

**THE EFFECT OF HOME-BASED STROKE
REHABILITATION BAL-EX STROKE ON ACTIVITY OF
DAILY LIVING AND QUALITY OF LIFE AMONG
PATIENT WITH ISCHAEMIC STROKE AT
REHABILITATION UNIT, HOSPITAL UNIVERSITI SAINS
MALAYSIA**

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Dissertation submitted for the partial fulfillment of the

Degree of Master of Family Medicine

Universiti Sains Malaysia

2015

ACKNOWLEDGEMENTS

I would like to express my deepest appreciation to the following individuals, for providing guidance and support in multiple ways.

- Asso. Prof. Dr Juwita Shaaban (Head Department of Family Medicine, USM and main supervisor), Dr Zuraida Zainun (Senior Medical Lecturer of Audiology Program, USM), and Puan Azzyati Muhamad Nor (Physiotherapist, HUSM) and Dr Najib Majdi Yaacob (Lecturer Biostatistic, USM) as co researchers, for all their guidance and support from the beginning of this research, until completion of this dissertation.
- All the lecturers in Family Medicine Department, USM, who has shared their wisdom, knowledge and support throughout this study.
- My colleagues and course mates, for their suggestions, concerns and cooperation throughout this study.
- My family, beloved husband and my children, for their unconditional support and understanding during time spent away from home.

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Abbreviations

HUSM	-Hospital Universiti Sains Malaysia
ADL	-Activity of daily living
QOL	-Quality of life
SSQOL	-Stroke Specific Quality of Life Scale Questionnaire
HRQOL	-Health Related Quality of Life
NIHSS	- National Institutes of Health Stroke Scale
DVD	-Digital Video Disk
BI	-Barthel Index
RM ANOVA	-Repeated Measure Analysis of Co-Variance

Abstrak

KAJIAN KESAN REHABILITASI STROK DI RUMAH BAL-EX STROKE KEATAS PEMULIHAN AKTIVITI HARIAN DAN KUALITI KEHIDUPAN PESAKIT STROK ISKEMIK YANG MENGUNJUNGI UNIT REHABILITASI HOSPITAL UNIVERSITI SAINS MALAYSIA

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Pengenalan: Strok adalah punca kematian kedua paling lazim berlaku dan merupakan punca utama ketidakupayaan di kalangan golongan dewasa di seluruh dunia. Pengurangan kematian strok membawa kepada peningkatan keperluan untuk Perkhidmatan Pemulihan untuk mengatasi kecacatan kepada mangsa-mangsa strok. Pemulihan strok di rumah adalah alternatif kepada pesakit dalam pemulihan untuk membantu pesakit angin ahmar memperbaiki fungsi mereka dan mempunyai kualiti hidup yang lebih baik.

Objektif: : Untuk menilai kesan daripada intervensi menggunakan modul video Bal-ex strok bagi pemulihan rumah untuk pesakit strok iskemik.

Metodologi: Ini adalah kajian rawak terkawal (RCT) melibatkan 80 pesakit strok ischemic ringan dan sederhana. Secara rawak dibahagikan kepada kumpulan kawalan dan kumpulan intervensi (40 pesakit dalam setiap kumpulan). Kumpulan intervensi menerima kombinasi pemulihan di rumah berpandukan modul strok Bal-ex dan dua kali setiap minggu pemulihan susulan di unit pemulihan, Hospital USM selama 4 bulan. Kumpulan kawalan menerima sesi terapi pesakit luar sahaja setiap minggu. Kedua-dua kumpulan telah dinilai dengan Barthel Indeks bagi aktiviti kehidupan harian dan SSQOL kualiti hidup pada permulaan, akhir bulan ke 2 dan akhir bulan ke 4.

Keputusan: Pada asasnya, tiada perbezaan yang ketara dalam min skor ADL dan QOL antara kumpulan kawalan dan intervensi. Pada bulan ke 2 dan ke 4, skor ADL dan QOL bagi pesakit dalam kumpulan intervensi adalah jauh lebih tinggi jika dibandingkan dengan kumpulan kawalan. Pada bulan ke 2 dan ke 4, skor ADL dan QOL pesakit dalam kumpulan intervensi adalah jauh lebih tinggi berbanding pesakit dalam kumpulan kawalan ($p < 0.001$). Kedua-dua kumpulan menunjukkan peningkatan yang ketara dalam ADL pada bulan ke 2 (Kumpulan intervensi; $p < 0.001$, Kumpulan kawalan; $p < 0.001$) dan bulan ke 4 (Kumpulan intervensi; $p < 0.001$, Kumpulan kawalan; $p < 0.001$). Perubahan yang sama didapati dalam QOL pada bulan ke 2 (Kumpulan intervensi; $p < 0.001$, Kumpulan kawalan; $p < 0.001$) dan bulan ke 4 (Kumpulan intervensi; $p < 0.001$, Kumpulan kawalan; $p < 0.001$).

Kesimpulan: Program pemulihan awal di rumah dengan menggunakan modul strok Bal-ex selepas serangan strok ischemic membawa kepada peningkatan yang lebih cepat dalam fungsi, aktiviti harian dan peningkatan kualiti hidup daripada penjagaan biasa.

Abstract

THE EFFECT OF HOME BASED STROKE REHABILITATION BAL-EX STROKE ON ACTIVITIES OF DAILY LIVING AND QUALITY OF LIFE AMONG ISCHEMIC STROKE PATIENTS ATTENDING REHABILITATION UNIT, HUSM

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Introduction: Stroke is the second commonest cause of death and a leading cause of adult disability worldwide. Reduced stroke mortality leads to increasing need for rehabilitation services to address the disability in stroke survivors. Home-based stroke rehabilitation is an alternative to inpatient rehabilitation to help stroke survivor improve their function and have better quality of life.

Objectives: To evaluate the effect of an intervention using video module Bal-ex stroke for home rehabilitation among ischemic stroke patients.

Methods: This is a randomized controlled trial (RCT) involving 80 patients with recent mild to moderate ischemic stroke. They were randomly divided into control group and intervention

group (40 patients in each group). The intervention group received a combination of home rehabilitation guided by Bal-ex stroke module and twice weekly outpatient follow-up at rehabilitation unit, Hospital USM for 4 months. The control group received only weekly outpatient therapy sessions. Both groups were assessed with Barthel Index for activity of daily living and SSQOL for quality of life at baseline, end of month 2 and end of month 4.

Results: At baseline, there was no significant difference in mean ADL and QOL score between control and intervention group. At month 2 and 4, patients in intervention group had significantly higher ADL and QOL score compared to patients in control group ($p < 0.001$). Both groups showed significant improvement in ADL at month 2 (intervention group; $p < 0.001$, control group; $p < 0.001$) and month 4 (intervention group; $p < 0.001$, control group; $p < 0.001$). Similar changes were observed for QOL at month 2 (intervention group; $p < 0.001$, control group; $p < 0.001$) and month 4 (intervention group; $p < 0.001$, control group; $p < 0.001$).

Conclusion: Early home rehabilitation program by using Bal-ex stroke module after ischemic stroke leads to more rapid improvement in function, daily activities and increased quality of life than usual care.

Asso. Prof. Dr Juwita Shaaban: Supervisor

Dr Zuraida Zainun: Co-Researcher

Puan Azyati Muhamad Nor: Co-Researcher

Dr Najib Majdi Yaacob: Co-Researcher

CHAPTER 1: LITERATURE REVIEW

1.1 STROKE – EPIDEMIOLOGY

Stroke is a global health problem and is the second commonest cause of global mortality in 1990 (4.38 million deaths, almost 3 million in developing countries)(1). 15 million people worldwide suffer a stroke every year. Nearly six million die and another five million are left permanently disabled(2). Stroke is among the top four leading causes of death in ASEAN countries since 1992(3). In Malaysia, stroke is one of the top five leading causes of death after ischemic heart disease, septicemia, malignant neoplasms, and pneumonia(4). By 2020, stroke mortality will have almost doubled, mainly as a result of an increase in the proportion of older people and the future effects of current smoking patterns in less developed countries(5). Over the past two decades (1990–2010), the absolute number of people with incident ischemic stroke has increased significantly by 37% and incident hemorrhagic stroke by 47%, and the number of deaths due to ischemic and hemorrhagic stroke has increased by 21% and 20% respectively(6).

1.2 PATHOGENESIS OF ISCHEMIC STROKE

The World Health Organization (WHO) definition of stroke is rapidly developing clinical symptoms and/or signs of focal, and at times global, loss of cerebral function, with symptoms lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin(7, 8). This syndrome varies in severity from recovery in a day, through incomplete recovery, to severe disability, to death.

Strokes are either ischemic or hemorrhagic. Ischemic strokes are caused by interruption of the blood supply, while hemorrhagic strokes result from rupture of a blood vessel or an abnormal vascular structure. Diagnosis of stroke subtypes is critical for appropriate management, and usually made by using Computerized Tomography (CT) or Magnetic Resonance Imaging (MRI)(9).

Ischemic stroke constitutes 80–85% of all strokes (9-11) which results from the occlusion of a major cerebral artery leads to loss of blood flow and subsequent tissue death in the affected region. Ischemic stroke further classified into different subtypes according to clinical syndromes and the presence of cardiac sources of embolism, atherosclerotic arterial disease (thrombotic), disease of small penetrating arteries, or various rarer causes(5). The subtypes are:

- a) Thrombotic Ischemic stroke
 - Result from the atherosclerotic obstruction of large cervical and cerebral arteries, with ischemia in all or part of the occluded artery. This can be due to either occlusion or embolism (12).

b) Embolic cerebral infarction

- Embolism of a clot in the cerebral arteries come from other site such as from cardiac lesions, either valves or cardiac cavities, or due to rhythm disturbances with stasis of the blood as seen in atrial fibrillation(12).

c) Lacunar cerebral infarctions

- small deep infarcts in the territory of small penetrating arteries, due to a local disease of these vessels, mostly related to chronic hypertension(12).

Risk factors for stroke can be classified as modifiable or non-modifiable. Advancing age is associated with increased ischemic stroke prevalence. Stroke incidence rates also rise exponentially with increasing age(13). Men have higher age-specific stroke rates if compare to women and they are more likely to have their first-ever stroke at younger age (14). Some modifiable risk factors such as hypertension, diabetes, ischemic heart disease, atrial fibrillation and cigarette smoking are common and affect health in several ways providing opportunities to modify risk in most people(5, 15, 16). Specifically in Kelantan, the risk factors for stroke were smoking, diabetes, heart disease, and hypercholesterolemia, with hypertension being the highest risk factor(4).

1.3 STROKE REHABILITATION

Stroke patients are at highest risk of mortality in the first few weeks of onset. Up to 50% will die within the first month depending on age, type, severity, comorbidity and effectiveness of treatment of complications. Patients who survived maybe left with no disability or with mild, moderate or severe disability(12). Hemiparesis is one of the presenting finding in three quarters of patient with stroke. Acute neurological impairment frequently resolves spontaneously, but persisting disabilities will lead to dependency in activities of daily living in stroke survivors. As a consequence from stroke, millions of them have to adapt with restrictions in activities of daily living. Many of them often depend on other people's continuous support to continue their life. Moreover, by 2030, it is estimated that stroke will be the fourth most common cause of disability in western countries (9).

Rehabilitation is a restorative and learning process which seeks to hasten and maximize recovery from stroke by treating the resultant impairment, disabilities, and handicaps. Stroke rehabilitation is one of the important components in the stroke management. Rehabilitation after stroke is continuous learning, starting within days of stroke onset and ending only when it was no longer produces any positive effect. More than half of patients who survive the first month after a stroke will require specialized rehabilitation(17). Effective rehabilitation interventions which initiated early after the stroke onset can enhance the recovery process and minimize functional disability (18). Severities of stroke also play an important role to determine the type and intensity of rehabilitation. Greater severity is associated with poorer outcomes. Severe strokes often cause multiple disabilities and constitute not only the most

disabled group of stroke patients but also the greatest challenge for rehabilitation and greater resources (19).

There are a few types of rehabilitation programs available such as hospital programs, acute care facility or rehabilitation hospital, long-term care facilities with therapy and skilled nursing care, outpatient programs and home-based programs. The goals of rehabilitation are to help patients become as independent as possible, enhance functional activities and participation in society and thus improve quality of life. Although a majority of functional abilities may be restored soon after a stroke, recovery is an ongoing process. Even though rehabilitation does not reverse brain damage, but it can help them regain freedom of movement and functional independence and reintegrate as fully as possible into the community. Effective rehabilitation relies on few factors. A coordinated, multidisciplinary team approach and regular team meetings, as well as meetings with the patient, family and caregiver are essential(17). Rehabilitation for stroke patient should start as early as possible once patient medically stable and fit for rehabilitation program. Early rehabilitation after 7 days becomes one of important component of stroke management(17).

Peszczyński et al (1972) of the Joint Committee for Stroke Facilities summarized the accepted and well-established principles of rehabilitation for stroke as follows: 1) prevent or minimize secondary complications, 2) compensate for sensory and perceptual loss, 3) substitute for lost motor function, 4) provide environmental stimulation, 5) encourage socialization, 6) produce a high degree of motivation, 7) enable independent function and home living, and 8) achieve vocational rehabilitation when feasible(20).

A study done by Hopman and Verner (2003) shows that inpatient rehabilitation has a strong, positive impact on HRQOL, as expected. However, the finding that significant improvements during inpatient rehabilitation may be followed by equally significant declines in the 6 months after discharge suggests that patients may not do well when they return to their own environment(21). This shows that home or outpatient rehabilitation is important for improvement of functional and quality of life in stroke survivors over time.

The outcomes of stroke and rehabilitation vary among patients. Rehabilitation in the acute stage optimizes the patient's potential for functional recovery. Early mobilization will prevent or minimizes the harmful effects of stroke and the potential for secondary impairments. Teasell et al (2008), revealed the evidence-based stroke rehabilitation care which is more efficient in functional gain, fewer complications, lower mortality rate, and had lower need for institutionalization(22). Ideally, the rehabilitation therapy should begin in the acute-care hospital after the stroke patient's condition is stable. Duncan et al (2005) recommended that stroke rehabilitation therapy should be started as soon as possible, once medical stability is reach(18).

The median length of survival among ischemic stroke patients independent in daily living was longer than that of those who are dependent (9.7 years (95% CI 8.9 to 10.6) versus 6.0 years (95% CI 5.7 to 6.4), resp.)(23). The result from rehabilitation affects not only longer survival period but also the quality of life of stroke patients for functional independence(23, 24).

1.4 HOME-BASED REHABILITATION

Stroke rehabilitation can be conducted in many ways. It is either in inpatient rehabilitation hospitals, the patient's home, or outpatient facilities. Some patients may recover from the acute phase with no need for rehabilitation services. Home-based rehabilitation is defined as a "rehabilitation program provided in the patient's place of residence(18). Home-based rehabilitation programs provide the greatest flexibility in terms of schedule, frequency and intensity of rehabilitation. It is most convenient for patients who are homebound because of lack of transportation or because they require only one type of therapist.

In Malaysia, there was limited number of center available for inpatient rehabilitation setting. Most stroke patients are discharge soon after medically stable and attended outpatient rehabilitation programs which were also in limited resources either limited number of rehabilitation center or insufficient physiotherapist trained in neurologic rehabilitation. Cost and time for travelling may also contribute for not continuing rehabilitation after discharge from the hospital. Thus, home based rehabilitation that does not require physiotherapist is an attractive alternative to the current rehabilitation program available in Malaysia.

Home rehabilitation has evolved in recent years as an alternative to inpatient rehabilitation for suitable patients. The aim of home rehabilitation is to provide a home environment alternative to hospital rehabilitation either in or outpatient. The potential benefits associated with home rehabilitation include those related to patients and families for example improved empowerment, earlier return to home and family, and to the community. The factors responsible for the superiority of the home rehabilitation program may include family

support, earlier initiation of rehabilitation, rehabilitation in the home environment, an individually tailored program with audiovisual materials, and close follow-up (24, 25)

A study by Duncan et al (1998), demonstrated that a randomized, controlled clinical trial of a specific home rehabilitation intervention is feasible(25). It shows that individuals with stroke can make gains in function beyond that which occurs with usual care. This pilot study demonstrated that a randomized clinical trial is possible in post discharge stroke rehabilitation, the intervention may be home based, and may need a very structured intervention program to improve strength, balance, endurance, and bimanual activities to be effective(25). A few studies showed early home rehabilitation intervention is effective in stroke patients. They obtained better outcomes in motor function, balance and activities of daily living (24-26).

Study by Mayo et al. (2000) found that home rehabilitation had significantly better Instrumental ADL scores and Reintegration to Normal Living Index scores compared with patient treated in hospital. However, there was no differences in Barthel Index between 2 groups (27). Another study by Donnelly et al (2004) provides evidence base to support earlier discharge to community based rehabilitation as a way of increasing patient choice particularly with respect to mild to moderate stroke patients(28).

In Malaysia, Redzuan et al (2012) support the home-based program for stroke rehabilitation and it is safe, does not have negatively impact on independence, and is not stressful for caregivers(29). Another studies done in Thailand also agreed that home rehabilitation is a good alternative than usual care and showed improvement in function, reduced disabilities, and increased quality of life in intervention group(24, 30). Both studies used audio visual program as a medium for home rehabilitation.

Home rehabilitation program costs also have been shown to be lower than inpatient rehabilitation in the hospital. Several studies have suggested that home-based rehabilitation is more cost-effective than traditional, hospital-based care (25, 28, 31, 32). In Malaysia, post-stroke outpatient care costs are significantly influenced by stroke severity. The cost of patients care was the main cost earned during the first three months after hospital discharge, while travelling expenses was the main cost earned when attending outpatient stroke rehabilitation therapy(33). The mean cost of attending outpatient therapy per patient was USD 17.50 per session (range USD 6.60–30.60), with travelling expenses (41.8%) forming the bulk of the cost, followed by medical fees (38.1%) and out-of-pocket expenses (10.9%)(33).

1.5 QUALITY OF LIFE AMONG STROKE PATIENTS

Quality of life (QOL) is a ubiquitous concept that has different philosophical, political and health-related definitions. Health-related QOL (HRQOL) includes the physical, functional, social and emotional well-being of an individual(34). WHO defines Quality of Life as “individual’s perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns”(35). It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, level of independence, social relationships, personal beliefs and their relationship to salient features of their environment(35).

Medical treatment and intervention may prolong life, but it is important to know the nature of that further life. Without an assessment of QOL, a treatment may be successful despite of poor psychosocial functioning or adjustment to illness. Stroke patients who are fully independent according to Barthel Index scores may experience limitations in a lot of areas such as employment, leisure activities or emotional adjustment.

One study that assessed 63 stroke survivors during inpatient rehabilitation 1 month after stroke and again at home 6 months after the stroke found there was improvement in functional independence and HRQOL over time but this improvement was strongly correlated with self-care and self-efficacy (36). Another study of 46 patients after 4 years of stroke found that despite a good recovery in terms of hospital discharge, activities of daily living, and return to work, the QOL of 83% of the patients had not returned to the pre-stroke level(37).

A study done by K. Laurent et al (2011) among first-stroke victims found that stroke victims have a significantly poorer quality of life than the general population(38). Another study done by Gbiri et al (2012) showed that QOL in Nigerian stroke survivors over the first 12 months post-stroke improved significantly, however it remained relatively lower than the total obtainable score throughout the 12 months (39).

Quality of life can be measured by various scales. In the last few years, several specific HRQOL scales have been developed but Stroke Impact Scale (SIS) and Stroke-Specific Quality of Life Scale (SSQOL) are the most used to measure the quality of life in stroke survivors (40). The SSQOL is a single stroke outcome measure that aims to efficiently assess the various domains important in determining stroke-specific HRQOL across the spectrum of stroke symptoms and severity(41).

1.6 ACTIVITY OF DAILY LIVING AMONG STROKE PATIENT

Activities of daily living (ADL) generally involving functional mobility and daily personal care such as eating, toileting, dressing, bathing, or brushing the teeth. The ability to perform ADL may be compromised by a variety of causes, including chronic illnesses and accidents. An inability to perform these renders one dependent on others, resulting in a self-care deficit. The limitation may be temporary or permanent. The goal of rehabilitation is to promote the greatest degree of independence for the patient. The rehabilitation may involve learning the skills or new ways to accomplish ADL.

ADL are a proxy of how the stroke survivor will function in the home environment. The autonomy in ADL was monitored with the Barthel Index (BI), a simple and reliable test frequently used in stroke studies. BI is an objective, standardized tool for measuring functional status. The individual is scored in a number of areas depending upon independence of performance. Total scores range from complete dependence which is 0 to complete independence which is 100. The Barthel Index (BI) and the modified Rankin Scale are the most commonly used scales to measure outcome after stroke or chronic illnesses in clinical trials (42). Nevertheless, they have some shortcomings which is BI and modified Rankin Scale are relatively insensitive to change over time, and may poorly represent the impact of stroke on a patient's subsequent life.

Duncan et al (1998) stated that a randomized, controlled clinical trial of a post stroke home-based exercise program is feasible however there was no group differences were found in the changes on the Barthel Index ADL after 12 weeks intervention (25). A study by Chaiyawat et

al (2009) showed that in the intervention group which using audiovisual CD program for home rehabilitation, all outcomes were significantly better ($p < 0.05$) and at three months, the BI showed more significant improvement in the intervention group than in the usual care group (24). In 2012, another randomized control trial was done to evaluate the long term effectiveness of home rehabilitation program. The study showed that BI was improved in both group but significantly better for intervention group(30).

Another study by Yulong Bai et al (2012) was done among haemorrhagic stroke patient. This study showed that early rehabilitation program significantly improved the daily activities and motor functions of patient with stroke. The Modified BI score of rehabilitation group were significantly higher than those of the control group over 6 months period ($p < 0.05$)(43).