Music therapy for stroke patients to reduce movement disorders: randomized controlled trials systematic review with meta-analysis

Sanita Šuriņa, Kristīne Mārtinsone, Jana Duhovska, Mirdza Paipare
Rīga Stradiņš University (Latvia)

Background

Stroke is one of the main causes for a functional disability. Improving of the motor functions, after the stroke, is one of the most important rehabilitation tasks. There are trials, showing positive results for using the music therapy methods and techniques, especially the rhythmic auditory stimulation (RAS), for stroke patient rehabilitation. Therefore, summarizing the data from these trials is an actual issue.

Objective

Summarize the trials about the use of music therapy for stroke patient gait and hand motor function improvement, by creating a systematic review of randomized controlled trials, with meta-analysis.

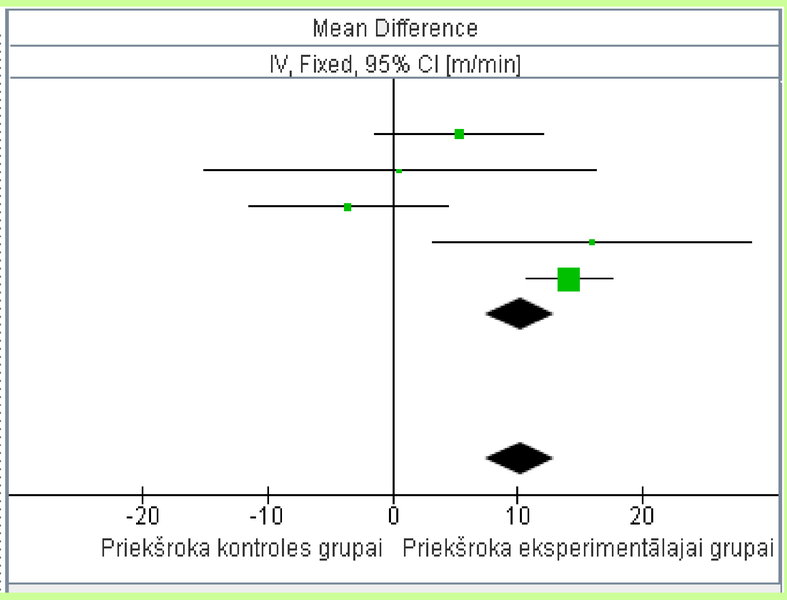
Methods

The trials were searched in MEDLINE, Cochrane Trial Register, EBSO (Academic Search Complete and Health Source – Nursing Academic Edition) databases. The trial quality was evaluated by PEDro scale. 14 randomized controlled trials were included in the systematic review. The meta-analysis for 4 gait outcomes and 6 hand function outcomes was performed, using the RevMan software.

Results

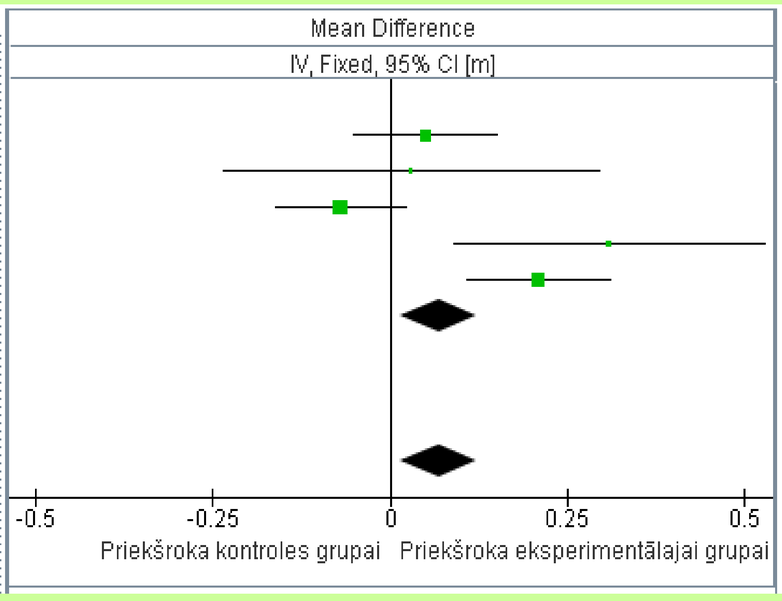
Using a fixed effect analysis model, the following overall effect Z values were calculated for the experimental group, compared with the control group: gait speed: Z=7.26 (P<0.00001); steps per minute: Z=7.14 (P<0.00001); step length: Z=2.52 (P=0.01); gait symmetry: Z=8.68 (P<0.00001); Fugl-Meyer test: Z=8.09 (P<0.00001); ARAT test: Z=0.74 (P=0.46); Box and blocks test: Z=3.03 (P=0.002); Wolf motor function test: Z=6.28 (P<0.00001); shoulder flexion: Z=1.80 (P<0.07); elbow extension: Z=1.19 (P=0.23). Using a random effect analysis model for outcomes, where trial heterogenity was large (I^2>75%), the following overall effect Z values were calculated: gait speed: Z=1.67 (P=0.09), steps per minute: Z=1.78 (P=0.08), step length: Z=1.41 (P=0.16); Fugl-Meyer test: Z=1.29 (P=0.20).

Study or Subgroup	Eksperimentālā Mean [...	SD [m/...	Total	Kontroles Mean [...	SD [m/...	Total	Weight	Mean Difference IV, Fixed, 95% CI [m/...
1.1.1 Aprēķins pēc rādītāja pēc-intervences vērtības								
Cha 2014	30.6	17.04	41	25.26	13.98	41	16.7%	5.34 [-1.41, 12.09]
Schauer 2003	48.6	17.4	11	48	21	12	3.1%	0.60 [-15.11, 16.31]
Suh 2014	12.05	2.7	8	15.59	11.1	8	12.2%	-3.54 [-11.46, 4.38]
Thaut 1997	48	18	10	32	10	10	4.7%	16.00 [3.24, 28.76]
Thaut 2007	34.5	9.1	43	20.3	6.5	35	63.3%	14.20 [10.73, 17.67]
Subtotal (95% CI)			113			106	100.0%	10.22 [7.46, 12.98]
Heterogeneity: Chi² = 20.90, df = 4 (P = 0.0003); I² = 81%								
Test for overall effect: Z = 7.26 (P < 0.00001)								
Total (95% CI)			113			106	100.0%	10.22 [7.46, 12.98]
Heterogeneity: Chi² = 20.90, df = 4 (P = 0.0003); I² = 81%								
Test for overall effect: Z = 7.26 (P < 0.00001)								
Test for subgroup differences: Not applicable								



1. figure. Gait speed meta-analysis

Study or Subgroup	Eksperimentālā Mean [m]	SD [m]	Total	Kontroles Mean [m]	SD [m]	Total	Weight	Mean Difference IV, Fixed, 95% CI [m]
1.3.1 Aprēķins pēc rādītāja pēc-intervences vērtības								
Cha 2014	0.68	0.25	41	0.63	0.22	41	27.9%	0.05 [-0.05, 0.15]
Schauer 2003	0.99	0.33	11	0.96	0.32	12	4.1%	0.03 [-0.24, 0.30]
Suh 2014	0.21	0.03	8	0.28	0.13	8	33.9%	-0.07 [-0.16, 0.02]
Thaut 1997	1	0.3	10	0.69	0.19	10	6.0%	0.31 [0.09, 0.53]
Thaut 2007	0.88	0.21	43	0.67	0.24	35	28.2%	0.21 [0.11, 0.31]
Subtotal (95% CI)			113			106	100.0%	0.07 [0.02, 0.12]
Heterogeneity: Chi² = 20.95, df = 4 (P = 0.0003); I² = 81%								
Test for overall effect: Z = 2.52 (P = 0.01)								
Total (95% CI)			113			106	100.0%	0.07 [0.02, 0.12]
Heterogeneity: Chi² = 20.95, df = 4 (P = 0.0003); I² = 81%								
Test for overall effect: Z = 2.52 (P = 0.01)								
Test for subgroup differences: Not applicable								



2. figure. Step length meta-analysis

Conclusions

Gait exercises, combined with RAS, provide better results than gait exercises alone. Statistically significant improvement was detected for all gait outcomes, when the fixed effect analysis model was used. Concerning the use of RAS and other music therapy interventions for hand function rehabilitation, a reliable answer currently cannot be provided. Further research, using larger groups of participants, can support wider use of RAS for gait training, as well as provide more evidence about perspectives of music therapy for hand function rehabilitation of stroke patients.