Cardiac Rehabilitation: Impact on Psycho-behavioral Symptoms, Inflammation, Cardiac Health, and Quality of Life

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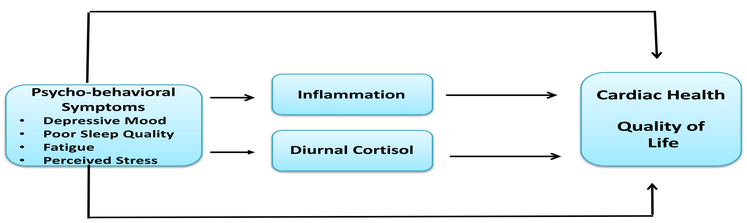
Purpose and Significance

- **Guided by Psychoneuroimmunology theory, the purpose of this study was to examine psycho-behavioral symptoms and IL-6, with respect to cardiac health and quality of life (QoL), in cardiac patients over a 12-week cardiac rehabilitation**

Background

- **Cardiac events result in psychological stress, depressive mood, fatigue, and sleep disturbance (psycho-behavioral symptoms), which jeopardize cardiac health. To promote recovery, cardiac rehabilitation programs provide monitored exercise and health education. Whether rehabilitation reduces psycho-behavioral symptoms or stress-related inflammation remains unclear. Inflammatory mediators (interleukin 6; IL-6) contribute to cardiovascular disease and engender psycho-behavioral symptoms.**

Theoretical Framework



Methods

- **A prospective longitudinal design,**
- **Participants were evaluated at program start (T1), mid-program (T2 - 6 weeks), and program completion (T3 -12 weeks).**
- **Forty of 58 participants completed all time points.**
- **At each time, participants completed questionnaires, and provided a blood sample for IL-6 measurement (enzyme linked immune-absorbent assay).**
- **Cardiac health data, including HDL and LDL levels, and metabolic equivalents (MET) were collected from medical records.**
- **Data were analyzed using ANOVA, Pearson's r, and multi-level linear modeling**

Results

Sample Characteristics

SAMPLE DEMOGRAPHICS
N=58

Sex	Male - 69%; Female - 31%
Age	Range 35-85 yrs., 71% > 60 yrs. ; Mean Age = 66.8
Race/Ethnicity	White – 85%; Asian – 7% Hispanic/Latino – 5% African American – 3%
Marital Status	Married - 67%
Income	64% >$70k
Education	College (82%) Graduate School/Professional - 27%
Employment	78% Retired

SAMPLE - CARDIAC RISK FACTORS

Cardiac Risk Factors	Percent
Diabetes	33
Hypertension (on med for HTN)	95
Hyperlipidemia	90
BMI (+ or = 26.4)	75
History of Smoking:	
• Never	57
• Former Smoker	43
• Active Smoker	2

Results

CARDIO-METABOLIC CHANGES OVER TIME

	Time 1	Time 2	Time 3	P Value
BMI	30.3 ± 5.3	29.6 ± 4.6	29.1 ± 4.6	P<.05
MET levels	2.9 ± 0.77	4.2 ± 1.4	4.3 ± 1.4	P<.05
LDL Cholesterol	92.5 ± 35.8	N.A.	62.5 ± 35.9	P<.05
HDL Cholesterol	44.6 ± 14.2	N.A.	41.9 ± 9.6	P<.05
Total Cholesterol	159.5 ± 46.2	N.A.	121.1 ± 32.9	P<.05
Heart Rate (resting)	72 ± 12	72 ± 12	72 ± 13	N.S.
Systolic Blood Pressure (resting)	124 ± 14	122 ± 14	123 ± 12	N.S.

Values are mean ± SD; N.A. = Not Available. N.S. = Not significant.

PSYCHO-BEHAVIORAL VARIABLES – CHANGE OVER TIME

Variable	Time 1	Time 2	Time 3	P Value
Depressive Mood	8.6 ± 8.6	9.4 ± 8.5	8.3 ± 7.8	N.S.
Sleep Disturbance	7.2 ± 3.9	6.4 ± 3.6	5.6 ± 3.0	P < .05
Fatigue	4.1 ± 17.8	1.9 ± 19.2	-0.13 ± 16.5	P < .05
Perceived Stress	13.2 ± 7.1	11.1 ± 7.1	9.82 ± 6.4	P < .05
Quality of Life	23.9 ± 3.9	25.1 ± 4.0	25.5 ± 3.2	P < .05
Health Function QoL	22.7 ± 4.3	24.5 ± 4.6	25.1 ± 3.6	P < .05
Social Support	81.7 ± 10.2	83.9 ± 8.5	84.7 ± 8.3	N.S.

ASSOCIATION BETWEEN PSYCHOLOGICAL VARIABLES & QUALITY OF LIFE

T 1	QOL	Health Function QoL
CES-D	-.816 **	-.662 **
PSQI	-.416 **	-.453 **
MFSI	-.810 **	-.808 **
SPS	.588 **	.479 **
PSS	-.742 **	-.748 **

T2	QoL	Health Function QoL
CES-D	-.590**	-.574**
PSQI	-.405**	-.366*
MFSI	-.835**	-.805**
SPS	.587**	.537**
PSS	-.757**	-.716**

Time 3	QOL	Health Function QoL
CES-D	-.480**	-.532**
PSQI	-.418**	-.334*
MFSI	-.660**	-.703**
SPS	.547**	.464**
PSS	-.626**	-.634**

*p = .05 ** p = .01

Results

- **Although perceived stress decreased significantly over the course of cardiac rehabilitation, 35% of participants continued to report increased stress at T3.**
- **Depressive mood did not change over rehabilitation, with 22% scoring above the cut-score for depression risk**
- **Fatigue decreased significantly over time; however, those with greater fatigue had worse cardiac health**
- **Sleep quality improved significantly over time, yet, 42% of participants reported sleep disturbance at T3**
- **Both total QoL and the Health Functioning Subscale (HFSUB) significantly improved by end of cardiac rehabilitation**
- **Both QoL and HFSUB were negatively correlated with depressive mood, disturbed sleep, fatigue, and perceived stress, but positively correlated with social support.**
- **Although IL-6 did not change over time, participants with higher IL-6 levels had lower MET levels, lower HFSUB, and greater LDL levels**

Conclusions & Implications for Practice

- **Psycho-behavioral symptoms and QoL improved over cardiac rehabilitation**
- **Yet a sizeable proportion of participants continued to experience stress, depressive mood, and sleep disturbance at completion of rehabilitation.**
- **Findings emphasize the need for cardiac rehabilitation clinicians to address psycho-behavioral symptoms to promote holistic recovery, better QoL, and future cardiac health.**