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Effects of basic body awareness on balance, functional mobility and gait speed in patients with Stroke

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Abstract

Stroke leads to serious, long-term disability among adults. The hemiparesis may lead to balance impairment, reduced postural stability, asymmetrical stance, limited walking balance and dependence in activities of daily living. This study described Basic Body Awareness Therapy and Conventional Physiotherapy for participants with stroke. The Patients from Group A were received Conventional Physiotherapy and Group B received Basic Body Awareness Therapy and Conventional physiotherapy on regular basis for 30 minutes for 3 weeks. The intervention included Basic Body Awareness Therapy which consists of movements along with breathing exercises and massage. Balance, Functional mobility and gait speed were examined using Berg Balance scale, Timed up and Go test and 10 MWT. The result shows that the Basic Body Awareness Therapy helps to improve the Balance, Functional Mobility and Gait speed in Patients with stroke. So, Basic Body Awareness Therapy can be added to the regular management protocol in order to gain the improvement.

Keywords: Stroke, balance impairments, postural instability, gait speed, basic body awareness therapy

Introduction

Stroke is a common, serious, and disabling global health-care problem. After stroke onset, functional damage persists in 40% of patients and severe disability remains in 15–30%. The neurological disorders that may occur in stroke patients include motor and sensory disorders, cognitive disorders, perception disorders, language disorders, and emotional disorders. Several participants suffer from permanent disabilities and do not recover due to the loss of motor functions^[1].

Stroke is defined by the World Health Organization as ‘a clinical syndrome consisting of rapidly developing clinical signs of focal disturbance of cerebral function lasting more than 24 hours or leading to death with no apparent cause other than a vascular origin^[2].

Global Burden of Diseases (GBD) study reported nearly 5.87 million stroke deaths globally in 2010, as compared to 4.66 million in 1990. This indicated a 26 % increase in global stroke deaths during the past two decades^[3].

In India, according to the data available, all the studies reveal that ischemic stroke occurs in 68-80% and hemorrhagic stroke in 20-32%^[4].

Knowing the risk factors for stroke is the first step in preventing a stroke. Some risk factors are changeable, by having regular medical checkups and knowing the risk, one can focus on change that will lower the risk. The major risk factor is high blood pressure^[5]. Other risk factors are diabetes, high cholesterol, atrial fibrillation (AFib), sickle cell anemia, excessive alcohol intake^[6]. Stroke affects people of all ages^[7].

The natural course of stroke recovery has been shown to contribute to 50% of overall motor recovery within the first 2 weeks after stroke, and 80% of overall recovery after 1 month^[8]

The most common characteristic of stroke are contralateral hemiparesis and sensory loss, contralateral spastic hemiparesis, perceptual deficits such as unilateral neglect, anosognosia, apraxia, and spatial disorganization, homonymous hemianopia, visual agnosia, prosopagnosia, bilateral cortical blindness, imbalance, etc. Loss of balance includes weakness on one side of body, loss of sensation, neglect, vertigo, vision problem, ataxia, concentration problems, perceptual problem, vestibular problems, falls^[9].

Balance is very complex and involves many different parts of the body such as ears, eyes, and sensory nerves in muscles and joints.

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The cerebellum, which acts as the body's movement and balance control center. It receives messages about the body's position from the inner ear, eyes, muscles and joints, and sends messages to the muscles to make any postural adjustments required to maintain balance. Treating an underlying condition can help improve balance ^[10].

Basic Body Awareness Therapy

The term "body awareness therapy" was first used in the late 1960's in connection with Physiotherapy for neurotic patients. Clinical experience has been the most important source of inspiration for the development of body awareness therapy. Dysfunctions and needs of the participants have largely determined the development of this method ^[11].

The theories of Basic BAT have been mainly inspired by the works of Swedish Physical therapist Roxendal and French-movement educator Dropsy; they were influenced both by Eastern movement traditions such as tai chi chuan and Zen meditation and by Western traditions such as dance and movement pedagogy. Dropsy and Roxendal first described Basic BAT, which consists of movements, breathing exercises and massage. The aim of Basic BAT is to increase bodily and mental balance, increase freedom in movement, breathing and strengthen the ability to be mentally present. In Basic BAT, the relation to the ground, the postural line, as well as the co-ordination and centering of the movement, works as a means to deepen the contact with the body and to free the breathing. The word awareness means to be fully mentally present, here and now, accepting limitations and assets. The Basic BAT approach sees the body and movements as an integrated part of the human being. The treatment modality was developed as a combination of western and eastern traditions of personal development. As a therapy is also influenced from T'ai-chi Ch'uan (T'ai-chi) and Zen meditation, these movements were originally used to enhance the learning of the T'ai-chi form. The Zen influence can be traced in the way the attention is lightly focused on here and now both in movement and stillness. The founder of the treatment modality claimed the overall goal to be balance, freedom of muscle tensions ^[12]. Body awareness training (BAT) is a method for improvement of dynamic balance and postural control ability. BAT is comprised of simple repetitive movements that maintain ability using stability limits. A main component of BAT is to enhance an individual's awareness of their movement. Multiple slow repetitive movements may enable the participant to experience the body and its limits. In other words, BAT generates awareness of one's body and enables focus on body awareness during movement. Movements are performed in various positions in order to identify the center line of the body. BAT results in improved postural control, balance, free breathing, and coordination ^[13]. Basic BAT can increase cost-effectiveness and hence, health-related quality of life ^[14].

Basic BAT has been found to be beneficial for various disorders, for example long-term musculoskeletal pain, fibromyalgia irritable bowel syndrome, schizophrenia, and eating disorders. In psychiatric out-participants, a period of Basic BAT improved sleep, self-efficacy, and physical coping resources. Participant's experiences of Basic BAT related to increased balance, awareness, handling of body signals, and movement control. Basic BAT helped with affect regulation, social abilities, and thinking more clearly ^[15]. There is a growing interest in therapies designed to

increase body awareness. Body awareness has been defined as the subjective, phenomenological aspects of proprioception and interoception that enters conscious awareness. A focus of Basic Body Awareness Therapy is to find a new attitude towards the body, thus strengthening the person's recourses, and integrating it in everyday life. A core movement is stimulation of the center line through weight transfers from left to right, and rotation around the center of the body. Basic Body Awareness Therapy may be conducted individually or in groups and is often led by a Physiotherapist. The movements can be performed in sitting, standing or supine ^[16]. The fundamental basis of Body Awareness Therapy is the somatic, biological knowledge. In practice, Body Awareness Therapy differs from traditional Physiotherapy by stimulating sensory awareness and concentrating the main interest on exercises aimed at total coordination. If treatment of movement functions is given with a sufficient degree of sensory activation, emotional reactions occur. Body Awareness Therapy is thus, based on a biological foundation, but is also associated with emotional reactions. Repeated exercises involving movements of daily life were intended to increase the participant's Basic body management and self-confidence.

Body awareness therapies can be defined as body-oriented physiotherapeutic approaches using an holistic perspective in Physiotherapy treatment directed towards an awareness of how the body is used, in terms of body function, behaviour and interaction with self and others. Aim of Body awareness therapy is to normalize posture, balance and muscular tension or stiffness which are experienced and visible in the movement pattern ^[14]. Body awareness training (BAT) is a method for improving dynamic balance and postural stability. BAT is composed of simple repetitive movements within stability limits. A main component of BAT is making the person conscious of their movements. In other words, BAT involves an awareness of one's body and reflection upon how the body feels during movement. Movements are performed in various positions to find a center line of the body. BAT targets include postural control, balance, free breathing, and coordination ^[17].

The construct of body awareness refers to a particular kind of mindful, non-judgmental awareness and a sense of self, grounded in physical sensations in the present moment. Scandinavian physical therapists use a treatment method Basic Body Awareness Therapy (Basic BAT), aimed at enhancing awareness of body and self through exploration of Basic movement principles such as functional balance, free breathing, mental awareness, and embodied presence. Basic BAT involves both activating and experiencing one's body through movement, recognizing that these experiences touch different dimensions of existence: physical (like the organic matter of bones and muscles), physiological (processes such as blood circulation), psychological (attention, emotions), and existential (the sense of "I am") ^[15].

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foundation, but is also associated with emotional reactions. Repeated exercises involving movements of daily life were intended to increase the participants' Basic body management and self-confidence [16]. Therapy aims towards supporting patient to come in contact with and gain a more firm and free balance, grounding, and the center line as important elements in treatment [18].

Materials and Methods

The research design used for the study was pre-posttest Experimental study. The source of data for this study were patients with stroke referred from In Patient department (IPD) and Out Patients Department (OPD) of Medicine to department of Neuro-Physiotherapy, Dr. A. P. J. Abdul Kalam College of Physiotherapy, Pravara Rural Hospital, Loni (BK), Taluka- Rahata, Dist- Ahmednagar, Maharashtra State, India. Thirty participants both male and female diagnosed with stroke with age of 50 to 65 with ability to walk with or without assistance. Berg Balance Scale score >45 and Mini Mental State Examination score within 25-30. Patients in subacute stage of stroke were included in the study. The patient excluded were with any medical, physical or cognitive impairment that will affect the ability to actively participate in the intervention or to understand written and verbal instructions. Patients with physical impairments like pusher's syndrome [19], post-stroke fatigue, central post stroke pain, post stroke shoulder pain [20] Cognitive impairments like communication problems including aphasia, a condition affecting the ability either to understand or process language, attention deficits [21]. Psychological issues, cardiac problems or metabolic conditions, sensory impairments [22] like impaired tactile sensations, impaired stereognosis, and impaired proprioception were excluded. Participants were divided into Group (A), which received Conventional Physiotherapy and Group (B), receiving Basic Body Awareness Therapy along with Conventional Physiotherapy for 3 weeks of duration. Outcome measures were assessed using Berg Balance Scale, Timed Up and Go test, 10 MWT. Pre and post intervention assessments were done.

Procedure

The study received ethical approval from the Institutional Ethical Committee (IEC) of PIMS, Loni (Ref. no. PIMS/CPT/IEC/2018/69 of Dr. A. P. J. Abdul Kalam College of Physiotherapy, Pravara Institute of Medical Sciences, Loni Total thirty participants (n=30) were selected and screened according to inclusion and exclusion criteria, the participants diagnosed with stroke. Informed written consent form was obtained from the patient. Group A: included 15 participants and Group B included 15 participants. Thirty patients diagnosed with stroke were randomly divided into two groups (Group A and Group B) of fifteen patients each. The variables like balance, functional mobility, and gait speed were assessed using Berg Balance scale, Timed up and go test and 10 meter walk test.

Outcome Measures

Balance: It was measured using Berg Balance Scale which was developed as a performance-oriented measure of balance in elderly individuals [23]. The criteria related validity has been supported by moderate to high correlations between Berg Balance Scale and other functional measurement in variety of older adults with disability [24] A score of <40 is associated with highest risk of fall and <45 is associated with greater risk of fall [23].

Functional Mobility

It was measured using Timed Up and Go scale. TUG is also a responsive test for capturing improvements in mobility during the first three months after stroke. So, it was used in the study A score of ≥ 14 seconds has been shown to indicate high risk of falls.

Gait speed

10 meter walk test is a performance measure used to assess walking speed in meters per second over a short distance. It can be employed to determine functional mobility, gait. Gait speed is a quick and easy measure of walking disability that has been recommended as an outcome measure in stroke rehabilitation [25].

Data Analysis and Results

Berg Balance Scale: On comparison of pre and post intervention of Basic BAT and Conventional Physiotherapy shows using Berg Balance Scale in Group A using paired 't' test showed 't' value 6.16 and $p < 0.05$, it was observed that this difference was extremely significant. In Group B, 'p' < 0.05 and 't' value is 4.802, it was observed that this difference was extremely significant. On comparing post interventions of BBS score with Basic Body Awareness Therapy and Conventional Physiotherapy using unpaired 't' test was 2.28 and 'p' value is 0.043.

Timed Up and Go test

On comparison of pre and post intervention of BBAT and Conventional Physiotherapy shows using Timed Up and Go test in Group A using paired 't' test showed 't' value 6.82 and $p < 0.05$, it was observed that this difference was extremely significant. In Group B, $p < 0.05$ and 't' value is 6.85, it was observed that this difference was extremely significant. On comparing post interventions of TUG score with Basic Body Awareness Therapy and Conventional Physiotherapy using unpaired 't' test was 2.28 and 'p' value is 0.043.

10 Meter Walk Test

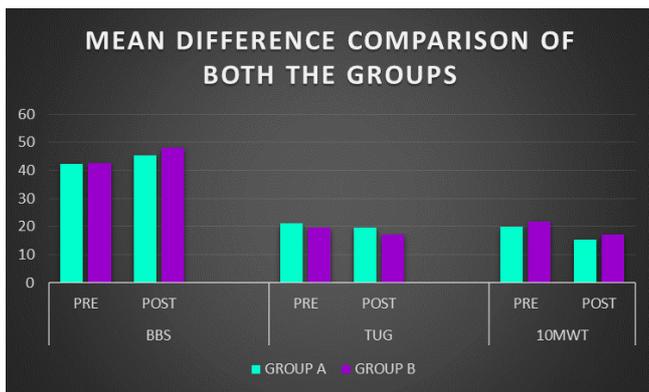
On comparison of pre and post intervention of BBAT and Conventional Physiotherapy shows using 10 MWT in Group A using paired 't' test showed 't' value 10.16 and 'p' < 0.05, it was observed that this difference was statistically significant. In Group B, 'p' < 0.05 and 't' value is 9.78, it was observed that this difference was statistically significant. On comparing post interventions of TUG score with Basic Body Awareness Therapy and Conventional Physiotherapy using unpaired 't' test was 1.56 and 'p' value is 0.76.

Table 1: pre and post comparison of both groups

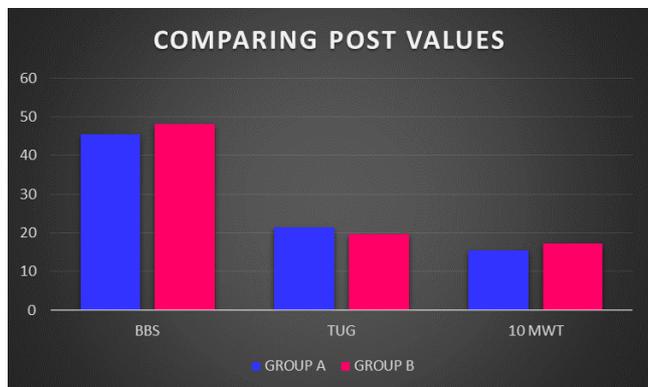
Groups	Outcome Measures	Mean±SD		't' value	'p' value
		Pre	Post		
A(Conventional)	BBS	42.13	45.40	6.16	<0.05
	TUG	21.46	19.6	6.82	<0.05
	10 MWT	20.00	15.46	10.16	<0.05
B(Conventional with Basic BAT)	BBS	42.53	48.13	4.80	<0.05
	TUG	20.66	17.20	6.85	<0.05
	10 MWT	21.66	17.20	9.78	<0.05

Table 2: post values comparison of both the groups

Outcome measures	Group A Post	Group B Post	't' value	'p' value
BBS	45.4	48.13	2.28	0.043
TUG	19.60	17.20	3.027	0.98
10 MWT	15.46	17.20	1.56	0.76



Graph 1: Mean difference comparison of pre and post values of both the groups



Graph 2: Mean difference comparison of post values of both the groups

Discussion

The study shows significant differences in Balance, functional mobility and gait speed on Berg Balance Scale, Timed Up and Go Test and 10 MWT within 3 weeks of intervention of Basic body Awareness Therapy along with Conventional Physiotherapy.

Improvement in Berg Balance Scale

Basic BAT consisted of sensory stimulation and awareness of shifting body weight by performing simple, repetitive movements that challenges persons stability limits. The movements in body awareness therapy focus on dynamic balance and postural stability [16] Balance depends on multiple sensory inputs and neuromuscular system interactions which is affected in stroke patient. It may lead

to falls which in turn results in poor body awareness [17]. Basic BAT is more effective in improving BBS score because it mainly focuses on postural stability. If it is affected it can affect a person’s stability limits, and can cause difficulty to regain balance and base of support. Various studies on balance suggests that postural adjustments are an integral part of motor performance. Hence, balance improved with Basic BAT.

Mialinn *et al.* studied on Body awareness therapy in person with stroke. In their study, 46 patients were included - 24 in the experimental intervention group and 22 in the control group with mean age group of 64 years. Follow-up were conducted one week and six weeks after the intervention period. The experimental intervention consisted of body awareness therapy in groups for eight weeks, 60 minutes once a week. Within the experimental intervention group, significant improvements over time was found for the tests Berg Balance Scale along with other parameters like Timed Up and Go cognitive, and 6-minute walk test. Within the control group, significant improvements over time were found for the Timed Up and Go Cognitive test. Follow-up were conducted one week and six weeks after the intervention period.

Focus of the movements in body awareness therapy is to integrate postural balance, free breathing, and self-awareness. These components may contribute to an increased understanding of the quality of a movement, both for the physiotherapist and the patient. An essential element in body awareness therapy is to reflect upon how the body feels when performing movements, which could promote concentration and well-being in patient. The movements in the body awareness therapy challenged postural stability in sitting and standing, which are components included in the Berg Balance Scale.

Improvement in TUG scale

The movements in body awareness therapy focus on dynamic balance and postural stability which could be beneficial for patient with hemiparesis. Postural control and functional mobility are key focus areas for therapeutic intervention after acute stroke. Improvements in function have been attributed to “true” physiologic recovery when the patient more closely approximates “normal” balancing responses, compensatory strategies, or a combination of both. Compensatory motor patterns are adaptive movements that reflect the effects of the lesion, the mechanical characteristics of the motor system, and the environmental demands on the individual [26].

Focus of the movements in body awareness therapy is to integrate postural balance, free breathing, and self-awareness. These components may contribute to an increased understanding of the quality of a movement, both for the physiotherapist and the patient. An essential element in body awareness therapy is to reflect upon how the body

feels when performing movements which could promote concentration and well-being^[14]. In Basic Body Awareness Therapy, the concentrative movements focus on one's body being in movement which was useful for improving a sense of presence, the bodily experiences always are experienced in the present moment. Moreover, the presence is key to achieve the awareness of unity of body and mind. According to Yalom, presence is the hidden agent for learning. Stability along the vertical axis is a precondition of movement quality. Balance gives background stability. Postural stability and postural orientation exist at the same time as an inner physical and perceptual reference. Through this stability, the experience of being in equilibrium arises as a qualitative aspect of movement. Improvement of body and movement awareness when implementing Basic BAT helps refining the participant's movement quality through the Basic BAT movements. Body awareness improved with the flexing and extending movement, in addition to arm and relational movements.

In relation to Basic body awareness therapy, the change originates in movement; the new bodily movement experiences can be seen as generating a new homeostasis. Because of new movement experiences in relation to these movements. The intention of treatment is the rise of perception and movement awareness promoting movement quality in patients and to connect as a whole human being with body that are in part disconnected. It is found that patients suffering from stroke had mostly dysfunctional movement in their body, lacking elasticity, and poor coordination, mechanical and a-rhythmical movements. Though Basic BAT supports this group of patients feel that the legs are reconnected and integrated into the perception of a whole and unified human being and movement quality is improved.

Mehling *et al*, states that body awareness is the awareness of embodiment as an innate tendency of our organism for emergent self-organization and wholeness. In that way interoception is central and next to body scheme, existing of exteroceptive and proprioception sensations. Interoception is triggered when changes occur in homeostasis, registered by different kinds of receptors in joints, muscles. Basic Body Awareness Therapy allows integrated maps of our bodily conditions being generated.

Bipedal locomotion is a motor task where the control system, in each step, needs to support body weight, provide forward and lateral stability and maintain forward progression. Thus, the postural antigravity control which provides body support and balance control to prevent falling is continuously associated with progression. In addition, adaptation allows the adjustment of gait patterns to the environment. The articulated body segments with quite different mass and inertia are linked by muscles with their own idiosyncratic viscoelastic characteristics, and their totality is responsible for the production of force and kinematics. The consequence is that each single joint movement involves dynamic interactions with the other segments of the kinematic chain inducing postural disturbance. Thus, the overall behaviour of the body and limbs during walking is determined by the net forces and torques resulting from the interplay of neural and mechanical factors. The neural control of muscles has been shown to be modular, organized in functional groups often referred to as modules or muscle synergies.

Patients with stroke limits walking functions^[27]. Walking has been identified as one of the most important components of Activities and Participation in the International Classification of Functioning, Disability and Health, ICF, Core Set for Stroke. In stroke rehabilitation, a major aim is therefore to optimize recovery of locomotor skills and gait performance, in order to enable participation in everyday activities. To evaluate gait performance after stroke and changes following an intervention, we had used 10 MWT. It was expected that gait speed would be more responsive than other outcome measures because of the continuous nature of this variable and the objective nature of the testing procedure. Not much improvement was seen in the groups because of diminished muscular endurance or active movement, particularly in the ankle plantar flexors and the hip flexors, the muscle groups that provide the power to increase speed. Various balance functions are known to affect gait speed^[28]. Asymmetric dynamic posture and movement is the most prevalent locomotor deficit of stroke-related hemiparesis. Impaired postural control ability is a barrier to improvement of balance and walking ability for independent living in patients with damage to the central nervous system. Walking speed is a cardinal indicator of post stroke gait performance; however, no consensus exists regarding the optimal treatment methods for its enhancement. The most widely accepted criterion for establishing the contribution of treatment to walking speed is the gain in speed. The actual speed, however, at the end of the intervention (final speed) may be more important for functional community ambulation^[29]. Balance ability is a major factor in improvement of walking ability. Decreased balance ability may occur through disturbances of walking ability necessary for independent living in stroke. As, balance has shown improvement it had helped patients for walking and hence, walking abilities had been improved.

Gyllensten AL *et al*, studied on the outcomes of Basic Body Awareness Therapy (Basic BAT) added to treatment as usual (TAU) compared to TAU only, for patients with mood, somatoform or personality disorders in psychiatric outpatient services. Seventy-seven patients were randomized to Basic BAT and TAU. Patients were assessed at baseline and after 12 sessions of Basic BAT, 3 months after baseline. At the termination of Basic BAT sessions, patients receiving Basic BAT in addition to TAU showed significant improvements concerning the quality of movements using the Body Awareness Scale-Health (BAS-H), and psychiatric symptoms and attitudes towards body and movement using the Body Awareness Scale interview, compared to the TAU. A significant improvement is seen in results and depends on theories that regard the body as part of the psychological defence system. Muscle tension and breathing blocks can serve as a way to become less sensitive to inner affects or experiences. To become more in balance and harmony in a bodily way and more free in the breathing is to revitalize affective experience and to become more conscious. According to Dropsy, an improved contact with the body also improves the contact with oneself and reality. According to Monsen, an improved contact with the body implies an improved contact with self and others. In empirical traditions, this is the basis of all body-oriented psychotherapy. T'ai-chi training is known to improve balance and fear of falling in elderly people. Since Basic BAT treatment is influenced by T'ai-chi, the results from this study are in line with earlier research on improving

balance in the body and strengthen the belief in one's own abilities. This study indicates a positive short-term outcome of the Basic BAT.

Conclusion

Basic Body Awareness Therapy results in improvement in balance during sitting, standing and walking. Basic Body Awareness Therapy may therefore be a useful complementary therapy in stroke rehabilitation and hence Conventional Physiotherapy as well as Basic Body Awareness Therapy.

Limitations of Study

- Short duration Intervention period.
- Age group included was limited.
- No follow up after 3 weeks, so long term effect of intervention could not be suggested.
- Improvement in psychological aspect was not considered after intervention.

Recommendation

- Functional clinical assessment tool should be used for more precise, sensitive, and comprehensive evaluation of balance, functional mobility and gait speed in a clinical setting. Future studies can be done on Basic BAT with long duration and follow ups and should include more training sessions

Clinical implication

There is a growing interest in therapies designed to increase body awareness. Body awareness has been defined as the subjective, phenomenological aspects of proprioception and interoception that enters conscious awareness.

Conventional Physiotherapy helps to improve physical aspect but Basic BAT helps to improve physical aspect along with movement pattern including breathing and awareness of body position. Hence, it has improved postural control, balance, free breathing, and coordination, also it is easily applicable and cost effective.

Basic Body Awareness Therapy may therefore be a useful complementary therapy in stroke rehabilitation and thus, Conventional Physiotherapy as well as Basic Body Awareness Therapy both the treatments are effective in alleviation of balance impairments, functional mobility and gait speed after stroke. Implementing Basic BAT in Physiotherapy is found to strengthen patients' motivation and belief in functional improvement.

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