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Type and Duration of Exercise in the SAMMPRIS trial

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Abstract

Background: Analyses from the SAMMPRIS trial showed that good control of vascular risk factors (SBP, LDL, and exercise) was associated with fewer vascular events and exercise had the biggest impact on outcome. We sought to determine the type and duration of exercise performed by SAMMPRIS patients during the trial.

Methods: SAMMPRIS aggressive medical management included a telephonic lifestyle modification program, INTERVENT, that was provided free of charge to all subjects during the study. We analyzed self-reported data collected by INTERVENT on the patients' type and duration of exercise from baseline (n= 394) to 3 years (n=132). We calculated the mean duration for each exercise type at each time period and then compared the change in exercise duration from baseline using paired t-tests and Wilcoxon signed rank tests.

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Disclosures

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Results: Walking was the most common form of exercise at all time points, as measured by both the duration of exercise and the number of patients performing the exercise. The mean duration of walking and other aerobic activities increased significantly from baseline to all other time points.

Conclusion: The type of self-reported exercise performed by SAMMPRIS patients included mostly walking or other aerobic activity and increased significantly during follow-up.

Introduction:

Intracranial atherosclerotic stenosis (ICAS) is one of the most important causes of stroke worldwide¹ and is associated with high risk of stroke recurrence^{2, 3}. The Stenting and Aggressive Medical management for prevention of Recurrent Stroke in Intracranial Stenosis (SAMMPRIS) trial incorporated intensive risk factor control for all patients and showed that aggressive medical management is superior to stenting in patients with severe (70–99%) symptomatic intracranial atherosclerotic disease^{4, 5}. Post hoc analyses of patients in the medical arm of SAMMPRIS showed that physical activity was the strongest predictor of lower risk of recurrent stroke and vascular events⁶. The purpose of this study is to report the type and duration of physical activity in the SAMMPRIS trial.

Methods:

The overall design of SAMMPRIS and its aggressive medical management protocols have been described previously^{4, 7}. In brief, SAMMPRIS was an NIH-funded, investigator-initiated and designed phase III randomized multicenter trial in which 451 patients were randomized at 50 sites in the USA to aggressive medical therapy alone vs. percutaneous transluminal angioplasty and stenting (PTAS) with the wingspan stent system plus aggressive medical therapy. Aggressive risk factor management primarily targeted systolic blood pressure (SBP) < 140 mm Hg, and low density lipoprotein (LDL) < 70 mg/dl. Secondary risk factors targeted included physical inactivity, diabetes mellitus, weight, and smoking. Using a commercially available lifestyle modification program (INTERVENT), all subjects received coaching on healthy lifestyle behaviors at regularly schedule times throughout the study at no charge. Lifestyle coaches provided individualized risk factor counseling (via telephone or internet) twice a month for 6 months and monthly thereafter. Risk factor values for each subject during follow-up were recorded at baseline, 30 days, 4 months, and every 4 months thereafter. Through INTERVENT, patients were provided with a health coach, who, after assessing the patient's health, lifestyle and their readiness for change, develops a personal action plan and then follows up regularly with the patient to monitor their adherence to the plan. Physical activity was assessed at the sites using the 8-point Physician based Assessment and Counseling for Exercise (PACE) questionnaire, which the participants completed at each visit. INTERVENT also collected self-reported exercise type and duration of activity (see appendix for questionnaire).

We analyzed self-reported data collected by INTERVENT on the patients' type and duration from baseline to close out. We calculated the mean duration of each exercise type at each time period and the compared the change in exercise duration from baseline using paired t-tests.

Results:

Of the 451 patients enrolled in SAMMPRIS, INTERVENT physical activity data from 394 patients was available at baseline.

As shown in the Figure, walking was the most common form of exercise reported by patients at all points in the study. The percentage of patients who reported walking for exercise increased from baseline 166 /394 (42%) to 1 year 167/264 (63%). In contrast, only 34/394 (8%) reported using a stationary cycle and 27/394 (6%) using a treadmill as their form of exercise at baseline. At 1 year, 28/264 (13%) reported stationary cycle and 28/264 (10%) reported treadmill use.

Walking was the form of activity that also had the highest duration for the patients overall. The mean duration of walking was 64.3 (\pm 131.7) minutes per week at baseline, 98.4 (\pm 142.4) at 1 year, 95.5 (\pm 138.9) at 2 years, and 84.0 (\pm 117.0) at 3 years (table 1).

When comparing the change in duration of walking for each individual at follow up compared to baseline, there was a significant increase in the mean duration of walking at all points (+40 minutes at 6 months, +36.8 minutes at 1 year, +32.4 minutes at 2 years, and +21.3 minutes at 3 years ($p < 0.05$)).

Discussion:

A post-hoc analysis from the SAMMPRIS trial showed that among patients with symptomatic severe intracranial atherosclerosis, physical activity was the most important risk factor associated with lower risk of recurrent stroke and vascular events⁶. SAMMPRIS also showed a positive linear relationship between intensity and duration of activity (as measured by the PACE score) and magnitude of prevention benefit (i.e. more exercise = lower risk)⁶. By analyzing the physical activity data collected by INTERVENT in this report, we determined that the most common physical activity done by SAMMPRIS patients was walking, as measured by both the number of patients performing the exercise and the duration of exercise.

An AHA/ASA scientific statement recommends that stroke survivors beyond the acute phase of recovery should perform aerobic activity for 20–60 minutes per day, 3–5 times each week, as well as muscle strength and endurance sessions⁸. Yet, previous studies have shown that stroke survivors have low level of activity⁹. A study by Ashe et al, showed that physical activity of community-living stroke survivors is lower than that of older adults with cardiovascular and musculoskeletal health conditions. This is believed to be related to various factors including post stroke disability, depression and fatigue¹⁰.

In SAMMPRIS, we found that increased physical activity among patients with prior stroke or TIA is feasible. The percentage of SAMMPRIS patients who met physical activity targets increased throughout the duration of the study from 30% at baseline to 68% at 3 years¹¹. In this report, we also found that for individual patients who exercised, their activity remained increased at each follow up visit compared to baseline. This increase in physical activity is likely due to the impact of frequent counseling by INTERVENT lifestyle coaches, given that

improvement of many risk factors, including physical activity, was associated with good compliance with INTERVENT¹². In addition, site coordinators and neurologists were also instructed to counsel patients on the importance of exercise.

This report has some limitations. While we demonstrate that increased physical activity is achievable in stroke patients, it should be noted that SAMMPRIS only included patients with non-disabling (modified Rankin score of ≤ 3) stroke or TIA at baseline. Therefore, our findings do not include patients who are unable to walk without assistance at baseline. In addition, some argue that the intensive medical management provided in SAMMPRIS was not “real world” and therefore the findings related to risk factor control and physical activities are not generalizable. However, lifestyle modification counseling programs are commercially available and covered by many insurance companies. Furthermore, the AHA/ASA scientific statement on physical activity in stroke survivors recommends physicians encourage physical activity and specifically endorses the use of comprehensive lifestyle programs, such as cardiac rehabilitation, after mild stroke to improve risk factors¹⁰.

Conclusion:

Walking was the most common type of exercise performed by SAMMPRIS patients and the duration and percentage of subjects walking increased significantly during follow-up. Given that physical inactivity is associated with recurrent vascular events and that improvement in physical activity in stroke patients is feasible, clinicians should encourage stroke patients to increase their activity.

Acknowledgments

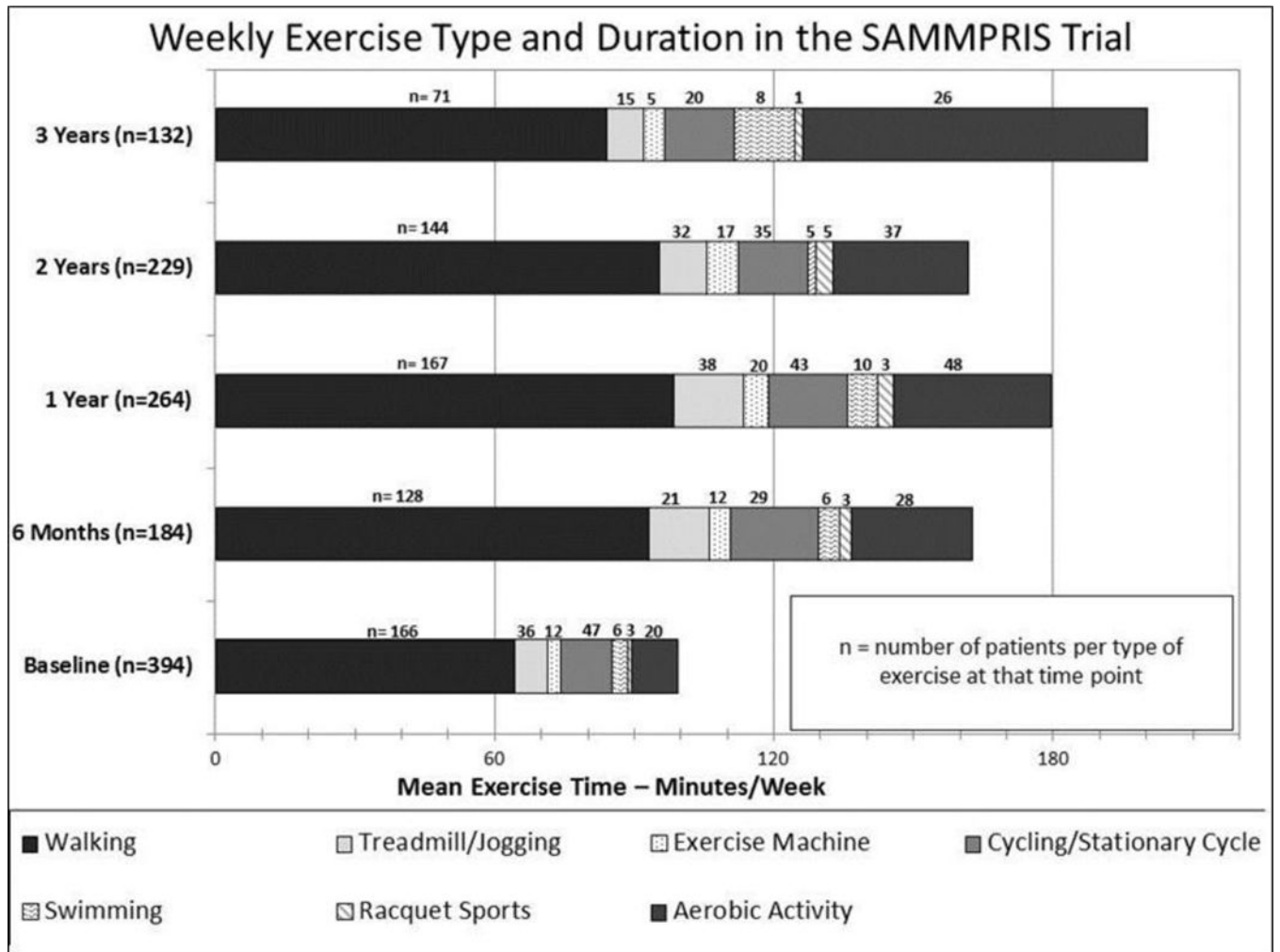
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Stenting versus Aggressive Medical Therapy for Intracranial Arterial Stenosis (SAMMPRIS), number (n)

Figure:
Weekly Exercise Type and Duration in the SAMMPRIS Trial Stenting versus Aggressive Medical Therapy for Intracranial Arterial Stenosis (SAMMPRIS), number (n)

Table 1: Weekly exercise types and duration (minutes) in the SAMMPRIS trial SAMMPRIS (Stenting versus Aggressive Medical Management for Intracranial Arterial Stenosis)

Follow Up	Walking	Treadmill	Stationary Cycle	Exercise Machine	Jogging	Cycling	Swimming	Racquet Sports	Aerobic Dance/Floor Exercise	Other Aerobic Activity	Total
Baseline											
Mean	64.3	4.7	7.4	2.8	1.8	3.6	3.5	0.8	0.9	9.0	98.9
(sd)	(131.7)	(21.9)	(35.1)	(18.7)	(15.6)	(24.3)	(44.7)	(12.9)	(8.5)	(82.6)	(190.1)
Median (Q1, Q3)	0 (0, 90)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	20 (0, 140)
6 Months (n=184)											
Mean	93.2	8.8	11.6	4.3	3.5	7.0	4.6	2.4	4.5	21.2	160.9
(sd)	(120.5)	(37.3)	(47.4)	(18.8)	(32.4)	(44.8)	(38.4)	(21.2)	(31.1)	(83.7)	(198.1)
Median (Q1, Q3)	60 (0, 17.5)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	104 (36.3, 210)
1 Year (n=264)											
Mean	98.4	12.1	12.7	5.3	3.1	4.0	6.7	3.2	4.4	29.7	179.7
(sd)	(142.4)	(43.5)	(42.8)	(22.3)	(19.7)	(23.7)	(55.6)	(36.0)	(22.1)	(130.8)	(234.5)
Median (Q1, Q3)	60 (0, 147.5)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	120 (20, 247.5)
2 Years (n=229)											
Mean	95.5	7.7	10.1	6.8	2.0	4.9	1.7	3.7	2.7	25.6	160.7
(sd)	(138.9)	(23.2)	(35.6)	(27.8)	(15.1)	(39.9)	(14.0)	(30.2)	(18.7)	(122.0)	(207.7)
Median (Q1, Q3)	60 (0, 140)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	110 (30, 210)
3 Years (n=132)											
Mean	84.0	6.1	8.6	4.6	2.1	5.9	12.8	1.8	4.7	68.6	199.3
(sd)	(117.0)	(21.9)	(26.9)	(24.7)	(16.8)	(35.7)	(78.8)	(20.9)	(25.7)	(247.5)	(314.7)
Median (Q1, Q3)	42.5 (0, 122.5)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	97.5 (0, 240)

SAMMPRIS (Stenting versus Aggressive Medical Management for Intracranial Arterial Stenosis)