There was a strong correlation between the motor function status achieved after 6 months and the rehabilitation program. In the non-rehabilitation group, significant gains in motor function were observed during the initial period of the disease and the subsequent home control, but no significant change was seen between discharge and the 6-month home control ($p>0.05$).

Conclusion: The results indicated that patients who received rehabilitation showed significant improvements in motor function over time, and these improvements were greater compared to the non-rehabilitation group. The age, gender, and etiological cause of the stroke did not significantly affect the functional outcomes.

Keywords: OSAS, thyroid, BMI, hypothyroidism

INTRODUCTION

The prevalence of chronic diseases with long-term consequences presents significant medical and socio-economic challenges in today's society. Among these conditions, cerebrovascular events (CVEs) stand out as one of the most severe globally, ranking as the third leading cause of death after cardiovascular diseases and cancer (1). As a result, there is a growing body of research aimed at optimizing the functional outcomes for patients who have experienced cerebrovascular events.

In the United States, CVEs hold the utmost urgency and frequency among all neurological disorders in adults and rank as the third most common cause of death (2). Surprisingly, nearly 29.6% of these patients fall below the age of 65, with 25.9% belonging to the 45-65 age group (3, 4).

Functional assessment plays a crucial role in measuring the extent to which individuals utilize their skills in various aspects of daily life, including work, leisure activities, social relationships, and other essential situations. By employing functional performance assessment measures, healthcare professionals can determine the patient's level of functioning upon admission and discharge. These measures also allow for the analysis of rehabilitation program effectiveness, goal attainment, and goal setting. Furthermore, they facilitate the identification of the patient's developmental process, evaluation of the rehabilitation program, as well as the identification of the patient's needs, goals, and achieved level of functioning.

In light of the aforementioned factors, the objectives of this study are as follows:

- To assess hemiplegic patients admitted to our neurology department between November 1993 and March 1994, following cerebrovascular events,

using the "Functional Independence Scale."
- To mathematically express and monitor the long-term daily life activities of patients receiving rehabilitation and those not receiving rehabilitation based on this assessment.
- To underscore the prognostic significance of functional status assessment.
- To establish the routine utilization of this scale in our clinic.

This study aims to provide a clear research direction and contribute to the field of functional assessment in patients recovering from cerebrovascular events.

MATERIALS AND METHODS

This study was conducted between November Şişli Etfal Education and Training Hospital, Physical Therapy and Rehabilitation Clinic, Istnabul. A total of 25 patients presenting with cerebrovascular hemorrhage or ischemia were included in the study.

Patients were evaluated using the Functional Independence Measurement Scale (FIM-1) within the first 72 hours of admission to our neurology department. During this assessment, a brief medical history was taken, risk factors were identified, and a general physical examination was performed. In addition to hemiplegia, any existing systemic diseases, thrombophlebitis, gastrointestinal problems, cataracts, nephropathy, oncological history, benign prostatic hyperplasia, epilepsy, congenital hip dislocation, bronchitis, and decubitus ulcers were recorded, along with the medications they were currently taking, including cardiovascular regulators, antiplatelets, antihypertensives, anticonvulsants, antidiabetic drugs, diuretics, bronchodilators, and oral anticoagulants.

Patients continued to receive treatment in the Neurology Department until they were medically stable. Upon completion of treatment in this department, the patients were divided into two groups: some were transferred to the Physical Medicine and Rehabilitation Department of the same hospital, while others were discharged home. Patients discharged and sent home and those transferred to the physical therapy department were subjected to a second scoring on the same day (FIM-2).

Patients who underwent a conventional rehabilitation program for an average of 4.7 weeks, five days a week, were assessed for a third time on the day of discharge (FIM-3).

All included patients were individually visited and re-evaluated in their homes six months after the cerebrovascular event (FIM-4).

The study did not include patients with muscle strength of 2/5 or higher in their upper and lower extremities, those with a poor overall condition, and those residing outside Istanbul and unable to attend the six-month follow-up.

Inclusion Criteria:
- Patients presenting with cerebrovascular hemorrhage or ischemia.
- Patients evaluated using the Functional Independence Measurement Scale (FIM-1) within the first 72 hours of admission to the neurology department.
- Patients with hemiplegia and existing systemic diseases, except thrombophlebitis, gastrointestinal problems, cataracts, nephropathy, oncological history, benign prostatic hyperplasia, epilepsy, congenital hip dislocation, bronchitis, and decubitus ulcers.
- Patients taking medications, including cardiovascular regulators, antiplatelets, antihypertensives, anticonvulsants, antidiabetic drugs, diuretics, bronchodilators, and oral anticoagulants.
- Patients who receive treatment in the Neurology Department until medically stable.
- Patients who are either discharged home or transferred to the Physical Medicine and Rehabilitation Department of the same hospital.
- Patients who undergo a conventional rehabilitation program for an average of 4.7 weeks, five days a week.
- Patients who can attend the six-month follow-up evaluation.

Exclusion Criteria:
- Patients with muscle strength of 2/5 or higher in their upper and lower extremities.
- Patients with a poor overall condition
- Patients residing outside Istanbul and unable to attend the six-month follow-up.

Evaluation

All the patients included in the study were divided into two groups, and those undergoing rehabilitation programs were evaluated four times using the FIM, while the other group was evaluated three times.

Functional Independence Measure is a measurement tool used to assess limitations in functions using scales. It has been found to be quite useful in determining the type and amount of services needed by disabled individuals. Assessing the level of independence in basic activities of daily living for any disabled person is essential for designing an effective rehabilitation program. Such a criterion should be highly standardized. Previously, the Barthel Index was commonly used for this purpose. However, the FIM, proposed by the American Physical Therapy and Rehabilitation Academy and the Rehabilitation Congress of America in 1986, gained significant attention and started to be used in the field of medical rehabilitation. FIM has the advantage of evaluating not only physical disability but also cognitive functions. It can be considered as a comprehensive disability index. It consists of 18 items in six categories (Table 1).

Within these six categories, there are separate evaluations, resulting in 18 different item options. FIM is divided into two subgroups: motor and cognitive, and it provides a total score. The scoring ranges from 1 to 7, resulting in a total score ranging from 18 to 128.

Table 1. FIM indicates six functional status

1	Self-care activities	Eating, personal grooming, bathing, upper extremity dressing, lower extremity dressing, toileting, bladder and bowel control
2	Sphincter control	Bladder control, bowel control
3	Transfers	Bed, chair, and wheelchair transfers, toilet transfers, shower, tub bench transfers
4	Locomotion	Walking, wheelchair use, stair climbing
5	Communication	Understanding, expression,
6	Social cognition	Problem-solving, social interaction, memory

The motor group represents the sum of the first four items, which are self-care, sphincter control, transfers, and locomotion. As these four items have 13 sub-features, the maximum score for this group is 91, and the minimum score is 13. The cognitive group represents the sum of the last two items, which are communication and social cognition. It includes five different features. Its impact on the total score ranges from a maximum of 35 to a minimum of 5.

FIM Scale Evaluation

Eating: Evaluates the ability to bring properly prepared food to the mouth, chew, and swallow. Opening canned goods, cutting meat, spreading butter on bread, serving water, and similar actions are not included in the evaluation.

This evaluation assesses oral care, hair care, washing of hands and face, and shaving or applying makeup.
1.Independent - A) (**7 scores**) Eats from a regular plate and drinks from a regular cup or glass, can eat using a regular knife, fork, or spoon, B) (6 scores) can eat with modified utensils (e.g., adaptive cutlery) or takes longer than usual to complete the eating process, if the person is receiving parenteral nutrition, they can prepare it themselves.
2.Assisted- A) (5 scores) Requires assistance (e.g., standing by, giving verbal cues, praising for the task, preparing orthoses used during eating), B) (4 scores) can perform 75% or more of the task, C) (3 scores)can perform 50-74% of the task, D) (2 scores)can perform 25-49% of the task, or if the person cannot take food orally for any reason and is receiving nutrition through parenteral or gastrostomy route, they can prepare it themselves, E) (1 score)can perform 25% or less of the task, if the person receives nutrition through the parenteral or gastrostomy route.

Self-Care: This evaluation assesses oral care, hair care, washing of hands and face, and shaving or applying makeup.
1.Independent- A) (7 scores) Performs dental and gum care, brushes or combs hair, washes face and hands, shaves or applies makeup, and completes all preparations independently, B) (6 scores) can perform these tasks using special tools such as orthoses and prostheses or takes longer than usual to complete them.
2.Assisted- A) (5 scores) Requires assistance (e.g., standing by, giving verbal cues, praising for the task) or preparing orthoses used during self-care, using specially adapted self-care tools, or performing pre-task preparations such as applying toothpaste on a toothbrush or opening makeup containers, B) (4 scores) can perform 75% or more of the task, C) (3 scores) can perform 50-74% of the task, D) (2 scores) can perform 25-49% of the task, E) (1 score) can perform 25% or less of the task.

Bathing: Assesses washing of the entire body from the neck down, excluding the back. This function can be performed in a bathtub, shower, or by sponge bathing in bed.
1.Independent- A) (7 scores) Can bathe and dry off independently, B) (6 scores) can bathe using special tools or takes longer than usual, or requires extra caution.
2.Assisted- A) (5 scores) Requires assistance (e.g., standing by, giving verbal cues, praising for the task) or preparing orthoses used during bathing, preparing specialized self-care tools, or performing pre-task preparations such as preparing water or setting up bathing tools, B) (4 scores) can perform 75% or more of the task, C) (3 scores) can perform 50-74% of the task, D) (2 scores) can perform 25-49% of the task, E) (1 score) can perform 25% or less of the task.

Dressing (upper body): This refers to dressing the upper part of the body, including the act of dressing and, if applicable, removing and putting on orthoses and prostheses.
1.Independent- A) (7 scores) Can dress and undress, retrieve clothing from typical locations (such as a closet or drawer), put on a bra, use overhead or front-zip garments, handle zippers, buttons, and snaps, and put on and take off orthoses and prostheses if applicable, B) (6 scores) may require special tools such as Velcro or take longer than usual to dress.
2.Assisted- A) (5 scores) Requires assistance (e.g., standing by, giving verbal cues, praising for the task) or preparing orthoses, special dressing tools, or garments, B) (4 scores) can perform 75% or more of the task, C) (3 scores) can perform 50-74% of the task, D) (2 scores) can perform 25-49% of the task, E) (1 score) can perform 25% or less of the task.

Dressing (lower body): Scoring the same as upper body dressing

Going to the Toilet: This evaluation assesses the ability to perform perineal hygiene, and manage clothing before and after toilet use, or after using a bedpan.
1.Independent- A) (7 scores) Can clean themselves after urination and defecation, insert sanitary pads or tampons, and manage their clothing after toilet use, B) (6 scores) may require special devices, take longer than usual, or need to be very cautious.
2.Assisted- A) (5 scores) Requires assistance (e.g., standing by, giving verbal cues, praising for the task) or preparing orthoses, special dressing tools, or garments, B) (4 scores) can perform 75% or more of the task, C) (3 scores) can perform 50-74% of the task, D) (2 scores) can perform 25-49% of the task, E) (1 score) can perform 25% or less of the task.
COMMENT: If the person requires assistance in using sanitary pads for menstrual periods (3-5 days per menstruation), the evaluation level would be 5 (under supervision or assistance with preparation).

Bladder Control: This evaluation assesses independent control of the bladder or the use of agents and tools to maintain control.
1.Independent- A) (7 score) No urinary incontinence occurs, and there is complete control, B) (6 score) requires the use of a catheter, urinary bag, or medication for control. If the person uses a catheter, they can independently insert, remove, clean, sterilize, and prepare it for reuse. If the individual uses a device, such as a condom catheter or an ileal device, they can independently apply, remove, empty, clean, or empty their leg bag. There are no accidents during these procedures.
2.Assisted- A) (5 score) Requires assistance (e.g., standing by, giving verbal cues, praising for the task) or experiences occasional urinary leakage due to time constraints in achieving satisfactory emptying or reaching the toilet. However, this occurs less than once a month, B) (4 score) minimal assistance is needed from external support. The person can perform 75% or more of the tasks independently but may experience occasional urinary leakage, not exceeding more than once a week, C) (3 scores) moderate assistance is required. The patient can perform 50-74% of the process of urination independently. There may be instances of urinary leakage, but it should not exceed once a day, D) (2 score) significant assistance is required. Despite the assistance, the patient frequently wets themselves. Bed pads or diapers should be used to absorb the urine or provide the patient with pads. In such cases, perineal care or catheterization is recommended, with or without these measures. The person can achieve 25-49% control of urination, E) (1 score) full assistance is required. Despite

the assistance, the patient frequently wets themselves. Bed pads or diapers should be used to absorb the urine or provide the patient with pads. In such cases, perineal care or catheterization is recommended, with or without these measures. The person has 25% or less control over urination.

Rectal Control: This evaluation assesses independent control of the rectum or the use of agents and tools to maintain control.
1.Independent-A) (7 scores) Complete control without any accidents, B) (6 scores) uses digital stimulation, various softeners, suppositories, laxatives, or medications to facilitate bowel movements. If the person has a colostomy, this is continued. There are no accidents.
2.Assisted- A) (5 scores) To achieve sufficient and satisfactory bowel movements, the establishment of a preparation team or the recommendation of a colostomy is advised. The person may experience occasional fecal incontinence, but it should not occur more than once a month, B) (4 score) requires minimal assistance for adequate bowel movements using suppositories, enemas, or external support. The person can handle 75% or more of the process independently. However, accidents may occur, not exceeding more than once a week, C) (3 score) Requires moderate assistance for adequate bowel movements using suppositories, enemas, or external support. The person can handle 50-74% of the process independently. However, accidents may occur, not exceeding more than once a day, D) (2 score) significant assistance is required. Despite the assistance, the patient frequently soils themselves. Bed pads or diapers should be used to absorb the stool or provide the patient with pads. In such cases, colostomy or rectal catheterization is recommended, with or without these measures. The person can achieve 25-49% control of bowel movements, E) (1 score) full assistance is required. Despite the assistance, the patient frequently soils themselves. Bed pads or diapers should be used to absorb the stool or provide the patient with pads. In such cases, colostomy is recommended. Rectal control is 25% or less.

Bed, Chair, Wheelchair: This assessment includes transfers from bed to chair, chair to wheelchair, and other transfers from a wheelchair, as well as the ability to stand upright in the typical walking mode.
1.Independent- A) (7 scores) If the individual can walk: They can ambulate, sit, and transition from a regular chair to a standing position. They can also transfer from bed to chair. All these tasks are performed safely, B) (6 scores) if the individual is in a wheelchair: They approach the desired chair, lock the brakes, raise footrests, and, if necessary, armrests. They sit, slide to another location, and can return safely.
2.Assisted- A) (5 scores) Assistance is required (e.g., standing nearby, providing verbal commands, praising after the task) or preparations need to be made, such as placing a sliding board or lifting the footrest, B) (4 scores) can perform 75% or more of the task, C) (3 scores) can perform 50-74% of the task, D) (2 scores) can perform 25-49% of the task, E) (1 score) can perform 25% or less of the task.

Toilet: This assessment evaluates the individual's ability to independently perform their toilet needs and return to their normal state afterward.
1.Independent- A) (7 scores) If the individual is in a wheelchair: They approach the toilet, lock the brakes, raise footrests, and, if necessary, armrests. They sit upright, slide to another location, and can return safely, B) (6 scores) if the individual can walk: They can approach the toilet, sit down, and stand up from a standard-height toilet. They perform all these tasks safely.
2.Assisted- A) (5 scores) Assistance is required (e.g., standing nearby, providing verbal commands, praising after the task) or preparations need to be made, such as placing a sliding board or lifting the footrest, B) (4 scores) can perform 75% or more of the task, C) (3 scores) can perform 50-74% of the task, D) (2 scores) can perform 25-49% of the task, E) (1 score) can perform 25% or less of the task.

Shower, Shower Chair: This assessment evaluates the individual's ability to enter and exit a bathtub or shower tray.
1.Independent- A) (7 scores) If the individual can walk: They can approach the bathtub or shower tray, enter and exit safely, if the individual is in a wheelchair: They approach the bathtub or shower, lock the brakes, raise footrests, and, if necessary, armrests. They sit upright, slide to another location, and can return safely, B) (6 scores) The individual uses a sliding board, lever, safety belt, or a specially designed seat. They can perform the task over an extended period or with great caution.
2.Assisted- A) (B) (5 scores)) Assistance is required (e.g., standing nearby, providing verbal commands, praising after the task) or preparations need to be made, such as placing a sliding board or lifting the footrest, B) (4 scores) can perform 75% or more of the task, C) (3 scores) can perform 50-74% of the task, D) (2 scores) can perform 25-49% of the task, E) (1 score) can perform 25% or less of the task.

Locomotion (Walking, Wheelchair Use): This assessment evaluates the individual's ability to walk, stand upright, or use a wheelchair in an upright position within the home.
1.Independent- A) (7 scores) The individual walks at least 150 feet without any assistance. They do not use a wheelchair and it is safe, B) (6 scores) The individual walks up to 150 feet with the use of orthotics, a prosthetic leg, specially designed shoes, a cane, or a walker. They take longer than the normal time to complete the task and need to be very cautious, C) (5 scores) exceptional mobility within the home: The individual walks at least 50 feet without assistance, with or without an assistive device. They take longer than normal to complete the task or can use a powered wheelchair for at least 50 feet without assistance.
2.Assisted- A) (5 scores) If the individual is walking: They need continuous observation, verbal commands, and praise to walk up to 150 feet. If the individual is in a wheelchair: They need continuous observation, verbal commands, and praise to use the wheelchair to travel up to 150 feet, B) (4 scores) The individual independently accomplishes at least 75% of the task to travel a minimum of 150 feet, C) (3 scores) the individual independently accomplishes 50-74% of the task to travel a minimum of 150 feet, D) (2 scores) the individual independently accomplishes 25-49% of the task to travel a minimum of 50 feet. They require assistance from only one person, E) (1 score) The individual can perform 25% or less of the task, requiring assistance from two people. They cannot walk 50 feet or use a wheelchair.
COMMENT: There are various methods to evaluate the percentage of effort expended. For example, if the individual walks without assistance for the first 75 feet but requires assistance for the next 75 feet, they would be classified as Level 4. If they require continuous assistance throughout the remaining distance, they would be classified as Level 3.

Stairs: This assessment evaluates the individual's ability to go up and down a set of stairs consisting of 12 to 14 steps in a single attempt.
1.Independent- A) (7 scores) The individual goes up and down the stairs at least once without holding onto the railing or any support. They perform this task safely, B) (6 scores) The individual goes up the stairs at least

once while holding onto the railing, using a cane, or with portable support. It takes longer than usual and requires caution, C) (5 scores) exceptional mobility within the home: The individual can go up and down 4 to 6 steps independently with or without an assistive device. They take longer than normal to complete the task.
2.Assisted- A) (5 scores) Under supervision, with verbal commands and praise, the individual can go up and down the stairs in a single attempt, B) (4 scores) the individual can accomplish 75% or more of the stair climbing task independently, C) (3 scores) the individual can accomplish 50-74% of the stair climbing task independently, D) (2 scores) the individual can accomplish 25-49% of the stair climbing task independently. They require assistance from one person, E) (1 score) the individual can perform 25% or less of the stair climbing task and requires assistance from two people. They are unable to go up and down the stairs and need to be carried.

Comprehension: This assessment involves understanding through auditory and visual communication, which refers to comprehending what is being conveyed through spoken or written words.
1.Independent- A) (7 scores) The individual understands spoken and written instructions or complex and abstract conversations, B) (6 scores) The individual struggles to understand spoken and written instructions or complex and abstract concepts. They may require hearing, visual, and other assistive aids and may take a longer time to comprehend the given instructions.
2.Assisted- A) (5 scores) Reminder assistance: The individual understands what is written or spoken about daily events with more than 90% accuracy but may require reminders for less than 10% of the time, B) (4 scores) minimal reminder assistance: The individual understands what is written or spoken about daily events with 75% to 90% accuracy, C) (3 scores) moderate reminder assistance: The individual understands what is written or spoken about daily events with 50% to 75% accuracy, D) (2 scores) Maximal reminder assistance: The individual understands what is written or spoken about daily events with 25% to 49% accuracy. More than half of the time relies on reminders, E) (1 score) fully dependent: The individual understands what is written or spoken about daily events with 25% or less accuracy, or they do not understand or respond correctly even with assistance.

Expressing: This assessment involves expressing the language's clear expression either verbally or silently, which means conveying instructions in the spoken or graphical form appropriately and accurately with proper grammar.
1.Independent- A) (7 scores) The individual expresses complex and abstract ideas skillfully through continuous speech or nonverbal signs or in written form, B) (6 scores) the individual expresses complex and abstract ideas with some difficulty. This may require the use of augmentative communication tools or systems to enhance communication.
2.Assisted- A) (5 scores) This individual expresses basic needs and ideas about daily events with more than 90% accuracy and may require reminders for less than 10% of the time, B) (4 scores) This individual expresses basic needs and ideas about daily events with 75% to 90% accuracy, C) (3 scores) This individual expresses basic needs and ideas about daily events with 50% to 74% accuracy, C) (2 scores) This individual expresses basic needs and ideas about daily events with 25% to 49% accuracy. More than half of the time is spent relying on reminders, E) (1 score) This individual can express basic needs and ideas about daily events with 25% or less accuracy or cannot express them even with reminders.

Social Adaptation: This assessment evaluates the ability to interact with others in therapeutic or social relationships.
1.Independent- A) (7 scores)7- The individual establishes good relationships with staff, fellow patients, and family members (e.g., demonstrates self-control, accepts criticism, is aware of the impact of their words and actions on others), B) (6 scores) The individual establishes appropriate relationships with staff, fellow patients, and family members in certain structured situations or modified environments. They may require an extended period of time for social adaptation. Medication may be utilized to achieve this level.
2.Assisted- A) (5 scores) They require supervision only in tense or unfamiliar situations, such as monitoring through cameras, verbal control, giving commands, or providing various forms of praise. However, no more than 10% of the time should be spent on these interventions, B) (4 scores) The individual adapts to the environment appropriately for 75% to 90% of the time, C) (3 scores) The individual adapts to the environment appropriately for 50% to 75% of the time, D) (2 scores) The individual adapts to the environment appropriately for 25% to 49% of the time. They may require occasional intervention from others, E) (1 score) They can adapt to the environment for 25% or less of the time or may not be able to adapt at all.

Problem-Solving: This assessment measures the ability to solve daily life problems. It involves making logical, safe, and timely decisions considering the financial, social, and personal aspects of the problem, as well as the initiation, outcome, and self-correction processes and activities.
1.Independent- A) (7 scores) Consistently arrives at appropriate decisions. Begins the process and proceeds step by step to solve the problem until completion. If a mistake is made, they self-correct, B) (6 scores) Encounters some difficulty in decision-making and self-correction in unfamiliar situations. Takes longer than necessary for decision-making and problem-solving.
2.Assisted- A) (5 scores) Requires supervision. Only requires supervision for solving problems in tense or unfamiliar situations. However, no more than 10% of the time should be spent on supervision, B) (4 scores) Solves problems for 75% to 90% of the time, C) (3 scores) Solves problems for 50% to 75% of the time, D) (2 scores) 2- Solves problems for 25% to 49% of the time. Requires guidance for more than half of the time, E) (1 score) Solves problems for 25% or less of the time or may not be able to solve problems at all.

Memory: This assessment evaluates the individual's ability to store and utilize information, particularly in verbal and visual forms. It assesses the recognition of being a part of society. A memory error can hinder both the storage and retrieval of information.
1.Independent- A) (7 scores) Easily recognizes familiar people, remembers daily routines, and fulfills others' requests without the need for repetition, B) (6 scores) Encounters difficulty in recognizing people, remembering daily routines, and fulfilling others' requests. Requires commands or cues from oneself or the environment.
2.Assisted- A) (5 scores) Requires external commands or verbal support only in tense or unfamiliar situations. However, this assistance should not exceed 10% of the time, B) (4 scores) Recognizes and remembers for 75% to 90% of the time, C) (3 scores) Recognizes and remembers for 50% to 75% of the time, D) (2 scores) 2- Recognizes and remembers for 25% to 49% of the time. Requires reminders for more than half an hour, E) (1

score) Recognizes and remembers for 25% or less of the time, or may not recognize or remember at all.

RESULTS

A total of 25 patients who presented with cerebrovascular hemorrhage or ischemia were included in the study. The clinical and laboratory characteristics of the patients are provided in Table 1. Among these patients, 18 completed their medical treatment and were discharged home without undergoing any rehabilitation program, while 7 were transferred to the rehabilitation service and received an average of 4.7 weeks (33 sessions) of treatment. The classic hemiplegia rehabilitation program was applied to all patients as part of the rehabilitation process. Following their initial days of illness, all patients were visited at home 6 months later to evaluate their condition. The average age of patients included in the rehabilitation group was 59.85, while for patients discharged directly to the home, it was determined to be 63.88. The mean rehabilitation duration was 33 days and similar between males and females (p>0.05).

Table 1. Participants' characteristics

Age, years	62.76±14.08 (40-89)
Sex, male/female, n,%	13/12
Involvement, n **Cerebral ischemia** **Cerebral hemorrhagia**	 20 5
Involved body site • **Left** • **Right**	 11 14

The incidence of ischemic and hemorrhagic strokes in women was 10.4% and 2.6%, respectively, while in men it was 9.6% and 2.4%, respectively. There was no significant difference between genders (p>0.05). There was a higher prevalence of asthma bronchial in 12% of cases among the patients. Diabetes (%8), ischemic heart disease (%8), and hypertension (%4) are also observed. Among the patients, only one had a tracheostomy due to laryngeal cancer, which limited their ability to speak. There were 4 patients with a history of prior stroke (SVO) among them.

Table 2. FIM scores

		FIM 1 (Mean)	FIM 2 (Mean)	FIM 3 (Mean)	FIM 4 (Mean)
Eating	A	3.04	4.92	6.42	5.88
Self-care	B	3.04	5.16	6.14	5.2
Bathing	C	1.72	3.44	5.14	4.12
Dressing-upper body	D	2	3.28	5	4.36
Dressing-lower body	E	1.8	3	4.71	4.2
Toileting	F	1.64	2.6	5.14	4.48
Bladder	G	2.04	3.84	6.42	5.4
Rectum	H	3.56	5.16	7	5.72
Bed, chair	1	1.32	2.92 ..	6.42	4.88
Toilet	J	1.28	2.2	5.14	4.44
Shower	K	1.08	1.72	3.14	3.48
Walking	L	1.04	1.76	4.71	3.76
Stairs	M	1	1.32	4.71	3
Comprehension	N	5.72	6.72	7	6.72
Expressin	0	4.84	5.56	6.28	5.8
Social life	P	5.44	6.2	6.71	5.88
Problem solving	R	4.68	5.44	6.85	5.76
Memory	S	6.32	6.76	6.85	6.4
Total		51.12	71.96	103.78	89.48
Standard Deviation		16.41	18.06	14.23	29.15

Figure 1 displays the distribution of patients based on the risk factors associated with CVO (cerebrovascular occlusion). Hypertension and heart disease were found to be more prevalent in our group. However, no patients were identified who had a history of oral contraceptive use or polycythemia.

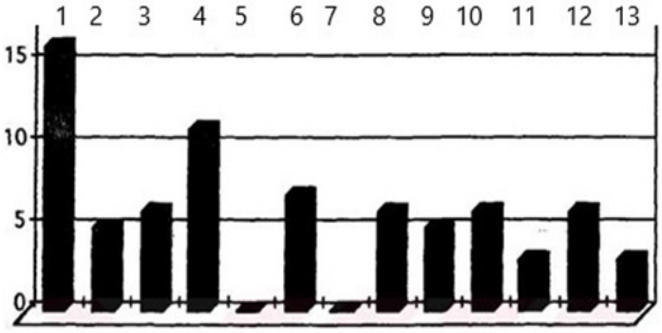

Figure 1. 1-Hypertension, 2-Diabet, 3-Dyslipidemia, 4-Heart disease, 5-Polcyctemia, 6-Smoking, 7-Oral contraceptive, 8-Alcohol, 9-TIA, 10-Migren, 11- Diet, 12-Obesity, 13-Hyperuricemia (n)

Table 2 presents the average values of FIM measurements in the 18 subgroups during four different periods. This allows for observing the changes in each specific characteristic during the course of the disease prognosis.

Table 3 shows the changes in total FIM averages depending on the etiological cause between the groups that received and did not receive a rehabilitation program.

Table 3. Etiology-related changes in FIM scores in each period

	Clinical	TFIM1	TFIM2	TFIM3	TFIM4
Reh (+)	Ischemia	60.2	79.8	103.6	108.6
	Hemorrhagia	41.5	60.5	104.5	121.5
	Total	54.85	74.28	103.78	112.28
Reh (-)	Ischemia	51.66	73.33	x	79
	Hemorrhagia	39.66	59.66	*	87.66
	Total	49.66	71.15	x	80.44
	General	51.12	71.96	103.78	89.48

Reh; Rehabilitation, TFIM; total FIM scores

In Figure 2, the difference in scores during the evaluation of total FIM between admission to the neurology service and discharge from the neurology service is shown for both the rehabilitation group and the non-rehabilitation group. While both groups show a similarity between TFIM-1 and TFIM-2, the notable difference lies in the differentiation during home control.

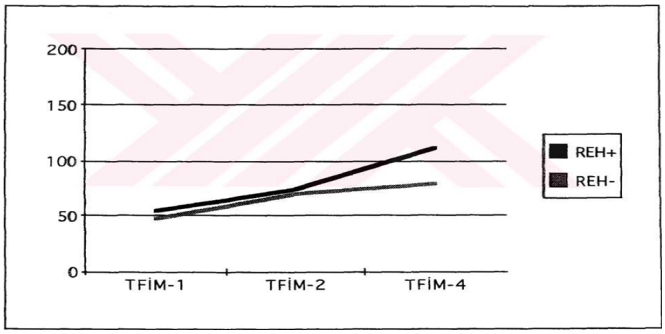

Figure 2. TFIM scores according to rehabilitation status.

Table 3 demonstrates motor gains over time in both groups ($p<0.05$). In the group that received rehabilitation, there was a consistently positive improvement in motor function over time, with significant progress in each period compared to the previous one.
The correlation ($r=0.75$) between the motor function status achieved by the patient 6 months after rehabilitation and the rehabilitation program is strong.
In the non-rehabilitation group, there were significant gains in motor function between the patient's admission to the neurology service and their discharge, as well as during the initial period of the disease and the subsequent home control after 6 months. However, there was no significant change between their discharge from neurology service and their condition during the home control after 6 months.

DISCUSSION

Stroke is the most common cause of disability and death in the elderly population (5,6). Treatment begins with the identification of cerebrovascular events and should initially focus on identifying acute medical problems and stabilizing the patient. Subsequently, a rehabilitation plan is developed to regain lost abilities and functions and achieve the highest possible quality of life. Generally, hemiplegia rehabilitation starts from the acute phase, continues during the hospital stay, encompasses the evaluation and correction efforts during the return to the community, and then transitions into the monitoring of the patient. The primary goal is not only to improve functions during the rehabilitation period but also to teach independence after the rehabilitation program. The success of the rehabilitation program is measured by the individual's functional level in maintaining daily life activities.

Hemiplegia rehabilitation is a costly and time-consuming process (7). Therefore, it is important to identify patients who will benefit from and recover through rehabilitation in advance. The functional level assessment of the patient is performed by the treatment team at the beginning of the rehabilitation program, and the treatment is based on this evaluation.

The determination of the expected discharge level is necessary at the beginning of rehabilitation. Factors such as age, accompanying systemic diseases with hemiplegia, functional ability level during admission and discharge periods, family support, and the patient's mental and psychological condition can influence the expected level of recovery, treatment intensity and type, and length of hospital stay. Age, gender, and disease severity can also influence the prognosis and functional outcomes of stroke patients (8,9).

In this study, the patients were evaluated with the FIM within the first 72 hours of admission to our hospital's neurology department (FIM-1). The patients continued to receive treatment in the neurology department until they became medically stable. After completing their treatment in this department, 7 patients were transferred to the Physical Medicine and Rehabilitation Department of the hospital, and 18 patients were discharged and sent home. The discharged patients and those transferred to the physical therapy department were re-evaluated on the same day (FIM-2). Patients who underwent a 4.7-week rehabilitation program, five days a week, using the conventional method were evaluated for the third time on the day of discharge (FIM-3). All included patients were individually followed up and evaluated at their homes six months after the cerebrovascular event (FIM-4).

In recent years, functional evaluation of patients has become crucial, with numerous benefits in terms of clinical practice, research, education, application, economy, quality assurance, and workload reduction. FIM has been widely used since 1986, particularly in countries such as the United States, Australia, Canada, France, Japan, Italy, Germany, and Sweden. It assesses 18 different items and scores range from 1 to 7, with a total score range of 18 to 126 (10). In our study, the results were consistent with the literature. There was a moderate inverse correlation between the total FIM4 score and the age of the patients, which was the same for both groups.

In many studies, the incidence of cerebrovascular events has been found to differ between genders (11,12). In our study, 52% of patients were male and 48% of patients were females, this similar ratio allowed us to make generalizations without any gender-related bias. The impact of gender on prognosis has not yet been definitively determined and remains a subject of debate. However, according to the literature, both genders have a positive effect on recovery individually.
Although there are authors who argue that gender does not affect prognosis, a study conducted on 736 hemiplegic cases at the Belfast City Hospital between 1948 and 1956 emphasized that women had a better recovery compared to men (13-15). In our study, however, there was no significant difference between genders in the total FIM scores obtained by patients on the first day of the illness and during the follow-up home visits.

In today's world, the incidence of stroke is increasing among individuals under the age of 55, while the prevalence of stroke is decreasing among those aged 55 and above (16). However, approximately 20% of men experienced a stroke of any kind during the follow-up period from 50 to 98 years of age, resulting in a cumulative incidence that approached 50% (17).

In our study, the average age was 62.76±14.08, and 36% of the patients were in the 40-55 age group. Among the two groups we divided the patients into, the average age of rehabilitated individuals was found to be 59.85, while for non-rehabilitated individuals, it was 63.88. This study demonstrates similar results to previous studies reported from data of the Turkish Population regarding age, cause of stroke, and gender (18). Boru et al. detected 50 stroke cases in their study. 80% of those were found to have had an ischemic stroke, 14% of those were hemorrhagic cases, and 6% of those had an unclassified stroke type. The overall prevalence rate in those $\geqslant$ 18 years was 1.7%. The male/female ratio was 0.92. Young (<45) stroke prevalence was found to be 0.6% (18).

Black-Schaffer R.M. and colleagues examined the relationship between age and return to work in 79 hemiplegic patients and found that younger individuals were more likely to return to work compared to older individuals (19,20). Age, cognitive independence, and pain can predict rehabilitation outcomes after stroke. Treatment of cognition and pain should be taken into account during rehabilitation (21).

Ischaemic stroke remains the most common type of stroke (22). In our study, 80% of the patients were admitted due to ischemia, while 20% were admitted due to hemorrhage. Despite having the same etiological causes, the course of the disease varied, which was entirely related to the size and location of the lesion. When we divided the patients in our study into rehabilitation

and non-rehabilitation groups based on their etiological causes, it was noteworthy that the total FIM scores of ischemic patients were higher in the early stages of the disease. In the later stages, it can be observed that both groups, especially the hemorrhagic patients, catch up with or even outperform the ischemic patients in terms of functional outcomes.

When examining the connection between the etiology of the disease and functional changes in our study, a strong correlation was found between cognitive changes and the etiology of the disease in patients undergoing rehabilitation.

Derickt and colleagues conducted a study on the effects of gender and the affected side on prognosis, concluding that the affected side only changed the type of handwriting and did not affect daily life activities (23). The affected side has also important clinical implications. Patients with right hemispheric strokes present later to an emergency department, have a lower chance to receive thrombolytic therapy and have worse clinical outcomes than patients with left hemispheric strokes (24). Except for one of our patients, all of them were right-dominant. When patients reached a neurologically stable condition, the mean FIM-2 score was found 69.86 for patients with right-sided (dominant) involvement and 75.1 for patients with left-sided involvement. The difference between the two groups was not statistically significant. We attributed this to the patient's psychological problems and lower educational levels during the acute phase, as well as their lack of effort.

Early rehabilitation can help prevent complications that may arise from prolonged immobility or inactivity, such as muscle atrophy, joint stiffness, and pressure sores. It also allows individuals to capitalize on their heightened potential for recovery during this period and maximize functional gains. The optimal time to begin rehabilitation after a stroke remains unsettled, though the evidence is mounting that for at least some deficits, initiation of rehabilitative strategies within the first 2 weeks of stroke is beneficial. Commencing intensive therapy in the first 24 h may be harmful (25,26).

Early rehabilitation significantly improves upper extremity movements, sensation, body image, mental state, aphasia, and lower extremities occurred after 14 weeks (27,28). The rate of improvement may reach up to 80% six weeks after the onset of the disease, and functional recovery closely follows neurological improvement. The reason for conducting this assessment at the end of the acute phase of the disease is that functional recovery is most rapid in the first two weeks. Various publications have reported a significant slowdown in recovery after six months (26-28). Galski and colleagues state that early initiation of rehabilitation leads to faster improvement in patients' cognitive abilities. The significant improvement in these functions that affect the patient's rehabilitation has shortened the length of stay in the rehabilitation service and positively affected the prognosis (29,30).

However, A variety of physiotherapy interventions improve functional outcomes, even when applied late after a stroke. The efficacy of the intervention was particularly evident when short- and long-distance walking were considered as separate outcomes and activities of daily living independence (31). The literature information regarding the length of stay in rehabilitation departments for patients from the end of acute neurological problems indicates an average of 1 month (32,33). In this study, the average duration of rehabilitation was 33 days, which includes the period in which patients could mobilize with the assistance of independent aids such as a cane. There was no significant difference in terms of hospital stay between genders.

The important thing here is to objectively evaluate the results of the applied rehabilitation in order to assess the success and suitability of the program by the treatment team and determine any necessary changes if needed. Patients who were admitted to the rehabilitation program and those who were directly sent home without being included in the program were evaluated based on FIM-2 scores. There was no statistically significant difference between the two groups. According to this result, there was a statistically significant difference in the FIM-4 scores during the 6-month follow-up home visits between the two groups with the same initial conditions. This result shows that the difference between the group that underwent rehabilitation and the group that did not undergo rehabilitation can be demonstrated through FIM scoring.

There are many studies in the literature that evaluate stroke outcomes using FIM scoring (34,35). In all of these studies, the changes in patients' activities of daily living before and after rehabilitation show a significant improvement in favor of the patient in a statistically significant manner, as in our studies. In our study, we examined the patients in two groups: those who underwent rehabilitation and those who did not. The changes in motor functions increased significantly for both patient groups during the period from the onset of the disease until they returned home. There was a strong correlation between functional gain during this period and rehabilitation. These results were consistent with previous studies (34,35). In patients who were not included in the rehabilitation program, the motor changes during the 6-month follow-up home visits were statistically insignificant. In fact, there were decreases in total scores, especially in motor functions, for some patients. Similarly, after the discharge of patients in the rehabilitation group in terms of daily life activities, their changes were significant. This change indicates that the patient is becoming increasingly independent.

When patients were evaluated in terms of cognitive functions, there was a strong correlation between the group admitted to the rehabilitation program and the cognitive scores gained during the program until the condition reached by the patients after 6 months. In a relevant source that supports our study, a secondary analysis of individuals receiving inpatient stroke rehabilitation care and examined the correlations between measures of cognitive impairments and participation in the rehabilitation program. The study found a strong correlation between the group admitted to the rehabilitation program and the cognitive scores gained during the program. This suggests that stroke patients who participated in the rehabilitation program showed improvements in cognitive functions over timethe researchers evaluated the cognitive functions of patients before and after participating in a rehabilitation program (36).

Considering that there are studies indicating the evaluation of cognitive functions with FIM and the impact of these scores on the total length of hospital stay for patients, it is necessary to provide such support to the patient during the rehabilitation period (37,38).

However, this view, which is valid for stroke patients, is not clear whether same for individuals with spinal cord injury (39,40).

These results indicate that our rehabilitation outcomes and the rate of benefiting from treatment are not significantly different from other countries, and in fact, our patients benefit even more from the treatment.
In our study, we examined the extent to which all the data obtained from the patient were effective in determining the prognosis of patients undergoing rehabilitation. According to our findings, in determining the patient's condition after 6 months, the dominant side involvement, educational status, total motor and total FIM scores during discharge from the neurology service, age, and etiological cause were found to be determinants with an 84% rate, as determined by multiple regression analysis. While the study provides valuable insights into the rehabilitation outcomes of stroke patients, it is important to acknowledge its limitations

1.The most important limitation is the data cover an old specialization thesis and consists of a small sample size considering the large sample-sized studies conducted following this thesis.

2.Sample size and generalizability: The study had a relatively small sample size, which may limit the generalizability of the findings. The results might not be representative of the broader population of stroke patients, and larger studies with diverse populations are needed to confirm the findings.

3.Single-center study: The study was conducted at a single center, which may limit the generalizability of the findings to other healthcare settings. Multicenter studies involving different geographic locations and healthcare systems would enhance the external validity of the results.

4.Lack of control group: The study did not include a control group of stroke patients who did not undergo rehabilitation. A comparison between the rehabilitation group and a control group would have allowed for a more comprehensive understanding of the impact of rehabilitation on functional outcomes.

5.Potential confounding variables: Although the study considered various factors that could influence rehabilitation outcomes, there may still be other unmeasured confounding variables that could have affected the results. Factors such as socioeconomic status, comorbidities, and access to post-discharge support were not fully explored but may have influenced the outcomes.

6.Follow-up period: The study's follow-up period was limited to six months after the cerebrovascular event. A longer-term follow-up would provide insights into the sustainability of the functional gains achieved through rehabilitation and any potential changes over time.

7.Assessment tools: While the study utilized the Functional Independence Measure (FIM) to assess functional outcomes, other outcome measures could provide additional perspectives on the rehabilitation process. Incorporating a broader range of assessment tools, such as quality-of-life measures or specific functional scales, could provide a more comprehensive evaluation of the patient's progress.

8.Absence of qualitative data: The study relied solely on quantitative measures and did not include qualitative data, such as patients' experiences and perspectives on rehabilitation. Including qualitative data could enrich the understanding of the rehabilitation process and offer valuable insights into patient-centered outcomes.

Addressing these limitations in future research would strengthen the evidence base and provide a more comprehensive understanding of the factors influencing rehabilitation outcomes in stroke patients.

CONCLUSION

Early rehabilitation initiation, tailored treatment plans, comprehensive functional assessments, and continuous evaluation play vital roles in optimizing outcomes and promoting independence in stroke patients. Understanding the factors influencing prognosis can guide healthcare professionals in providing individualized care and support to stroke survivors.

DECLARATIONS

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