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Health-related quality of life significantly improved in obese patients with psoriatic arthritis one year after a structured weight loss intervention

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Abstract

Objective In this interventional weight loss study, health-related quality of life (HRQoL), anxiety, depression and fatigue were compared at baseline (BL) and at 12 months (M12) in patients with psoriatic arthritis (PsA) and controls.

Methods PsA patients ($n=39$) between 25 and 75 years of age, with body mass index (BMI) ≥ 33 kg/m^2 were included in a weight loss intervention with very low energy diet (VLED) for 12 or 16 weeks depending on BL BMI < 40 or ≥ 40 kg/m^2. The 36-item short-form health survey (SF-36) was used to assess HRQoL. Anxiety and depression were assessed by the Hospital Anxiety and Depression Scale. Assessments were done at BL, M3, M6 and M12. As controls ($n=39$), obese individuals, already planned for VLED treatment were recruited and matched for sex, age and weight to the PsA patients.

Results In PsA patients, physical HRQoL, as demonstrated by the physical component summary (PCS) of SF-36, improved from median (IQR) 34 (25–45) at BL to 43 (34–50) at M12, $p=0.009$. No significant effect on mental HRQoL, demonstrated by the mental component summary (MCS) score, was seen. Similarly in controls, PCS significantly improved (median IQR, 44 (36–50) at BL to 52 (44–55) at M12, $p<0.001$), whereas no significant improvement was seen in MCS. Anxiety and depression decreased significantly in both PsA patients and controls.

Conclusions The weight loss intervention was associated with significant improvements in physical HRQoL, as well as anxiety and depression, in PsA patients and controls.

Trial registration ClinicalTrials.gov identifier: NCT02917434, registered on September 21, 2016, retrospectively registered.

Key message

• Improved physical HRQoL and reductions in anxiety, and depression were seen in both PsA patients and controls after a weight loss intervention.

Keywords Arthritis, Health-related quality of life, Obesity, Psoriatic arthritis

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Background

Psoriatic arthritis (PsA) is a heterogenous disease characterized by arthritis, dactylitis, enthesitis and in a minority axial disease [1]. PsA is associated with reduced health-related quality of life (HRQoL), depression and anxiety compared with the general population [2, 3]. Obesity is common in PsA and adversely affects HRQoL, anxiety and depression [4–6]. Weight loss in obese patients with psoriasis (PsO) has been demonstrated to improve HRQoL [7, 8]. However the effect of weight loss on HRQoL in PsA is to our knowledge largely unexplored, although we have previously reported on positive effects on disease activity in the rheumatic disease and on summary physical aspects of HRQoL and on the health assessment questionnaire (HAQ) twelve months after a structured weight loss intervention with very low energy diet (VLED) in patients with PsA and obesity and matched controls [9]. In this post-hoc analysis we aimed to assess the effect on physical as well as mental HRQoL, anxiety and depression in the same weight loss study.

Methods

Study design and setting

In this secondary analysis of an open prospective interventional weight loss study, obese PsA patients and matched controls were followed up to twelve months. A more detailed description of the method has previously been published [10].

PsA patients

PsA patients were recruited from three hospitals in Western Sweden: the Department of Rheumatology at Sahlgrenska University Hospital, rheumatology units at Alingsås and Borås hospitals. Patients were 25 to 75 years of age, had BMI ≥ 33 kg/m^2, and fulfilled the Classification criteria for Psoriatic Arthritis (CASPAR) criteria [11]. Exclusion criteria (patients and controls) were pregnancy, type 1 diabetes, heart disease, epilepsy, porphyria, type 1 diabetes, catabolic disease, severe kidney disease, binge eating disorder, current treatment with lithium/warfarin/phenytoin, or having mental imbalance affecting participation or previous stroke, myocardial infarction or major surgery/trauma the last three months, or having been treated for cancer during the last five years. Treatment with conventional synthetic or biologic disease-modifying anti-rheumatic drugs were held constant from three months before BL to M6.

Controls

Recruitment was done from the Regional Obesity Center at Sahlgrenska University Hospital. Obese individuals that were already planned to receive treatment with VLED, were matched for sex, age and weight to PsA patients. In addition to the exclusion criteria previously mentioned, those having a diagnosis of PsA, PsO, or any inflammatory rheumatic disease were not eligible for the study.

Dietary intervention

Patients and controls were given VLED (containing 640 kcal/day) (Cambridge Weight Plan Limited, Corby, UK) during 12 (if BMI < 40 kg/m^2) or 16 (if BMI ≥ 40 kg/m^2) weeks. Thereafter, solid foods were gradually reintroduced during 12 weeks. Participants were given personalised energy-restricted dietary advice by dietitians and brief support for physical activity. In agreement with the routines for structured weight loss treatment, all participants were followed at the Regional Obesity Center for 12 months.

Survey and physical assessments

PsA patients were followed at the Rheumatology unit at Sahlgrenska University Hospital at BL, after three, six, and twelve months. The controls were followed using a similar protocol. Body height and weight were measured, and BMI was calculated. In PsA patients, joints (66/68 swollen/tender joints count) were assessed and the DAPSA score was calculated [12]. Activity limitations (Health Assessment Questionnaire (HAQ)) [13] were assessed. The patients' disease activity was assessed with visual analogue scales (VAS) for global disease activity, pain and fatigue. The 36-item short-form health survey (SF-36) was used to assess HRQoL [14]. The SF-36 contains 36 items, separated in eight domains: physical functioning, role physical, social functioning, role emotional, mental health, vitality, bodily pain, and general health. The different domains and the component summary scores range from 0 to 100, with higher scores indicating a better health status. The physical and mental component summary (PCS and MCS) scores are frequently used as summary measures. Higher scores on PCS and MCS represent better health and normal values, standardized to the Swedish SF-36 normative population, for PCS and MCS are (mean ± sd) 50 ± 10, where a value below 50 represents worse health status than the general population. The SF-36 has been validated for use in PsA [15]. The Hospital Anxiety and Depression Scale (HADS), consisting of 14 assumptions, seven relating to anxiety and seven relating to depression [16], was used to assess anxiety and depression. Answers are given on a scale from 0 to 3 for each assumption. A score of ≧ 8 points for anxiety or depression are considered clinically relevant.

Statistical analyses

Descriptive statistics were reported as numbers (%), median and interquartile range (IQR). The Mann-Whitney U test was used for between group comparisons of continuous variables. For categorical variables, the

chi-square test was used. Wilcoxon Signed Rank Test was used for comparing continuously related samples. Two-tailed tests were used. A p-value ≤ 0.05 was considered statistically significant. Statistical analyses were done using SPSS Statistics version 29 (IBM, Chicago, USA).

Ethics

All participants provided written informed consent. The Regional Ethics Committee in Gothenburg (approval number 901-15) approved the study. ClinicalTrials.gov identifier: NCT02917434, registered on September 21, 2016, retrospectively registered.

Results

Baseline

In total, 39 PsA patients (median age 55 (IQR 48–62) years; 64% women) and 39 controls (median age 56 (IQR 48–60) years; 74% women) were followed up until M12. There were no significant differences in height or weight comparing PsA patients and controls (Table 1). BMI was however lower in the PsA patients, 35.2 (IQR 33.9–37.9) kg/m^2 compared with the controls, 38.5 (37.0-41.7) kg/m^2, $p < 0.001$. In PsA patients the median DAPSA score at BL was 15.3 (6.6–29.1) indicating moderate disease activity, and the majority (35/41, 85%) of PsA patients had peripheral disease. Sixteen (41%) reported use of biologic-DMARDs and approximately half (17/39, 43.6%) reported use of conventional synthetic DMARDs with no biologic DMARD. SF-36 PCS scores were significantly better in controls compared to PsA patients, whereas no differences in MCS, HADS anxiety and HADS depression were observed.

BL to M12 in PsA patients

In PsA patients, BMI was reduced from 35.2 (IQR 34.3–37.9) at BL to 30.5 (28.0-32.9) at M12. HAQ, VAS scales (global disease activity and fatigue) and DAPSA improved significantly comparing BL and M12 (Table 2). For SF-36 scales, significant improvements were noted in physical domains and consequently PCS (34 (25–45) at BL to 43 (34–50)) at M12, $p = 0.009$), whereas mental domains and MCS were numerically although not significantly improved comparing BL and M12 (Table 2; Fig. 1). HADS was reduced from already low levels at BL, median (IQR) (3 (1-7) for anxiety and 2 (1-7) for depression to 2 (1-7.5), $p = 0.045$ and 1 (1-4), $p = 0.045$, respectively.

BL to M12 in controls

In controls, BMI was reduced from 38.5 (36.8–41.7) at BL to 32.6 (30.3–34.8, $p < 0.001$) at M12 (Table 2). In parallel to PsA patients, significant improvements in SF-36 physical subscales (except for bodily pain) and consequently PCS, median (IQR) 44 (36–50) to 52 (47–56), $p < 0.001$, were seen at M12, whereas non-significant improvements were seen in mental subscales and MCS at M12 (Table 2; Fig. 1). Similarly, as in PsA patients, HADS was reduced from low levels at BL to M12. Median (IQR) for anxiety: 5 (2-8) at BL to 2 (1-5) at M12, $p = 0.002$. Corresponding numbers for depression were: 3 (1.3–5.8) at BL to 2 (0.3–3.8) at M12, $p = 0.002$.

Discussion

In this study, we show positive effects of weight loss on physical HRQoL, anxiety, depression, and fatigue in patients with PsA and obesity and matched controls. Similarly, others have reported positive effects on HRQoL in a smaller study of ten patients with PsO and obesity following weight loss through bariatric surgery [7] and in a study with 60 men with PsO and obesity following a low-energy diet for 12 weeks [8]. Obesity in PsA is associated with increased disease activity [17], which in turn is associated with increased levels of depression,

Table 1 Baseline characteristics of PsA patients and controls

Variables	PsA ($n = 39$)	Controls ($n = 39$)	*p*-value
Women	25 (64.1)	29 (74.4)	0.462
Age, years	55 (48–62)	56 (48–60)	0.617
Height, m	168 (161-176.5)	165 (161–170)	0.180
Weight, kg	106.0 (93.5-112.5)	107.0 (96.5-122.2)	0.358
BMI, kg/m^2	35.2 (33.9–37.9)	38.5 (37.0-41.7)	< 0.001
PsO disease duration, years	35 (20–48)		
PsA symptom duration, years	15.5 (10.8–27.8)		
Biologic DMARDs	16 (41.0)		
Conventional synthetic DMARDs	17 (43.6)		
SF-36 Physical component summary	34 (25–45)	44 (36–50)	0.003
SF-36 Mental component summary	51 (39–57)	52 (40–57)	0.905
HADS-anxiety	3 (1–7)	5 (2–8)	0.202
HADS-depression	2 (1–7)	3 (1.3–5.8)	0.655

Numbers are median (interquartile range) or n (%)

BMI body mass index, DMARD disease modifying anti rheumatic drug, HADS hospital anxiety and depression scale, PsA psoriatic arthritis, PsO psoriasis, SF-36 medical outcomes study 36-item short-form health survey

Table 2 Baseline and M12 comparisons in PsA patients and controls

Variables	PsA, BL (*n* = 39)	PsA, M12 (*n* = 39)	PsA, *p*-value BL vs. M12	Controls, BL (*n* = 39)	Controls, M12 (*n* = 39)	Controls, *p*-value BL vs. M12
BMI, kg/m^2	35.2 (33.9–37.9)	30.5 (28.0-32.9)	< 0.001	38.5 (37.0-41.7)	32.6 (30.3–34.8)	< 0.001
HAQ	0.63 (0.13–1.13)	0.25 (0.00-0.63)	0.002			
VAS patients´ global disease activity, mm	50.0 (20.0–70.0)	30.0 (17.5–52.5)	0.023			
VAS pain, mm	40 (21–64)	30.0 (13.8–46.3)	0.073			
VAS fatigue, mm	50.0 (32.5–70.0)	35.0 (20.0–70.0)	0.021			
DAPSA, score	17.0 (8.2–25.4)	9.5 (4.8–18.1)	< 0.001			
SF-36 subscales						
Physical functioning	65 (40–84)	75 (56–90)	0.004	75 (50–90)	90 (75–100)	< 0.001
Role physical	50 (0-100)	100 (25–100)	0.024	100 (38–100)	100 (75–100)	0.024
Bodily pain	41 (31–62)	51 (41–74)	0.045	61 (41–100)	74 (51–100)	0.280
General health	53 (30–72)	64 (54–78)	0.003	62 (50–75)	77 (63–91)	0.001
Vitality	50 (25–60)	63 (35–80)	0.001	58 (36–79)	70 (40–90)	0.003
Social functioning	75 (50–100)	88 (75–100)	0.004	81 (63–100)	100 (88–100)	0.006
Role emotional	100 (42–100)	100 (75–100)	0.181	100 (67–100)	100 (67–100)	0.477
Mental health	78 (64–92)	88 (67–92)	0.293	80 (68–92)	88 (76–94)	0.102
SF-36 Physical component summary	34 (25–45)	43 (34–50)	0.009	44 (36–50)	52 (44–55)	< 0.001
SF-36 Mental component summary	51 (39–57)	54 (46–57)	0.179	52 (40–57)	54 (48–58)	0.062
HADS-Anxiety	3 (1–7)	2 (1-7.5)	0.045	5 (2–8)	2 (1–5)	0.002
HADS-Depression	2 (1–7)	1 (1–4)	0.046	3 (1.3–5.8)	2 (0.3–3.8)	0.002

Numbers are median (interquartile range) or n (%)

BMI body mass index, DAPSA disease activity in psoriatic arthritis, HADS hospital anxiety and depression scale, HAQ health assessment questionnaire, M month, SF-36 medical outcomes study 36-item short-form health survey, VAS visual analogue scale

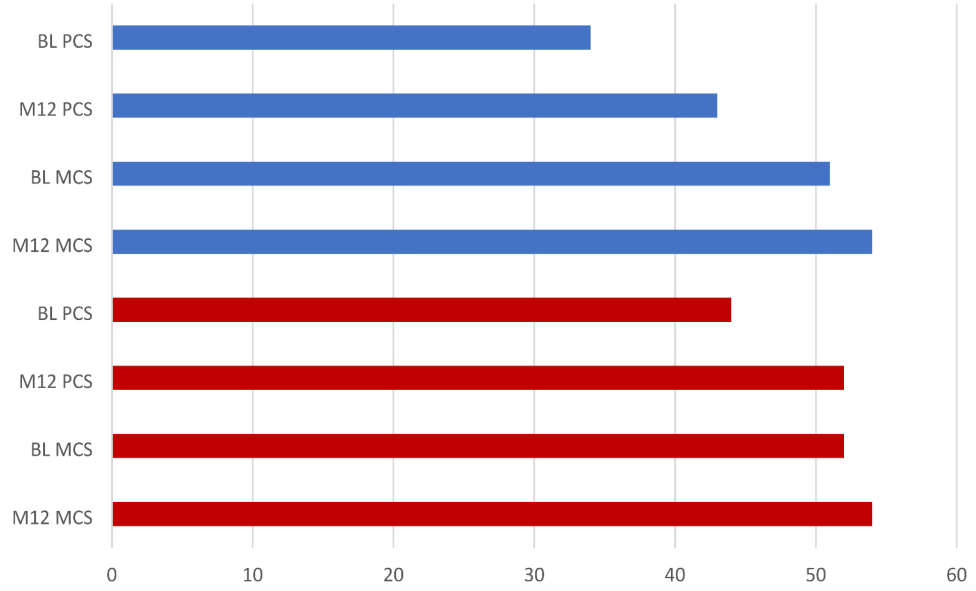

Fig. 1 Summary scores (median) for SF-36 at baseline (BL) and month 12 (M12) in PsA patients and controls. PsA patients are marked in blue. Controls are marked in dark red. MCS, Mental component summary, PCS, Physical components summary

anxiety and worse HRQoL [18, 19]. The improvements in physical but not mental HRQoL is in line with what has previously been reported in a systematic review and meta-analysis, although not specifically assessing PsO or PsA patients [20]. In our study, patients and controls reported no clinically significant signs of anxiety or depression (HADS below the cut-off score of eight) at BL. The small improvement that was reported at the M12 follow-up for PsA patients and controls may be of limited clinical significance, although anxiety and depression is

common in PsA. While limited by a small sample size, this study shows the positive effects on HRQoL that can be achieved by weight loss and support for physical activity in obese PsA patients.

Abbreviations

BMI	Body mass index
DAPSA	Disease activity in psoriatic arthritis
DMARD	Disease modifying anti rheumatic drug
HADS	Hospital anxiety and depression scale
HAQ	Health assessment questionnaire
M	Month
PsA	Psoriatic arthritis
PsO	Psoriasis
SF-36	Medical outcomes study 36-item short-form health survey
VAS	Visual analogue scale

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Author contributions
AJL participated in interpretation of data and was responsible for statistical analyses and drafting of the article. AB participated in the study design, recruitment and examination of patients, collection, analysis and interpretation of data. BE participated in the study design, recruitment and examination of patients, collection and interpretation of data and was responsible for the weight loss treatment and follow-up. LT participated in interpretation of data and drafting of the article. MD participated in interpretation of data and drafting of the article. LTHJ participated in interpretation of data and drafting of the article. IL participated in the study design, recruitment and examination of patients, collection and interpretation of data and was responsible for the weight loss treatment and follow-up. EK was responsible for the study design, recruitment of patients, rheumatologic evaluations, data collection, interpretation of data and participated in drafting of the article. All authors have critically reviewed the manuscript, approved the final version to be published and agreed to be accountable for all aspects of the work.

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Data availability
Data is available upon reasonable request.

Declarations

Ethics approval and consent to participate
All participants gave written informed consent. The Regional Ethics Committee in Gothenburg (approval number 901-15) approved the study.

Consent for publication
Yes.

Clinical trial number
ClinicalTrials.gov identifier: NCT02917434, registered on September 21, 2016, retrospectively registered.

Competing interests
The authors declare no competing interests.

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