Age-Related Rehabilitation Outcome in Stroke Patients

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Background: *Patients who survive a stroke usually have residual neurological deficits. Consequently, a rehabilitation program is valuable for improving their quality of life (QOL). However, age is a known factor that needs qualification vis-à-vis rehabilitation outcomes among Thai patients.*
Objective: *To study the functional and psychological outcomes and the QOL before and after rehabilitation program among three age groups of Thai stroke patients (≤ 44, 45-64 and ≥ 65 years of age).*
Study design: *Prospective, analytical study.*
Material and Method: *Three hundred and twenty seven stroke patients were measured using the Barthel index, the Hospital Anxiety and Depression scale (HADS) and the WHO QOL BREF questionnaire before and after undergoing an in-patient rehabilitation program. Data were collected from nine sites around Thailand.*
Results: *Functional and psychological outcomes and the quality of life score improved after the rehabilitation program. The youngest group of stroke victims showed the greatest improvement in functional outcome and QOL score in both the physical and social domains. No significant difference was found regarding anxiety and depression among the three groups.*
Conclusion: *An in-patient rehabilitation program was of benefit to Thai stroke patients but age significantly determined rehabilitation outcomes.*

Keywords: *Age, Functional outcome, Psychological condition, Quality of life, Rehabilitation program, Stroke, Thailand*

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Most patients who survive from an acute stroke have residual neurological deficits that cause difficulty in ambulation and taking care of themselves. Rehabilitation, therefore, serves a pivotal role in helping these patients to have effective, fulfilling independent lives. Several factors are herein related to functional outcomes of rehabilitation such as age, severity of paralysis and complications[1].

When stroke happens in persons under 45 it is called *stroke in the young*[2] and young patients usually have a greater potential for recovery than older patients, perhaps because of the emotional motivations of having a future, looking after their family, earning an income and/or having an important social role. By comparison, elderly (65 and over)[3] stroke patients already have declining physiological functions and some have disabilities related to aging (*e.g.,* blurred vision, osteoarthritis and memory loss), such that poorer rehabilitation functional outcomes are predicted.

Studies in elderly stroke patients indicate that they have a lower quality of life (QOL) than younger patients[4,5]. A study from Thailand suggested that Buddhism helped elderly patients to resign themselves to their fate *cum* disease[6]; notwithstanding, there has been no study in Thailand about rehabilitation outcomes and QOL comparing elderly and younger patients. The present study was set to examine the functional and psychological outcomes and QOL score

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among 3 age groups (*i.e.,* ≤ 44, 45-64 and ≥ 65 years of age) before and after a rehabilitation program.

Material and Method

Subjects

Included in the present study were stroke patients over 18, admitted to the rehabilitation ward in stable medical condition, able to follow at least a one-step command and could sit without dizziness for at least 30 minutes. Informed consent forms were signed before recruitment. Excluded from the present study were patients with: severe medical conditions such as uncontrolled heart and lung disease, uncontrolled psychosis, dementia and/or multiple disabilities.

Method

The present study was part of the Thai Stroke Rehabilitation Registry (TSRR), a national, multi-center, hospital-based registry of rehabilitation of stroke patients in Thailand between March and December 2006[7]. The data were collected from 9 hospitals across Thailand regarding stroke patients admitted for rehabilitation by rehabilitation doctors and nurses, physical and occupational therapists. The patients' functional level was evaluated weekly until they reached the goal of independence and were discharged. If they could not reach the goal, they were discharged when the Barthel index had not changed for 2 consecutive weeks.

Patients were divided into Group 1, 2 and 3 according to their respective age ≤ 44, 45-64 and ≥ 65 years of age and their rehabilitation outcomes compared within and among groups. Demographic data and the patients' neurological condition were recorded. The main rehabilitation outcomes (*viz.,* functional outcome on the 10-item Barthel index[8], psychological condition according to the hospital anxiety depression scale (HADS) and quality of life score by WHO BREF QOL) were measured and analyzed. Both the HADS and WHO BREF QOL have good validity and reliability in their Thai versions[9,10].

Statistical analysis

Demographic data and the characteristics of the patients were assessed using descriptive statistics, (frequency, percentage and mean ± standard deviation (SD)) while an ANOVA was used to compare the continuous data including the QOL and HADS scores among the three age groups. A p-value of less than 0.05 was considered statistically significant.

Results

There were 327 patients included in this study, 19, 161 and 147 patients in the 18-44, 45-64 and ≥ 65 year-old groups, respectively. The mean age in Group 1, 2 and 3 was 35.68 ± 6.24, 55.5 ± 5.36 and 73.06 ± 5.69 years, respectively. The percentage of male patients in both younger groups was higher than the oldest group.

Table 1. Demographic data

	Age ≤ 44 (n = 19) n (%)	Age 45-64 (n = 161) n (%)	Age ≥ 65 (n = 147) n (%)
Sex			
Male	17 (89.5)	105 (65.2)	71 (48.3)
Female	2 (10.5)	56 (34.8)	76 (51.7)
Age (mean ± SD)	35.68 ± 6.24	55.5 ± 5.36	73.06 ± 5.69
Marital status			
Single	6 (31.6)	14 (8.7)	3 (2)
Married	13 (68.4)	127 (78.9)	99 (67.3)
Divorce/separate	0	20 (12.4)	45 (30.6)
Education			
None	0	5 (3.1)	13 (8.8)
Primary school	3 (15.8)	71 (44.1)	100 (68)
Secondary school	5 (26.3)	30 (18.6)	20 (13.6)
Diploma	2 (10.5)	14 (8.7)	2 (1.4)
Bachelor or more	9 (47.4)	37 (23)	12 (8.2)
Others	0	4 (2.5)	0
Previous home			
Urban	13 (68.4)	106 (65.8)	84 (57.1)
Rural	8 (31.6)	55 (34.2)	63 (42.9)

Most of the present patients were married. Primary school was completed by most in the 2nd and 3rd groups while a higher education was achieved in the youngest. About two-thirds of the 1st and 2nd groups lived in urban areas compared to about one-half of the oldest group. The demographic data of all groups is presented in Table 1.

The most common risk factor for all groups was hypertension. The percentage of risk factors (including hypercholesterolemia, diabetic, cardiac disease, previous stroke, history of smoking, history of alcohol and transient ischemic attack) are shown in Table 2. Notably, the percentages of smoking and history of alcohol use were highest in the youngest group.

Regarding the pathology of stroke, infarction (mostly thrombosis) was more common than hemorrhage; nevertheless, in the youngest group, the percentage of infarction and hemorrhage was equal (Table 3). Conspicuously, there was a remarkable increase in the percentage of emboli in the youngest group and lacunar infarction in the oldest group (Table 4).

The number of sides of weakness among the three groups is shown in Table 5. There was relatively little bilateral side weakness among the three groups. The respective Barthel index score pre- vs. post-rehabilitation in the youngest to oldest groups (i.e., Group 1, 2 and 3) was 8.68 ± 4.41 vs. 16.53 ± 3.95, 7.65 ± 3.82 vs. 13.55 ± 4.89 and 7.14 ± 4.02 vs. 12.54 ± 4.76 - a statistically significant difference (Table 6). The ANOVA found no significant difference among the groups pre-rehabilitation ($p = 0.207$) but a significant differences between the first and second ($p = 0.032$) and first and third groups post-rehabilitation ($p = 0.002$).

The hospital anxiety and depression scale was assessed to evaluate the patients' psychological condition. The anxiety score pre- vs. post-rehabilitation was 7.13 ± 3.56 vs. 5.19 ± 3.12 in the youngest group, 7.82 ± 4.07 vs. 5.93 ± 3.43 in the middle group and 7.56 ± 3.84 vs. 5.87 ± 3.11 in the oldest group. The depression score in the youngest to oldest groups was 7.38 ± 3.42 vs. 5.94 ± 2.93, 8.71 ± 4.29 vs. 6.70 ± 3.76 and 9.33 ± 4.14 vs. 7.73 ± 4.07, respectively. Again, these were significant differences between before and after rehabilitation in the middle and oldest group ($p = 0.000$) (Table 7). There was, however, no significant pre- and post-rehabilitation difference among the groups ($p > 0.05$).

Table 8 shows the WHO BREF QOL pre- vs. post-program scores, by respective domain (*viz.*, physical, psychological, social and environmental). There was a significant difference between the second/

Table 2. Risk factors

	Age ≤ 44 (n = 19) n (%)	Age 45-64 (n = 161) n (%)	Age ≥ 65 (n = 147) n (%)
Diabetes	2 (10.5)	46 (28.6)	39 (26.5)
Hypertension	12 (63.2)	117 (72.7)	116 (78.9)
Hypercholesterolemia	5 (26.3)	83 (51.6)	90 (61.2)
Cardiac disease	1 (5.3)	28 (17.4)	30 (20.4)
Transient ischemic attack	0	0	3 (2)
Previous stroke	0	25 (15.5)	23 (15.6)
History of smoking			
Ever	3 (15.8)	42 (26.1)	41 (27.9)
Smoking	7 (36.8)	35 (21.7)	22 (15)
History of alcohol	11 (57.9)	53 (32.9)	34 (23.1)

Table 3. Type of stroke

	Age ≤ 44 (n = 19) n (%)	Age 45-64 (n = 161) n (%)	Age ≥ 65 (n = 147) n (%)
Infarction	9 (47.4)	101 (62.7)	124 (84.4)
Hemorrhage	10 (52.6)	59 (36.6)	23 (15.6)
Unknown		1 (0.6)	

Table 4. Type of infarction

	Age ≤ 44 (n = 19) n (%)	Age 45-64 (n = 161) n (%)	Age ≥ 65 (n = 147) n (%)
Thrombosis	5 (26.3)	67 (41.6)	76 (51.7)
Emboli	2 (10.5)	14 (8.7)	10 (6.8)
Lacunar infarction	2 (10.5)	16 (9.9)	32 (21.8)
Other	0	4 (2.5)	6 (4.1)
Unknown	10 (52.6)	60 (37.3)	23 (15.6)

Table 5. Side of weakness

	Age ≤ 44 (n = 19) n (%)	Age 45-64 (n = 161) n (%)	Age ≥ 65 (n = 147) n (%)
Side of weakness			
Left	7 (36.8)	87 (54.7)	82 (55.8)
Right	11 (57.9)	69 (43.4)	62 (42.2)
Bilateral	1 (5.3)	3 (1.9)	3 (2)

Table 6. Barthel index (pre- and post-rehabilitation program)

	Age ≤ 44		p-value	Age 45-64		p-value	Age ≥ 65		p-value
	pre	post		pre	post		pre	post	
Barthel index	8.68±4.41	16.53±3.95	0.000	7.65±3.82	13.55±4.89	0.000	7.14±4.02	12.54±4.76	0.000

Table 7. Psychological score (pre and post rehabilitation program)

	Age ≤ 44		p-value	Age 45-64		p-value	Age ≥ 65		p-value
	pre	post		pre	post		pre	post	
Anxiety	7.13±3.56	5.19±3.12	0.054	7.82±4.07	5.93±3.43	0.000	7.56±3.84	5.87±0.11	0.000
Depression	7.38±3.42	5.94±2.93	0.206	8.71±4.29	6.70±3.76	0.000	9.33±4.14	7.73±4.07	0.000

Table 8. Quality of life score (pre and post rehabilitation program)

	Age ≤ 44		p-value	Age 45-64		p-value	Age ≥ 65		p-value
	pre	post		pre	post		pre	post	
Physical	19.35±4.02	23.71±4.59	0.012	18.01±3.96	21.71±3.55	0.000	18.09±3.75	20.81±3.53	0.000
Psychological	18.17±3.64	20.65±3.61	0.136	18.15±4.15	20.56±3.50	0.000	18.04±3.74	20.04±3.35	0.000
Social	10.06±1.92	10.76±1.75	0.193	9.15±2.23	9.73±2.0	0.001	8.73±2.40	9.44±2.01	0.000
Environmental	24.59±3.71	27.71±4.88	0.087	24.49±4.90	26.56±4.28	0.000	24.32±3.56	25.74±3.60	0.000

third groups and the first group vis-à-vis the physical domain, but none for the psychological, social and environmental domains. The ANOVA comparing among groups indicated a significant difference in the physical and social domains ($p = 0.003$, $p = 0.032$). Additional analysis showed a significant difference between the first-third groups in the physical domain ($p = 0.006$) and a significant difference between the first-third groups in the social domain ($p = 0.032$).

Discussion

The most common risk factor of all age groups was hypertension; however, the percentage of history of smoking and of alcohol use in the young stroke group was prominent. Infarction was the major cause of stroke in all age groups; however, the percentage of hemorrhage and emboli was conspicuous in the youngest group while lacunar infarction was more commonly found in the eldest group. The common pathology of stroke in each age group of our results is similar to previous studies[2,11,12].

The present study, as in previous studies, found an improvement of functional outcomes after rehabilitation in all groups and that age was an important predictive variable of recovery[13-16]. The functional outcome correlates negatively with age: the older the patient, the poorer the outcome[17,18]. Another study about rehabilitation in young ischemic stroke victims showed that the number of patients with totally independent function was rather low[12]. By contrast, in the present study, functional outcome improvement in the youngest group was significantly better than the oldest group.

Whereas a depression problem was commonly found in the elderly, especially those with chronic illness, a higher prevalence of depression was found in the elderly with chronic illness after stroke[19-21]. In the present study, however, a difference in the psychological domain among the three age groups was not detected. Possibly, Thai culture offers an explanation as most of the presented patients had good family support, an important factor for combating depression[22]. Alternatively, Buddhism, the predominant religion, teaches individuals to accept one's fate (kharma).

Quality of life (QOL) is a multidimensional outcome comprising four domains. Some reports

indicate an improvement of the SF-36 QOL score after receiving in-patient stroke rehabilitation[4,23]. In Thailand, Sirikangwalkul's study about the factors affecting QOL among Thai stroke patients using the SF-36 confirmed the negative effect of aging on QOL[24]. A report confirmed that younger stroke victims have a better subsequent QOL than older stroke patients in first year after stroke[5]. The presented patients had an intermediate QOL in all groups. The physical and social domains of the QOL score of the youngest stroke victims were remarkably better perhaps because they have more social interactions than the older group. Thus, medical staff should place more emphasis on social problems as an aid to helping rehabilitate the elderly.

Conclusion

The in-patient rehabilitation program produced a significant improvement in functional and psychological outcomes and the quality of life score in all age groups of Thai stroke victims. The youngest group showed the greatest improvement in functional outcomes. There was no significant difference among the groups in their psychological condition pre-/post-rehabilitation; however, the physical and social scores for quality of life were highest in the youngest group.

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ปัจจัยด้านอายุที่มีผลต่อการฟื้นฟูสภาพผู้ป่วยอัมพาตครึ่งซีกจากโรคหลอดเลือดสมอง

ณัฐเศรษฐ มนิมนากร, ปรีดา อารยวิชานนท์, ภัทรา วัฒนพันธุ์, โฉมพิไล นันทรักษา, วิไล คุปต์นิรัติศัยกุล

ภูมิหลัง: *ผู้ป่วยอัมพาตจากโรคหลอดเลือดสมองที่รอดชีวิตมักจะมีปัญหาความพิการหลงเหลืออยู่ โปรแกรมการฟื้นฟูสมรรถภาพจะช่วยให้ผู้ป่วยดีขึ้นได้ อายุเป็นปัจจัยที่สำคัญที่มีผลต่อการฟื้นฟูสมรรถภาพ ซึ่งน่าจะนำมาศึกษาในคนไทย*

วัตถุประสงค์: *เพื่อศึกษาความสามารถในการช่วยเหลือตนเอง สภาพจิตใจ และคุณภาพชีวิตของผู้ป่วยอัมพาตจากโรคหลอดเลือดสมอง 3 กลุ่มอายุ: กลุ่มที่ 1 อายุ ≤ 44 ปี กลุ่มที่ 2 อายุ 45-64 ปี กลุ่มที่ 3 อายุ ≥ 65 ปี ก่อนและหลังได้รับโปรแกรมการฟื้นฟู*

รูปแบบ: *การศึกษาไปข้างหน้าเชิงวิเคราะห์*

วัสดุและวิธีการ: *ศึกษาจากผู้ป่วยอัมพาตจากโรคหลอดเลือดสมองที่เข้ารับการรักษาในหอผู้ป่วยเวชศาสตร์ฟื้นฟู หลังจากได้รับการโปรแกรมการฟื้นฟู จากทีมเวชศาสตร์ฟื้นฟู เครื่องมือที่ใช้วัดผลการฟื้นฟู ได้แก่ Barthel Index, Hospital Anxiety and Depression Scale (HADS) และ WHO BREF QOL โดยวัดก่อนและหลังได้รับโปรแกรมการฟื้นฟูสมรรถภาพ เก็บข้อมูลจากสถาบันที่เข้าร่วมโครงการ 9 แห่ง*

ผลการศึกษา: *ผลของโปรแกรมการฟื้นฟูสมรรถภาพ ช่วยให้ความสามารถในการช่วยเหลือตนเอง สภาพจิตใจ และคุณภาพชีวิตของผู้ป่วยดีขึ้น ผู้ป่วยกลุ่มที่อายุน้อยที่สุด มีความสามารถในการช่วยเหลือตนเอง และมีคะแนนทางกายและทางสังคมของคะแนนคุณภาพชีวิตดีที่สุด ไม่พบความแตกต่างของภาวะวิตกกังวล และภาวะซึมเศร้า ในคนไข้ทั้ง 3 กลุ่มอายุ*

สรุป: *โปรแกรมการฟื้นฟูสมรรถภาพในโรงพยาบาลสามารถช่วยให้ผู้ป่วยคนไทยดีขึ้น อายุเป็นปัจจัยที่มีผลชัดเจนต่อผลของการฟื้นฟูสมรรถภาพ*