Depression and Anxiety Moderate the Relationship Between Body Image and Personal Well-being Among Patients With an Implanted Left Ventricular Assist Device

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Depression and anxiety moderate the relationship between body image and personal wellbeing among patients with an implanted Left Ventricular Assist Device

Abstract

Background

Left Ventricular Assist Devices (LVADs) support the failing heart of patients with advanced heart failure (HF) and are used as a bridge to heart transplantation (HTx) or a destination therapy for patients ineligible for HTx. Body image changes, as well as anxiety and depression, are prevalent among LVAD implanted patients.

Objective

To investigate whether a relationship exists between body image and personal wellbeing among LVAD implanted patients and, if it does, whether it is moderated by anxiety and depression.

Methods

In this cross-sectional correlational study, a convenience sample of 30 adult LVAD implanted patients (mean age 63 ± 10 , 90% male) from the outpatient facility of a tertiary medical center, completed validated instruments such as Body Image Scale, Cosmetic Scale, Hospital Anxiety and Depression Scale and Personal Wellbeing Index, from October 2017 to February 2018. A multivariate linear regression and bootstrap moderation analyses were performed.

Results

Eleven patients (37%) had below-average personal wellbeing scores and 14 patients (47%) had below-average body image scores. Seven (23%) had either anxiety or

depression and 11 (37%) had both anxiety and depression. Body image was found to be significant predictor of personal wellbeing ($t=2.16$, $p=.04$). When anxiety and depression were present, body image ($t=2.08$, $p=.049$), depression ($t=2.53$, $p=.018$) and the interaction between body image and depression ($t=-2.1$, $p=.047$) were significantly associated with personal wellbeing.

Conclusions

Body image significantly predicted personal wellbeing among LVAD implanted patients. Depression alone or depression combined with anxiety moderated the relationships between body image and personal wellbeing. The current results may help heightening health care providers' awareness of body image perception among LVAD implanted patients.

Key words: LVAD, body image, anxiety, depression, personal wellbeing

Introduction

Left Ventricular Assist Devices (LVADs) are intracorporal mechanical pumps that assist the failing heart, powered through a driveline that exits the abdomen, connecting the device with its power supply: either batteries or non-portable power sources ^{1,2}. Left Ventricular Assist Devices are used as a bridge to heart transplantation (HTx) for patients with advanced HF or as a destination therapy for those heart failure (HF) patients who are for various reasons ineligible for HTx.³ Following modern LVAD implantation, the one and two year survival rate has improved dramatically reaching, 88% and 82.8%, respectively.³ Furthermore, LVADs have been demonstrated to improve HF patients' functional status and quality of life (QOL) over medical management.⁴⁻⁷

A previous metasynthesis study on adaptation and coping among patients with implanted LVAD, demonstrated that LVAD implantation had a considerable effect on patients' body image and sense of self, as well as psychological and social functioning ⁸. The implantation of vicarious mechanical devices such as LVADs affects patients' sense of identity and integrity ⁹. The need to be attentive (to care for the LVAD's function, change batteries, position the external cable) serves as a reminder that the LVAD is a prosthetic organ and that the embodying process can actually never be completed.⁹ In a qualitative study among LVAD implanted patients, self-image was affected by the inability to wear clothing as previously or select clothing that would make the LVAD less noticeable.⁵ Similarly, external components of the LVAD system were found to cause LVAD implanted patients dissatisfaction with their own body image, which led patient to look for strategies to overcome this problem.¹⁰ Strategies included

wearing clothes that did not accentuate the LVAD on one hand and that preserved and expressed the patient's personal style, on the other. Therefore, the first purpose of the current study was to investigate whether there is a relationship between body image and personal wellbeing among LVAD implanted patients. The prevalence of anxiety and depression among LVAD implanted patients was found to be elevated, with 23, 15 and 15% for anxiety and 28, 23 and 5% for depression, at baseline, three and six month follow-up, respectively¹¹. While no studies were found that examined the association between body image and depression in LVAD implanted patients, among HTx patients four of five body image scale values were negatively associated with depression scores.¹² Depression and anxiety significantly predicted QOL among LVAD implanted patients.¹³ Depression and anxiety were previously reported to have a moderating effect. Depression moderated the relationships between appetite and perceived health status¹⁴ and between medication regimen complexity and medication adherence among patients with heart failure.¹⁵ Attachment anxiety moderated the relationships between perceived behavioral control and reported adherence to medication recommendations among patients with Acute Coronary Syndrome.¹⁶ The purposes of the current study were, to investigate whether there is a relationship between body image and personal wellbeing among LVAD implanted patients and, if so, whether it is moderated by anxiety and depression.

Methods

Study population and design

This study was conducted using a cross-sectional correlational design. Approval for the study was obtained from the Helsinki Committee of the medical center where the study

took place. At the medical center where the study took place, every year about 17 LVAD implantations take place. At any given time, the medical staff of the outpatient care clinic monitor about 35 LVAD implanted patients. Consecutive patients with LVADs implanted were recruited from the Cardiothoracic Surgery Department between October 2017 and February 2018. The eligibility criteria were as follows: age 18 years or older, Hebrew speaking, and ability to sign the informed consent form.

Measures

Demographics and clinical variables

The structured self-administered questionnaire was comprised of four sections: (i) Personal Wellbeing Index, (ii) Body Image Questionnaire (BIQ), an eight-item scale incorporating two scales, the Body Image Scale (BIS) and the Cosmetic Scale (CS), (iii) Hospital Anxiety and Depression Scale, and (iv) sociodemographic characteristics.

(i) Personal wellbeing was measured by the Personal Wellbeing Index (PWI),¹⁷ which measures satisfaction with different life domains: (1) standard of living, (2) health, (3) life achievements, (4) personal relationships, (5) personal safety, (6) community connectedness, and (7) future security. Participants responded on an 11-point Likert-type scale (0 = *not at all satisfied* to 10 = *totally satisfied*). Data derived from the seven domain scores were averaged to form the PWI. In addition, one item was related to overall satisfaction with life (How satisfied are you with your life as a whole?). The seven domains constitute a single stable factor and account for about 50% of the variance¹⁸. Moreover, a correlation of .78 with the "Satisfaction with life scale"¹⁹ has been reported. The previously reported Cronbach alpha ranged from .7 to .85.¹⁸ In the

current study, the Hebrew translated PWI version demonstrated a Cronbach's alpha of 0.89.

(ii) The respondents' perceived body image was examined by the Body Image Questionnaire (BIQ), an eight-item scale incorporating two scales, the Body Image Scale (BIS) and the Cosmetic Scale (CS), each with a previously demonstrated high internal consistency.²⁰ The BIS asks questions about the patient's perception of and satisfaction with his or her body after the LVAD implantation. Participants were asked to rank items on a scale of 1 (*No, not at all*) to 4 (*Yes, extremely*). The BIS score is calculated by reverse-scoring and summing the responses to questions 1 through 5. Examples of the questions are: "Are you less satisfied with your body since the operation?" and "Do you think the operation has damaged your body?" The total BIS score ranges from 5 to 20, with higher scores representing a more positive perception of body image.

The CS is the sum of questions 6–8 on the BIQ, which assess the patient's satisfaction with the external driveline of LVAD. Examples of the questions are: "On a scale of 1 (very unsatisfied) to 7 (very satisfied), how satisfied are you with the external driveline?" Total CS scores range from 3 to 24, with a higher score indicating greater patient satisfaction with the cosmetic look of his or her external driveline. Previously reported values for Cronbach's alpha for the body image and cosmetics scales were .80 and .83, respectively.²⁰ In the current study, Cronbach's alpha values for the body image and cosmetics scales were .78 and .88, respectively.

(iii) Anxiety and depression were measured by the Hospital Anxiety and Depression Scale (HADS).²¹ The HADS consists of 14 items, seven items evaluating anxiety

symptoms and seven evaluating depression symptoms. Examples of items for anxiety are “I feel tense or ‘wound up’ ” and “I get a sort of frightened feeling as if something awful is about to happen.” Examples of depression items are “I still enjoy the things I used to enjoy” and “I can laugh and see the funny side of things.” Participants were asked to rank items on a scale of 0 (*not at all*) to 3 (*most of the time*). The final score was calculated by summing responses. For comparability with previous research, both scales were dichotomized using cutoff points suggested in the literature.²² This allowed each person to be identified as not anxious or depressed (score of less than 8 on the HADS anxiety and depression subscale), anxious only (score of 8 or more on HADS anxiety), depressed only (score of 8 or more on HADS depression), and both anxious and depressed (score of 8 or more on both HADS subscales). Most factor analyses demonstrated a two factor solution in good accordance with the HADS subscales, HADS-A and HADS-D ²³. Cronbach’s alpha for HADS-A ranged from .68-.93 (mean .83) and for HADS-D from .67-.90 (mean .82).²³ Previously, the Hebrew translated HADS version demonstrated Cronbach’s alpha of 0.86 for HADS-A and 0.89 for HADS-D ²⁴. In the current study, the Cronbach’s alpha of the Hebrew translated HADS version were 0.81 for HADS-A and 0.89 for HADS-D.

(iv) Information on demographic variables comprised of gender, age, ethnicity, marital status, employment status, and time from LVAD implantation in months.

Thirty-two potential eligible participants were approached by two trained nurses regularly involved in the outpatient care of LVAD supported patients, who asked the patients whether they would be willing to participate in a study on the experience of LVAD implanted patients. Patients were guaranteed that refusal to take part in the study

would cause them no harm, and that all information collected would remain confidential. Those who signed the informed consent form were taken to a conference room in proximity to, but not part of, the LVAD clinic, and were handed the questionnaire to complete. Completion of the questionnaire took approximately 20 minutes. For undisclosed reasons, two patients declined to complete the questionnaire, resulting in a study sample of 30 participants (response rate of 93.8%).

Data analysis

Descriptive statistics (frequencies, means, and SD) were used to characterize the study population. Spearman ρ was used to examine the association between body image, satisfaction with cosmetic look, anxiety, depression, and PWI. A multivariate linear regression analysis was performed to determine how much variance in PWI could be accounted for by body image, anxiety and depression. The moderator hypothesis was tested by bootstrap moderation analysis.²⁵ This method calculates the conditional effect of independent variable (body image) on dependent variable (PWI) with or without moderators (anxiety and depression), through bootstrapping, set at 5000 samples. Body image level was categorized as low (1 SD below the mean), at the mean, or high (1 SD above the mean), after mean centering. All analyses were run using SPSS 24.0 with PROCESS statistical program.²⁵ Partial eta-squared values were calculated as a measure of effect size. Observed power values are also provided. All analyses were performed using a 95% confidence interval.

Results

Demographics:

A total of 30 patients participated in the study. Of these, 90% (27) were men. The mean age of the sample was 63 years (SD=10), ranging from 39 to 80 years of age. The most common etiology for heart failure (93%) was ischemic cardiomyopathy. Average time (SD) since LVAD implantation was 28.7 (20.2) months. The most common LVAD indication (77%) was Bridge to Transplantation (BTT) (Table 1).

Personal Wellbeing, Body image, Anxiety and Depression:

The mean score on the Personal Wellbeing Index was 6.51 (SD=1.55) (on a scale of 0 to 10), with 37% (11) patients having below average PWI. The mean scores for body image was 14.5 (SD = 4.17) (on a scale of 5 to 20), with 47% (14) patients having body image score below the average, and for the cosmetic scale the mean score was 14.23 (SD = 5.72) (on a scale of 3 to 24), with 47% (14) patients having a cosmetic scale score below the average. HADS: In total 40% (12) patients reported neither anxiety nor depression, 23% (seven) reported either anxiety or depression and 37% (11) patients reported both anxiety and depression. No differences in anxiety or depression scores were found between patients with different LVAD indications: Bridge to transplantation (BTT), Destination therapy (DT), and Bridge to recovery (BTR).

Relationships between body image, personal wellbeing anxiety and depression

Univariate:

The results of the correlation analysis of the research variables are shown in Table 2. There was a significant negative correlation between HADS-D and PWI ($r=-.39$, $p<.05$), reflecting that the presence of depression was associated with lower personal wellbeing. Hospital Anxiety and Depression Scale-Anxiety (HADS-A) scores were highly correlated with HADS-D scores ($r=.54$, $p<.01$).

Multivariate

The predictive contribution of body image, anxiety and depression on PWI were examined by multivariate linear regression analysis. The main effect of body image (i.e., an unconditional effect on other variables) was significant ($\beta=.37$, $SE=.06$, $t=2.16$, $p=.04$) (Table 3A). Further, the authors tested the moderation effect of anxiety and depression on the association between body image and PWI. The overall regression analysis was statistically significant [$F(5,24)=3.33$, $p=.02$] with 40.9% of PWI variance being explained. When anxiety and depression were present, body image ($b=.18$, $t=2.08$, $p=.049$, [95% CI: .001, .35]), depression ($b=5.99$, $t=2.53$, $p=.018$, [95% CI: 1.11, 10.86]), and the interaction between body image and depression ($b=-.33$, $SE=.16$, $t=-2.1$, $p=.047$, [95% CI: -.65--0.04]), were significantly associated with PWI (Table 3B). A statistical model of the moderation effect is presented in Figure 1. Visual representation of the moderation effect of anxiety and depression is provided in Fig. 2. Higher body image scores was unrelated to higher PWI scores among patients who had neither anxiety nor depression ($b=0.10$, $p=.29$), or who had anxiety and no depression ($b=-0.15$, $p=.34$), while in the presence of depression, this effect was positive if anxiety was present ($b=0.17$, $p=.05$), and even stronger in the absence of anxiety ($b=0.43$, $p<.01$).

Discussion

The main purposes of the current study were to describe body image and to investigate the association between body image and personal wellbeing among LVAD implanted patients and, if it exists, whether anxiety and depression moderate the relationship between body image and PWI. The study found that almost half of the patients had

below-average body image scores. The study found that body image significantly predicted personal wellbeing among LVAD implanted patients. The authors also found that co-existing depression alone and depression combined with anxiety had a moderating effect on the relationship between body image and personal wellbeing. This suggests that in the presence of both depression and anxiety or even, to a greater extent, in the presence of depression alone, lower body image was associated with lower personal wellbeing.

The authors also found that depression was significantly correlated with personal wellbeing. The current results are comparable to those reported by Casida et al, suggesting that among LVAD implanted patients, depression and anxiety significantly predict QOL, with depression being a stronger predictor than anxiety.¹³ Similarly, inverse relationship of depression with QOL following 12 month among VAD (Ventricular Assist Device) implanted patients ²⁶. Several factors contributing to anxiety and depression among LVAD implanted patients include: 1) Fear and uncertainty about the durability of the LVAD support; 2) need for major lifestyle modifications in order to accommodate the daily management of the complex LVAD self-care regimen, as well as certain physical activity limitations (e.g., swimming, contact sports, driving a motor vehicle, etc.), and 3) social isolation because of such limitations and altered body image.^{9–11,27}

The current study extends the previous literature examining the effect of body image on personal wellbeing among LVAD implanted patients. Other studies have found that LVAD implanted patients modified their own self-image, among others, by choosing clothes hiding the LVAD, an action that helped them improve their QOL.⁵ The

current study demonstrated both, the direct effect of body image on personal wellbeing and a moderation effect of anxiety and depression on the relationship between body image and personal wellbeing. Specifically, in the presence of both depression and anxiety, or even to a greater extent, in the presence of depression alone, lower body image was associated with lower PWI.

Although there is limited data on the association between body image and personal wellbeing or QOL among patients with implanted LVADs, the current findings correspond with a study on heart transplant recipients (HTRs) and AVR (Aortic valve replacement) patients.¹² Hartman et al. found that HTRs and AVR patients with HADS scores >8 demonstrated lower scores on the Dresden-Body-Image questionnaire (DKB-35) compared to patients with HADS≤8, meaning that lower body image scores were associated with anxiety and depression symptoms.¹² Moreover, AVR patients scored higher on the HADS and lower on the mental subscale of the QOL scale, compared to HTR patients. Among the reasons suggested was lower adaptation to mechanical devices (AVR) compared to biological devices (heart transplant).¹² Similarly, in the current study, the LVAD mechanical device may lead to body dissatisfaction among some of the patients. This dissatisfaction was associated with depression and lower personal wellbeing. It also has been described that avoidant coping might be correlated with increases in both anxiety and depression symptoms.⁹ A possible explanation of the current results might be that in the presence of depression, LVAD implanted patients used unfavorable coping strategies, allowing their negative body image to affect their personal wellbeing.

Limitations

As in most studies with LVAD patients, it is a challenge to recruit a substantial number of patients. A small sample size, non-randomized sampling method and mostly older participants in the sample might limit the generalizability of the results. Moreover, the small number of women in the sample may bias the results since, according to Grady et al., three and six month post-LVAD implantation women reported significantly worsened anxiety and depression symptoms, than men.⁷ Since the significant effects show observed power lower than .8 recommended by Cohen (1992), a caution should be used in interpreting the study results ²⁸.

Strengths

This study is the first to demonstrate both, the direct effect of body image on personal wellbeing and a moderation effect of anxiety and depression on the relationship between body image and personal wellbeing among patients with an implanted LVAD.

Future studies

A replication of the study with a larger number of randomly selected participants is recommended and to modify the inclusion criteria in order to recruit more women. In addition, future studies might examine whether the duration on LVAD affects the perceived body image. Moreover, it would be important to explore coping strategies used by LVAD implanted patients to deal with stressful events such as LVAD implantation. This will allow exploration of the effect of body image on personal wellbeing under various coping strategies.

Conclusions

- This study demonstrates both, an effect of body image on personal wellbeing and a moderation effect of anxiety and depression in the relationship between body image and

PWI. Specifically, in the presence of both depression and anxiety, or to a greater extent in the presence of depression alone, lower body image was associated with lower PWI. The current results may help heightening health care providers' awareness of body image perception among LVAD implanted patients.

What's new?

- Almost half the patients (47%) suffered from low body image.
- Body image affects personal wellbeing among LVAD implanted patients.
- Anxiety and depression moderated the relationships between body image and personal wellbeing among LVAD implanted patients
- The current results may help heightening health care providers' awareness of body image perception among LVAD implanted patients.

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Fig. 1. Statistical model of a moderation effect.

* - Interaction

Fig. 2. Correlations between body image and Personal Well-Being Index and indication of the moderation effect of depression (* $p<.05$).

A Table 1: Sample characteristics, n (%)

	Total N = 30
Age (years), mean (SD), median, IQR*, min-max	63.1 (10.1), 65, 15.5, 39-80
Male gender, n (%)	27 (90)
Family status Married/living with partner	24 (80%)
Time since device implants (month), mean (SD), median, IQR, min-max	28.7 (20.2), 23.5, 29.8, 2-72
Heart failure etiology, n (%) Ischemic cardiomyopathy Non-ischemic cardiomyopathy	28 (93.3) 2 (6.7)
LVAD type, n (%) HeartMate 3 HeartMate 2 Heart Ware	16 (53.3) 6 (20) 8 (26.7)
LVAD indication, n (%) BTT DT BTR	23 (76.7) 6 (20) 1 (3.3)
NYHA class before LVAD implantation, n (%)	IV – 6 (20) IIIb – 19 (63.3) III- 5 (16.7)

Current NYHA class, n (%)	I – 20 (66.7) II – 10 (33.3)
Complications after LVAD**	
Stroke	3 (10)
ESRD	2 (6.7)
Infection	6 (20)
GIB	4 (13.3)
Medications	
Antiplatelets	28 (93.3)
Anticoagulants	30 (100)
Beta Blockers	25 (83.3)
Diuretics	6 (20)
ACE Inhibitors	10 (33.3)
Antidepressants (SSRIs)	8 (26.7)

*-Interquartile range, **-There may be more than one complication in one patient

BTT - Bridge to transplantation, DT - Destination therapy, BTR - Bridge to recovery,
ESRD – end stage renal disease, GIB - gastrointestinal bleeding, ACE –Angiotensin
converting enzyme, SSRIs - Selective serotonin reuptake inhibitors

Table 2: Correlation analysis of study variables (n=30) (Spearman correlation)

	Variable	1	2	3	4	5
	Personal Well-Being Index	-				
	Body image	.33	-			
	Cosmetic scale	.3	.16	-		
	HADS-A ¹	-.32	-.24	-.15	-	
	HADS-D ²	-.39*	-.1	-.3	.54**	-

*p<.05, **p<.01

1-Hospital Anxiety and Depression Scale-Anxiety, 0-7=0, no anxiety, 8-21=1, anxiety

2-Hospital Anxiety and Depression Scale-Depression, 0-7=0, no depression, 8-21=1, depression

Table 3A. Main effects on PWI.

Characteristic	b	SE	β	t	p	95% CI*
Constant	5.05	1.04		4.85	<.001	2.91-7.19
Body image	.14	.06	.37	2.16	.04	.007-.27
HADS-A	.08	.61	.03	.14	.9	-1.16-1.34
HADS-D	-1.19	.56	-.39	-1.99	.057	-2.341-.04

$R^2=.30$, $F=3.72$, $p=.02$

*CI – confidence interval

Table 3B. Linear model for Personal Well-Being Index predicted by body image

Characteristic	b	SE	t	p	95% CI*	eta ²	Observed Power
Constant	3.32	1.22	2.73	.012	.81-5.83	.24	
Body image	.18	.09	2.08	.049	.001-.35	.15	.51
Anxiety	-3.8	2.44	-1.56	.13	-8.83-1.23	.09	.32
Body image X anxiety	.25	.16	1.57	.13	-.08-.58	.09	.32
Depression	5.99	2.36	2.53	.018	1.11-10.86	.21	.68
Body image X depression	-.33	.16	-2.1	.047	-.65--.004	.15	.52

$R^2=.409$, $F(5, 24)=3.33$, $p=.02$

*CI – confidence interval