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Physiotherapy And Daily Living Activities Of Stroke Patients

Kakagianni Evangelia
Phd Candidate, University Of West Attica

Kaba Evridiki
Professor, University Of West Attica

Papageorgiou
Dimitrios, Professor, University Of West Attica

Kelesi-Stavropoulou Martha
Professor, University Of West Attica

Abstract
This study aims to assess the Activities of Daily Living (ADL) performance in stroke patients, exploring the impact of physiotherapy while considering demographic characteristics and other health conditions. The Barthel scale was employed to measure ADL performance. Additionally, a three-level question on depression ("I do not feel depressed", "I feel moderately stressed or depressed", and "I feel excessively stressed or depressed") was included in the questionnaire. To examine the effect of physiotherapy and explanatory variables on the six ordinal variables of interest, a Linear Mixed-Effects Regression was performed, accounting for the effect of time. The findings indicated a significant difference in activity performance between the treatment and control groups. Moreover, depression, hypertension, and smoking were found to play a crucial role in the performance outcomes.

Keywords: *Stroke; Physiotherapy; Barthel; Activities of Daily Living*

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I. Introduction

The term "stroke" refers to acute cerebral dysfunction resulting from vascular issues that cause nervous system impairment lasting more than 42 hours. This neurological disorder is localized, typically due to vascular occlusion. However, generalized dysfunction can also occur if a vessel ruptures, leading to pressure phenomena and bleeding (Marino, 2009).

According to the World Health Organization (WHO, 2004), a stroke is any disorder in the brain tissue or spinal cord caused by damage to the blood supply, accompanied by a sudden onset of symptoms. It involves a combination of clinical manifestations related to diseased cerebral vessels and a subsequent temporary interruption of cerebral blood circulation (Mylonas & Logothetis, 1996).

The present study aims to measure the Activities of Daily Living (ADL) performance of stroke patients, investigating the impact of physiotherapy while taking into account demographic characteristics and other health conditions.

II. Methods

The Barthel scale is used to measure performance in ADL. Each performance item is scored on this scale with a specific number of points assigned to each level or rank (O'Sullivan 2007). It uses ten variables that describe activities of daily living and mobility. The time and physical assistance required to perform each item are used in determining the assigned value of each item. The scale is coded as a continuous variable with possible values ranging from 0 to 100. One extra 3-level question on depression ("I do not feel depressed", "I feel moderately stressed or depressed", and "I feel excessively stressed or depressed") was added to the questionnaire.

The questionnaire was completed three times (within six months and one year from the initial completion) by 101 subjects, 61 of whom belonged to the physiotherapy (treatment) group, and 40 to the control group.

Explanatory variables used in the analysis were time (0, 1, and 2 6-month periods after initial administration), age group (up to 40 years, up to 50 years, up to 60 years, up to 70 years, over 70 years), biological sex (male - female), marital status (married, single, divorced, widowed), level of education (illiterate, primary, secondary, high school, university), as well as the presence of five characteristics (yes, no): diabetes, smoking, hypercholesterolemia, hypertension, and atrial fibrillation.

To test the effect of physiotherapy and explanatory variables on the six ordinal variables of interest in the questionnaire, a Linear Mixed-Effects Regression was conducted, taking into account the effect of time.

III. Results

The model developed was statistically significant ($F(22, 280) = 42.568$, $p < .001$). Regarding the main effects, the results showed that the difference between the two groups was statistically significant ($F(1, 280) = 23.371$, $p < .001$). In addition, the effect of time was statistically significant ($F(2, 280) = 148.535$, $p < .001$) and differed between the two groups ($F(2, 280) = 25.500$, $p < .001$). Of the explanatory variables, hypertension was statistically significant at the 0.05 level ($F(1, 280) = 4.750$, $p = .030$), while smoking was also at the 0.10 level ($F(1, 280) = 3.338$, $p = . 069$). Finally, the patients' response to the depression question was statistically significant ($F(2, 280) = 28.925$, $p < .001$).

Specifically, control group members who did not present hypertension, did not smoke, and answered “I feel excessively stressed or depressed” on the depression question had an expected Barthel value of 28,703 points ($t = 2.317$, $df = 280$, $p = .021$) at baseline, increased by 15,997 units ($t = 4.855$, $df = 280$, $p < .001$) in the semester and 21.148 units ($t = 6.415$, $df = 280$, $p < .001$) in the year. The corresponding values for the treatment group were 25.552 units ($t = 4.424$, $df = 280$, $p < .001$) at six months and 32.460 units ($t = 4.832$, $df = 280$, $p < .001$) at one year. The overall means of the two groups were 40,213 units for the control group (95% CI: 30.731 – 49.694) and 60.143 for the treatment group (95% CI: 50.187 – 70.098). This difference indicates that the members of the treatment group had a significantly greater improvement on the Barthel scale than the members of the control group. The results are shown in Figure 1.

Regarding depression, subjects who reported “I feel moderately stressed or depressed” had an additional increase of 21.481 points ($t = 7.545$, $df = 280$, $p < .001$), while subjects who reported “I do not feel depressed” had an increase of 26.925 points ($t = 3.945$, $df = 280$, $p < .001$) relative to individuals who stated “I feel excessively stressed or depressed”. The overall means of the three responses were 60,967 points for the “I do not feel depressed” group (95% CI: 46.333 – 75.601), 55.524 points for the “I feel moderately stressed or depressed” group (95% CI: 46.830 – 64.217) and 34.042 points for the “I feel excessively stressed or depressed” group (95% CI: 25.964 – 42.120). This difference shows that the members of the latter group had a significantly lower value on the Barthel scale than the other two. The above shows the positive correlation between the two scales. The results are shown in Figure 2.

Finally, subjects who had hypertension had an expected decrease of 11.689 points ($t = -2.179$, $df = 280$, $p = .030$), while subjects who smoked had an expected decrease of 9.835 points ($t = -1.827$, $df = 280$, $p = .069$). The results are shown in Figures 3 and 4, respectively.

IV. Discussion

The study findings revealed a difference between the treatment and control groups in activity performance of the patients. In addition, depression, hypertension, and smoking play an important role in the resulting performance.

These findings offer valuable insights for stroke health professionals and caregivers, enriching their comprehension of patients' mental health and supporting enhancements in care practices. This study is particularly important for the organization of rehabilitation services throughout all healthcare facilities in Greece. It aims to aid in the prevention, early diagnosis, and treatment of mental disorders in stroke patients, ultimately minimizing hospital stays and lowering healthcare costs for the country.

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Tables And Plots

Table 1: Model ANOVA Table

Source	F	df_1	df_2	p-value	Sig.
Model	42,568	22	280	<0.001	***
Therapy Group	23.371	1	280	<0.001	***
Age	2.445	3	280	.064	-
Sex	0.165	1	280	.685	
Marital Status	1.721	3	280	.163	
Diabetes	1,804	1	280	.180	
Smoking	3.338	1	280	.069	-
Hypercholesterolemia	0.009	1	280	.923	
Hypertension	4.750	1	280	.030	*
Atrial Fibrillation	2.438	1	280	.120	
Education Level	0.956	3	280	414	
Time	148.535	2	280	<0.001	***
Time – Group Interaction	25.500	2	280	<0.001	***
EQ-5D Depression	28.925	2	280	<0.001	***

Significance Level: - 0.10, * 0.05, ** 0.01, *** 0,001

Table 2: Model Coefficients

Model Term	Coefficient	Std. Error	t	p-value	SSig.	95% Conf. Interval (Lower – Upper)	
Intercept	28.703	12.391	2.317	.021	*	4.312	53.094
Treatment Group	0.593	4.702	0.126	.900		-8.663	9.849
Age: >70	4.417	10.504	0.421	.674		-16.260	25.095
Age: 61-70	0.356	9.972	0.036	.972		-19.272	19.985
Age: 51-60	14.280	10.037	1.423	.156		-5.478	34.038
Sex: Female	-2.166	5.335	-0.406	.685		-12,668	8,336
Mar.: Widowed	-8.623	5.761	-1.497	.136		-19.964	2.718
Mar.: Divorced	-16.316	9.061	-1.801	.073	-	-34.153	1.520
Mar.: Single	-4.954	5.530	-0.896	.371		-15.839	5.931
Diabetes	-6.811	5.072	-1.343	.180		-16.795	3.172
Smoking	-9.835	5.384	-1.827	.069	-	-20.432	0.762
Hypercholesterolemia	0.447	4.634	0.096	.923		-8.675	9.569
Hypertension	-11.689	5,363	-2.179	.030	*	-22.246	-1.132
Atrial Fibrillation	-7.799	4,995	-1.561	.120		-17.631	2.033
Ed.: University	8.067	6.814	1.184	.237		-5.347	21.480
Ed.: High School	8.928	5.973	1.495	.136		-2.830	20.687
Ed.: Secondary	1.518	5.357	0.283	.777		-9.027	12.062
Time: 1 year	21.148	3.297	6.415	<.001	***	14.659	27.638
Time: 6 months	15.997	3.295	4.855	<.001	***	9.511	22.483
1 year - Treatment	32.460	4.832	6.718	<.001	***	22.948	41.971
6 months - Treatment	25.552	4.424	5,775	<.001	***	16.842	34.261
EQ-5D: 100	26.925	6.824	3.945	<.001	***	13.491	40.358
EQ-5D: 50	21.481	2.847	7.545	<.001	***	15.877	27.086

Significance Level: - 0.10, * 0.05, ** 0.01, *** 0.001

Figure 1: Barthel Comparison for the Treatment and Control Groups.

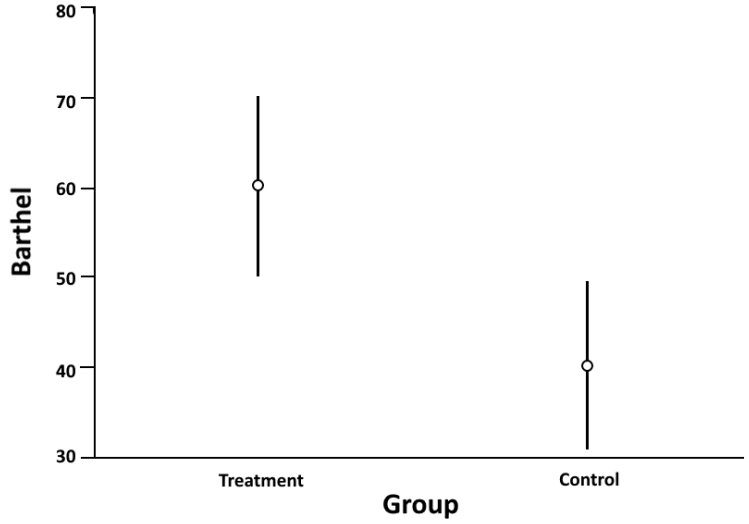

Figure 2: Barthel Comparison for the Depression Levels.

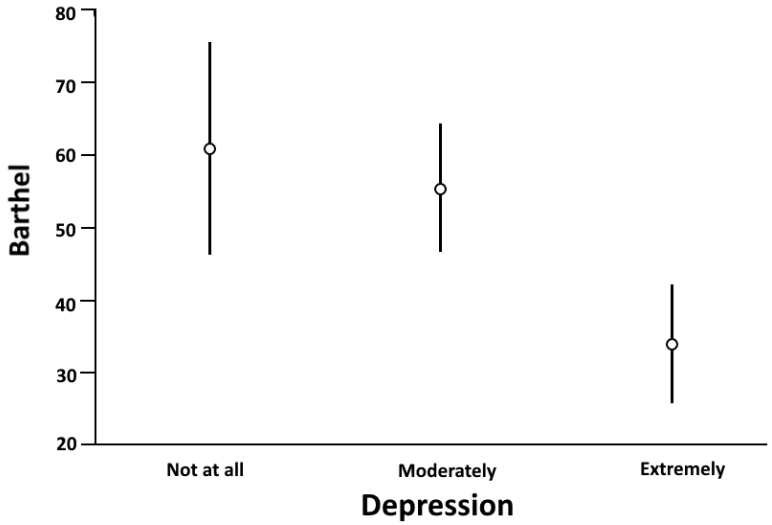

Figure 3: Barthel Comparison of Patients with and without Hypertension.

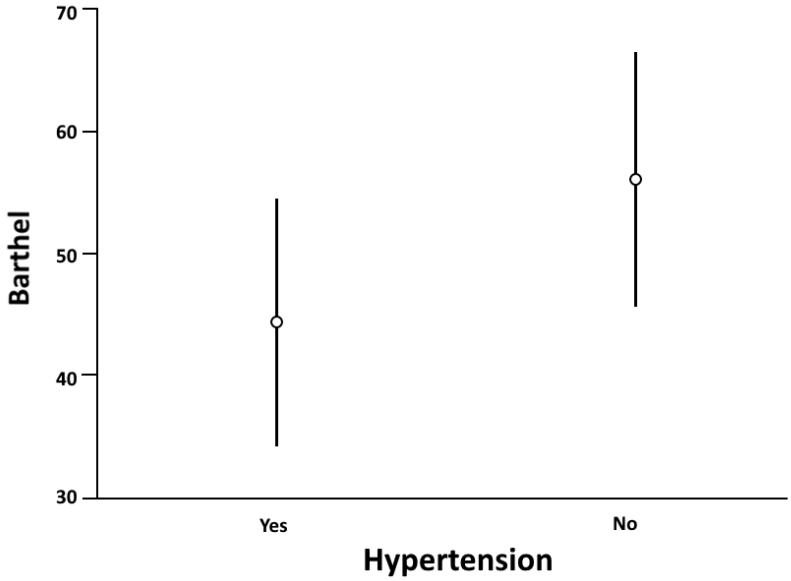

Figure 4: Barthel Comparison of Patients that do / do not Smoke.