EFFECTS OF MUSIC AND EXERCISE TRAINING DURING HEMODIALYSIS ON THE CARDIAC AUTONOMIC NERVOUS SYSTEM ACTIVITY

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Introduction

Cardiac autonomic nervous system (CANS) dysfunction is a common complication in (CKD), leading to increased cardiovascular morbidity and mortality(1).

Exercise training during hemodialysis (HD)(2).
•improves physical function and quality of life in HD patients
•suppress the sympathetic over-excitation
•restores the sympathetic (SNS) to parasympathetic nervous system (PNS) balance
It was supported that musical auditory stimulation influences heart rate variability (HRV)(3).
However, the effects of music on CANS in HD patients have never been studied before.

Thus, the **aim** of this study was to investigate the effectiveness of a 6-month, music and physical training combined program during HD on CANS in CKD patients.

Method

40 HD patients
50.0 ±14.7 yrs

Group **A**
combined music and exercise training program
n=10

Group **C**
sole music program
n=10

Group **B**
sole exercise training program
n=10

Group **D**
none of the above-mentioned interventions (control group)
n=10

Intervention program

Static Cycling Exercise:
3x/wk, 30'- 60', 12 -13 RPE

Music during program:
Patients' preference music: 45'- 60'
Relaxation music: pre and post monitoring

Measurements

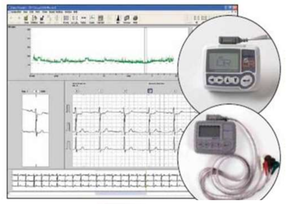
Dialysis prescription medications and level of anemia were constant during the study.

1) Ambulatory **24-hour Holter monitoring** (Gbi-3s Burdick):
Time- and frequency- domain analysis HRV calculation from Vision Series Holter System SW program

2) **Polar HR monitoring** during intervention (s810i):
Time- and frequency- domain analysis HRV calculation, pointcare plots from Precision Performance SW and Kubios HRV SW program

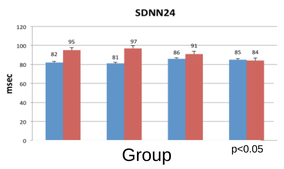
HRV indices:
HR: mean heart rate
SDNN: standard deviation of NN intervals
RMSSD: root mean square of successive differences
pNN50: proportion of NN50 divided by total number of NNs

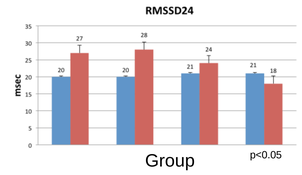
3) Six minute walk test:
Estimation of functional capacity

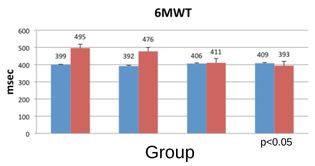


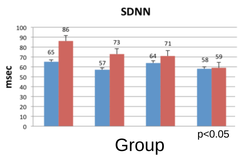
Results

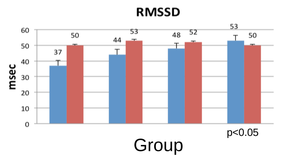
The functional ability of HD patients increased in the combined music-exercise group [F(3,36)=13.095, p=0.000]. Similar results were observed for the HR[F(3,36)= 1.910, p= 0.145]; the SDNN [F (3,36)=11.671, p=0.000]; the RMSSD [F (3,36)=12.395, p=0,000]; and the pNN50 [F (3,36)=45.752, p=0.000] respectively.

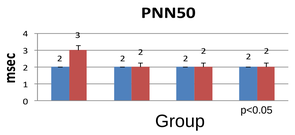




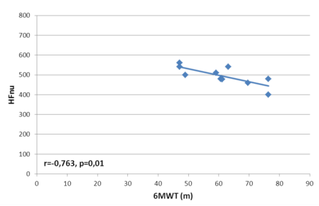


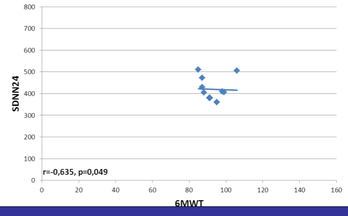






GROUPS	MHR (b/min)	SDNN (msec)	RMSSD (msec)	PNN50 (msec)	6mwt (m)
A (pre)	79±10	65±7	37±4	2±0,2	399±42
A (post)	73±13*	86±9*	50±5*	3±0,3*	495±46*
B (pre)	85±11	57±4#	44±3 #	2±0.2	392±41
B (post)	81±13*	73±4*	53±2*	2±0.3*	476±33*
C (pre)	88 ±11	64±7	48±2+	2±0.2	406 ± 52
C (post)	84±12*	71±7* +	52±2*	2±0.1* +	411 ±48* ‡
D (pre)	82±5	58 ±5	53±3 ≠ $ §	2±0.2	409 ± 40
D (post)	82±5	59 ±48≠ $ §	50±4	2±0.2* ≠ $	393 ± 42* ≠ $





:p<0.05 pre versus post,
:p<0.05 between groups A and B
+ :p<0.05 between groups A and C
≠ :p<0.05 between groups A and D
‡ :p<0.05 between groups B and C
$:p<0.05 between groups B and D
§ :p<0.05 between groups C and D

Conclusion

Combined musical auditory stimulation with exercise training during HD:
- influences on the balance of SNS and PNS beneficially
- improves the functional capacity

References

1. Deligiannis *et al.,* 1999. Effects of physical training on heart rate variability in Patients on hemodialysis. *Am J Cardiol*, 84:197-202.

2. Kouidi *et al.,* 2010. Depression, heart rate variability, and exercise training in dialysis patients. *Eur J Cardiovasc Prev Rehabil,*17: 160–167.

3. Valenti *et al,* 2012. Auditory stimulation and cardiac autonomic regulation. *Clinics,* 2012; 67(8):955-958.