

Post-Polio Sequelae

ACTIVITY AND POST-POLIO FATIGUE

Tanya L. Packer, MSc, BSc(OT)

Isabel Martins, BSc(OT)

Laura Krefting, PhD, OT(c)

Brenda Brouwer, PhD

ABSTRACT

Fatigue was studied in 12 subjects with post-polio sequelae (PPS). Results of the Fatigue Severity Scale (FSS) demonstrated a mean score of 4.8 ± 1.6 (non-disabled scores = 2.3 ± 0.7). The Human Activity Profile (HAP) was not sensitive enough to measure fatigue. Fifty percent of subjects scored below the first percentile based on age and sex matched norms. The Activity Record (ACTRE) results revealed that subjects spent 5% of their time resting and 1% in planning or preparation activities. Fatigue peaked in the late morning or early afternoon and was relieved by rest periods. Use of energy conservation and work simplification skills along with frequent rest periods was suggested as a possible method for managing PPS fatigue.

The most commonly reported post polio sequelae is fatigue.¹⁻³ Fatigue is described as the most severe and debilitating symptom by 77%

to 89% of persons with PPS.^{4,6} One study reported that physical exercise diminished fatigue in 70% of non-disabled individuals, whereas it increased fatigue in 48% of those with PPS.⁶ Only 15% of those with PPS reported a decrease in fatigue with minimal exercise. Although both non-disabled and PPS subjects described fatigue as "tiredness" and having "a lack of energy," only the PPS group described it as "increased physical weakness," a "heavy sensation in the muscles," and an "increased loss of strength during exercise."⁶

The purpose of this study was to describe the nature of fatigue experienced by people with PPS. Although Berilly et al⁶ have documented the way fatigue is perceived by those with PPS, there are no investigations of the patterns of fatigue, activities, or the impact of rest on the symptom. Such knowledge will guide intervention programs aimed at controlling fatigue and its impact on quality of life.

MATERIALS AND METHODS

Subjects of the study were polio survivors, self-referred to the post-polio assessment clinic. Subjects living in the community attended this 2-day outpatient clinic for assessment of fatigue, bracing needs, joint pain, muscle pain, and/or to request information regarding PPS. All subjects included in this study had a positive history of poliomyelitis, had no additional medical problems, and were not taking medication that would contribute to fatigue.

Twelve subjects, including 10 women (range: 42 to 77 years, mean: 56), seen consecutively at the clinic, participated in the study (Table). Five subjects were employed and seven were not employed outside the home (retired, on disability pension, or homemaker). Only three subjects used mobility aids: one used a cane occasionally, one has used periodic bracing, and the third used crutches and a manual wheelchair. Symptoms of PPS had developed within the last 5 years although, due to the insidious onset and

From the Division of Occupational Therapy, School of Rehabilitation Therapy, Queen's University, Kingston, Ontario, Canada.

This research was supported by the Canadian Occupational Therapy Foundation, Research Services of Queen's University, and the J.P. Bickell Foundation.

The authors acknowledge the assistance of Dr Judy Durance and all the staff of the Post-Polio Clinic at the March of Dimes, Kingston, Ontario. They especially thank all clients who participated in the study. Thanks also to Mike Ramsay for assistance in preparation of the manuscript.

Correspondence: Tanya L. Packer, MSc, BSc(OT), Div of Occupational Therapy, School of Rehabilitation Therapy, Queen's University, Kingston, Ontario, Canada K7L 3N6.

Table

SUBJECT DESCRIPTION AND RESULTS OF HAP AND FSS						
Subject	Age	Years Post-Acute Polio	Acute Involvement	HAP		FSS
				MAS (percentile)	AAS (percentile)	
01	43	38	2 limbs	<1	<1	5.6
02	77	38	No paralysis	42	23	2.3
03	56	56	2 limbs	04	<1	6.4
04	42	41	1 limb	37	<1	6.8
05	47	42	2 limbs	34	<1	N/A
06	53	42	Respiratory	29	29	4.8
07	51	47	1 limb	15	8	3.1
08	71	43	Back and abdominals	24	<1	6.8
09	72	53	2 limbs	24	<1	5.1
10	54	43	4 limbs	63	3	5.1
11	45	44	1 limb	85	83	3.0
12	61	43	2 limbs	76	66	3.9
Mean	56 ± 11.9	44.2 ± 5.4		36.2 ± 26.6	18.2 ± 28.2	4.8 ± 1.6

difficulty with diagnosis, most were unable to provide specific dates of onset.

The Activity Record (ACTRE), Fatigue Severity Scale (FSS), and the Human Activity Profile (HAP) were administered to characterize fatigue and to obtain quantitative and qualitative data regarding its impact on activities of daily living. The FSS and HAP are standardized measures but not specific to the PPS population. The ACTRE is a self-report activity log.

Subjects were asked to complete the ACTRE over a 2-day period prior to assessment at the clinic. During each ½ hour the dominant activity engaged in was recorded and rated (scale of 1 to 4) according to experiences of fatigue and pain, enjoyment and meaningfulness of the activity, and the level of perceived difficulty. Only the data pertaining to fatigue are reported here. Each activity was classified as rest, self care, preparation or planning, household activities, work, recreation or leisure, transportation, treatment, or sleep.⁷

The FSS and HAP were completed during the initial assessment at the clinic. The FSS assesses perceived fatigue.⁸ Nine statements are rated from 1 to 7, where 1 indicates the respondent "strongly disagrees" and 7 indicates the respondent "strongly agrees" with the statement. Examples of the statements are "fatigue interferes with my work, family, or social life" and "fatigue causes frequent problems for me." The FSS has been effective in collecting data on the general level of fatigue experienced by people with chronic degenerative illnesses.^{8,9}

The HAP is a survey of 24 activities, each of which has a known metabolic equivalent (MET).¹⁰ The activities include self-care, transportation, home maintenance, entertainment/social, and physical exercises. There are three performance

responses possible for each item: "still doing the activity," "have stopped doing the activity," and "never did the activity." The Maximum Activity Score (MAS) indicates the activity that the respondent engages in requiring the highest MET level. The Adjusted Activity Score (AAS) is the MAS minus the number of activities that the respondent has stopped performing. It measures the average MET levels in a typical day accounting for one or two activities requiring high MET levels. Age and sex matched norms allow comparison to the normal population.¹⁰

RESULTS

Because the assessment clinic is primarily concerned with service delivery, it was not possible to obtain all measures from all clients. All completed the HAP, 11 completed the FSS, and only 9 completed the 2-day ACTRE log.

The results of the FSS and the HAP are reported in the Table. The average fatigue score obtained on the FSS was 4.8 ± 1.6 . Scores for the non-disabled population are 2.3 ± 0.7 .⁸ MAS percentile scores ranged from <1 to 85 (mean: 36.2 ± 26.6). The AAS percentile scores ranged from <1 to 83 (mean: 18.2 ± 28.2); 50% of participants fell below the first percentile on the AAS scores.

Analysis of the ACTRE data revealed that the mean amount of time spent on sedentary tasks was $68.4\% \pm 9.5$, leaving only $31.3\% \pm 9.4$ of time spent on non-sedentary tasks. Sedentary tasks were defined as "mostly sitting or lying down" and non-sedentary tasks were defined as "mostly standing, walking, lifting, moving around, or sitting working with my hands." Seven of the nine respondents indicated taking additional breaks during non-sedentary activi-

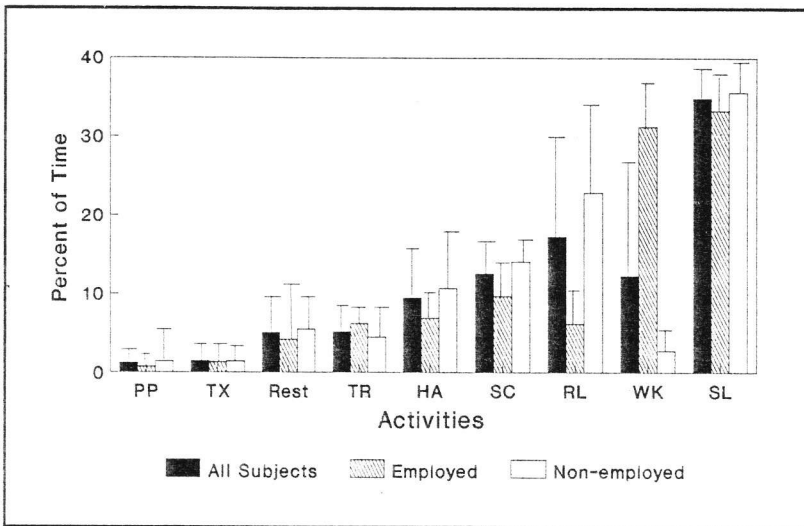


Fig 1: Mean percentage of time spent performing various activities. PP = planning and preparation; TX = treatment; TR = transportation; HA = household activities; SC = self-care; RL = recreation/leisure; WK = work; SL = sleep.

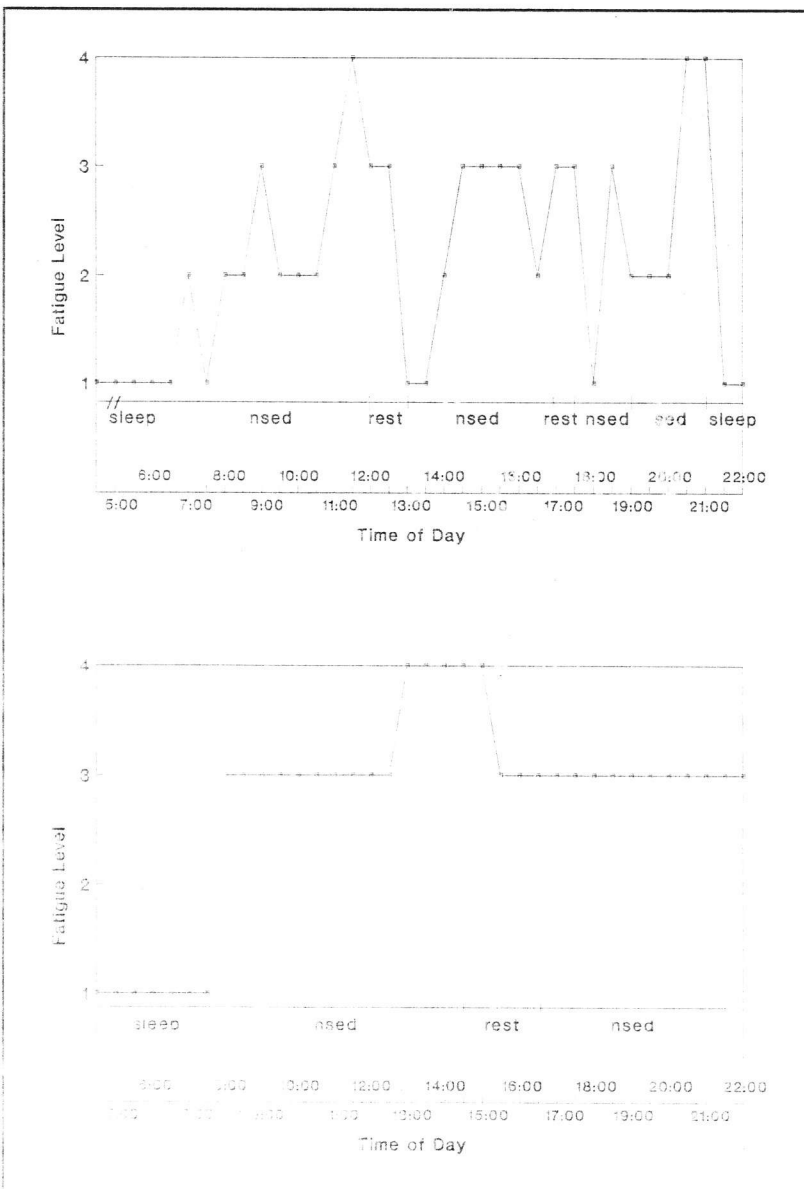


Fig 2: Typical fatigue patterns as demonstrated by two subjects, one who takes rest periods (top) and one who does not (bottom). sed = sedentary; nsed = non-sedentary.

ties. These were short breaks, not long enough to be recorded as 1/2 hour rest periods. These seven subjects collectively recorded 194 non-sedentary 1/2 hour periods during which they took 57 breaks (ie, during 29% of these periods).

Time spent in different activities by employed and non-employed subjects and the total group is reported in Figure 1. Subjects spent 5% of their time resting and about 1% of their time in planning and preparation tasks such as scheduling or planning of rest periods. They spent 35% of their time sleeping. Comparing time use of employed (n = 6) and non-employed (n = 3) subjects, it was found that employed subjects spent $31.2 \pm 5.5\%$ of their time in work activities (including volunteer and community service), while non-employed subjects spent only $2.8 \pm 2.8\%$ of their time in work activities. Those in the employed group spent less time in self-care, household activities, and recreation and leisure. There was less than 2% difference in the time the two groups spent resting or sleeping.

The two typical patterns of fatigue are illustrated in Figure 2. Subjects reported an increase in fatigue during the morning when few rests were taken. Subjectively they reported that they had to "keep driving (themselves) in order to get things done before extreme fatigue prevented further activity." Individuals tended to decrease their rating of fatigue during and following a period of rest or sedentary activity (Fig 2A). Individuals who did not take rest periods continued to report high fatigue ratings throughout the day (Fig 2B).

A comparison of measures was undertaken. Preliminary analysis using first order regression suggested there may be a correlation between the AAS and the FSS scores ($r = -.60, P < .05$) despite the fact that at least two of the subjects (11,12) were relatively asymptomatic. This suggests further investigation is warranted. There was no apparent correlation between the other variables (all r values $< .45$).

DISCUSSION

The scores on the FSS revealed that clients with PPS have higher perceived levels of fatigue than the non-disabled population and similar levels to subjects diagnosed with multiple sclerosis (4.8 ± 1.3) and systemic lupus erythematosus (4.7 ± 1.5).⁸

The HAP results indicated that individuals with PPS performed at much lower levels of function than would be expected in non-disabled subjects of the same age. Fifty percent of subjects did not achieve an AAS score above the first percentile. A score of less than the first percentile indicates that an individual has "stopped doing" enough activities that they did not register on the normative

scale. While it is impossible to determine a causal relationship between fatigue and the termination of activity, the negative correlation between the AAS and FSS supports this possibility. It is suggested that as fatigue increases, engagement in activity decreases. While comparison to normative data indicates the existence of a problem, our results show that the HAP is not sensitive enough to monitor changes in the activity level of these individuals.

From the daily activity patterns revealed by the ACTRE, it appears that fatigue peaked in the late morning and/or early afternoon. Rest periods, however, were able to decrease the fatigue rating. This is noteworthy because individuals with PPS spent only 5% of their time resting and 1% performing planning and preparation activities, suggesting that they were not using energy conservation techniques. Interestingly, the non-employed subjects did not spend more time resting than the employed subjects, but rather spent more time in recreation and leisure activities. It does not appear that an increase in available time results in planned rest periods. Education in energy conservation and work simplification techniques aimed at balancing rest and activity periods and decreasing sleeping time may provide clients with adaptive skills, permitting more efficient energy use and possibly decreasing post-polio fatigue.¹¹

REFERENCES

1. Dalakas MC, Hallet M. In: Plum F, ed. *Advances in Contemporary Neurology*. Philadelphia: FA Davis Co, 1988:51-58.
2. Raymond CA. Decades after polio epidemic survivors report new symptoms. *JAMA*. 1986; 255:1397-1404.
3. Young G. Occupational therapy and the post-polio syndrome. *Am J Occup Ther*. 1989; 43:97-103.
4. Halstead LS, Wiechers DO, Rossi C. Part II: Results of a survey of 201 polio survivors. *South Med J*. 1985; 78:1281-1287.
5. Cashman NR, Maselli R, Woolman RM, Roos R, Simon R, Antel JP. Late denervation in patients with antecedent paralytic poliomyelitis. *N Engl J Med*. 1987; 317:7-12.
6. Berily MH, Strauser WW, Hall KM. Fatigue in post-polio syndrome. *Arch Phys Med Rehabil*. 1991; 72:115-118.
7. Furst GP, Gerber LH, Smith CC, Fisher S, Shuiman B. A program for improving energy conservation behaviours in adults with rheumatoid arthritis. *Am J Occup Ther*. 1987; 41:102-111.
8. Krupp LB, LaRocca NB, Muir-Nash J, Steinberg AD. The fatigue severity scale. *Arch Neurol*. 1988; 46:1121-1123.
9. Krupp LB, Alvarez LA, LaRocca NB, Scheinberg LC. Fatigue in multiple sclerosis. *Arch Neurol*. 1988; 45:435-437.
10. Fix AJ, Daughton DM. *Human Activity Profile Professional Manual*. Odessa, Fla: PAR Psychological Assessment Resources, Inc, 1988.
11. Young G. Energy conservation, occupational therapy, and the treatment of post-polio sequelae. *Orthopedics*. 1991; 14:1233-1239.