Health-Related Quality of Life in Obese Persons Seeking Treatment

Kevin R. Fontaine, PhD; Lawrence J. Cheskin, MD; and Ivan Barofsky, PhD
Baltimore, Maryland

BACKGROUND. The relationship between obesity and increased risks of morbidity and mortality is well established. Less is known about the impact of obesity on functional health status and subjective well-being.

METHODS. We examined health-related quality of life (HRQL), measured by the Medical Outcomes Study Short Form-36 Health Survey (SF-36), and clinical characteristics of 312 consecutive persons seeking outpatient treatment for obesity at a university-based weight management center. SF-36 scores were adjusted for sociodemographic factors and various comorbidities, including depression, to better estimate the effect of obesity on HRQL. Health-related quality of life of the obese patients was then compared with that of the general population and with a sample of patients who have other chronic medical conditions.

RESULTS. Compared with general population norms, participants who had a mean body-mass index (BMI) of 38.1 reported significantly lower scores (ie, more impairment) on all eight quality-of-life domains, especially bodily pain and vitality. The morbidly obese (mean BMI, 48.7) reported significantly worse physical, social, and role functioning, worse perceived general health, and greater bodily pain than did either the mildly (mean BMI, 29.2) or moderately to severely obese (mean BMI, 34.5). The obese also reported significantly greater disability due to bodily pain than did patients with other chronic medical conditions.

CONCLUSIONS. Obesity profoundly affects quality of life. Bodily pain is a prevalent problem among obese persons seeking weight loss and may be an important consideration in the treatment of this population.

KEY WORDS. Obesity; health-related quality of life; SF-36 Health Survey; bodily pain. *(J Fam Pract 1996; 43:265-270)*

Excess body fat is a major public health problem in the United States. It is estimated that one third of US men and women over the age of 20 are at least mildly obese (body mass index [BMI] >28), a 40% increase in prevalence in the past 11 years.[1] Excessive body fat is a significant risk factor for diseases of virtually every organ system,[2] and the economic cost of weight-related illnesses exceeds $39 billion annually.[3] While the link between obesity and increased risks of morbidity and mortality is well established,[4] considerably less is known about the impact of obesity on health-related quality of life.[5,6]

Health-related quality of life (HRQL) refers to the overall effects of medical conditions on physical and mental functioning and well-being as subjectively evaluated and reported by the patient.[7] The development of standardized measures of HRQL make it possible to quantify the magnitude of the effects of a particular medical condition and to make comparisons with persons experiencing other medical ills or with those having no medical condition. Having such information should increase our understanding of the impact of a given illness on functioning across a range of domains, such as physical and mental functioning and role disability. It also may inform treatment practices and service provision, and influence public health policy.[8] For example, it has been demonstrated that the mechanical stress resulting from obesity is largely responsible for the link between excessive body weight and osteoarthritis and joint pain.[9] The impact such pain has on HRQL has been largely ignored, however, as has the effect of obesity on other dimensions of functioning and well-being.[5]

Submitted, revised, May 23, 1996.
From the Department of Medicine, The Johns Hopkins University School of Medicine, Baltimore, Maryland. Requests for reprints should be addressed to Kevin R. Fontaine, PhD, Johns Hopkins Bayview Research Campus, 333 Cassell Drive, Suite 1640, Baltimore, MD 21224.

The purpose of this study was to determine the HRQL of persons seeking university-based outpatient treatment for obesity, adjusting for sociodemographic factors and various comorbidities, and to compare them with published US population and illness-specific norms. We also investigated whether HRQL differed as a function of severity of obesity.

METHODS

Three hundred twelve consecutive participants (90% self-referred) seeking outpatient weight-loss treatment at the Johns Hopkins Weight Management Center in Baltimore, Maryland, during 1991 and 1992 underwent a comprehensive medical evaluation (ie, history, physical examination, biochemical profile, and electrocardiogram), psychological evaluation, metabolic testing, and an evaluation of dietary and exercise practices. Testing was performed for the purpose of individualizing treatment programs. The criteria for exclusion were a history of uncompensated renal, hepatic, or cerebrovascular disease; type I diabetes; cancer; or current pregnancy. Written informed consent was obtained from participants for the use of clinical data collected for research purposes. Participants received no inducements to participate and paid customary fees. The response rate was approximately 95%.

Demographic and health-related characteristics of the participants were collected by means of comprehensive application questionnaires administered at the time of enrollment in the program. Evaluative interviews were also conducted by the program's physician, psychologist, and dietitian. The personnel conducting the interviews remained constant throughout the data collection period. Medical conditions most commonly noted during the evaluations included low back pain, hypertension, type II diabetes, arthritis, and clinical depression or dysthymia. These were assessed by clinical interview.

Pretreatment HRQL was assessed using the Medical Outcomes Study Short-Form Health Survey (SF-36).[10] This self-administered questionnaire contains 36 questions measuring eight domains of functioning: physical functioning, role limitations due to physical health problems, bodily pain, general health perception, vitality, social functioning, role limitations due to emotional problems, and mental health. The SF-36 possesses sound psychometric properties and standardized norms, and is widely used in a variety of health-care contexts.[10-13] The majority of participants completed the SF-36 in less than 10 minutes. For all measures of the eight SF-36 domains, scores were transformed linearly to scales of 0 (maximal impairment) to 100 (no impairment). No item had less than a 95% response rate. In the statistical description of the study participants, absolute and relative frequencies were calculated for categorical variables; means and standard deviations for continuous variables. Analysis included single mean *t* tests and one-way analysis of variance.

Linear regression methods were used to estimate the impact of selected comorbid conditions (hypertension, type II diabetes, arthritis, depression) and sociodemographic characteristics (age, sex, marital status, education) on each of the eight SF-36 domains.[7-14] These adjustments resulted in 1- to 3-point increases in SF-36 scale scores, which better describe the effect of obesity on HRQL.

Based on the National Survey of Functional Health Status,[10] differences between adjusted study participants' SF-36 scores and general population norms of persons with no known chronic condition were tested for significance with single mean *t* tests. The effect size of obesity in SF-36 scores was determined by calculating the difference in scale score between the obese and the population norm, divided by the average deviation of the two populations. Effect sizes of 0.20, 0.50, and 0.80 or greater are considered small, moderate, and large, respectively.[15] For example, an effect size of 0.50 indicates that one group scored one half of a standard deviation lower than the other group, a moderately large difference. Identical sets of analyses were performed comparing male and female participants' adjusted SF-36 scores with male and female population norms. Participants were grouped into three categories of BMI, based on enrollment weight and height: mild obesity (BMI <30), moderate to severe obesity (BMI >30 and <40), or morbid obesity (BMI >40). One-way analysis of variance was used to contrast adjusted SF-36 scores among the three BMI subgroups. Where significant overall differences were found, conservative Tukey's honestly significant difference (HSD) tests were calculated on all possible pairwise comparisons. Finally, single mean *t* tests were used to compare study participants' adjusted SF-36 bodily

pain scores with published pain scores from patients having other chronic conditions.[7,10,16]

Results were considered significant at the $P < .05$ level. The main conclusions were not affected by strict Bonferroni corrections, which impose a significance level between .004 and .008 for the majority of comparisons. Statistical tests were performed with SPSS 6.0 for Windows.[17]

RESULTS

As part of the intake assessment, data were obtained from a total of 312 consecutive participants seeking outpatient weight loss treatment. Demographic characteristics of study participants are summarized in Table 1. The mean age was 39 years (range 16 to 70); 74% were women and 23% were nonwhite. Fifty-six percent reported at least college graduation as their highest level of educational attainment; 51% were in white-collar employment; and 52% were married.

Clinical characteristics of the participants were as follows: 56% reported that they were experiencing some chronic pain, 40% of whom reported lower back pain and 20% of whom reported arthritis. When the pain severity item of the SF-36 was used as an index of the prevalence of pain, 47.4% indicated experiencing pain during the 4 weeks prior to their intake assessment. Twenty-seven percent were diagnosed as hypertensive during their medical evaluation, ie, having systolic pressure >160 and/or diastolic pressure >90 or receiving current treatment for hypertension; 12% reported a diagnosis of type II diabetes; and 16% reported being depressed. The mean body weight of participants was 234.5 lb (SD 73.0; range 167 to 683 lb; BMI 38.1, SD 8.4 kg/m^2).

Comparison with SF-36 General Population Norms

The adjusted SF-36 data for participants and US population norms[10] are shown in Table 2. Compared with norms, obese participants scored significantly worse (ie, had lower scores) in all eight SF-36 domains. Differences between the obese and norms on HRQL were most pronounced in the bodily pain and vitality domains and least apparent in social functioning and role limitations due to emotional problems. An identical pattern of findings emerged when adjusted male and female obese participants' SF-36 scores were compared with male and female population norms. Finally, with sociodemographic variables and comorbid conditions controlled, there was one significant difference between the sexes on SF-36 scores within our sample. Men reported greater impairment (lower scores) on general health perception than did women (58.8 ± 20.2 vs 65.1 ± 19.9, $P=.016$). It should be noted, however, that when the Bonferroni procedure is used to adjust the P value, the difference is rendered nonsignificant.

Health Status and Degree of Obesity

Table 3 presents adjusted SF-36 scale scores for

TABLE 1

Sociodemographic Characteristics of Obese Study Participants (N=312)

Characteristic	Percentage of Patients
Age, y (n=309)	
<35	23.6
35 to 44	35.3
45 to 54	26.9
55 to 64	9.4
65 to 74	4.9
Sex (N=312)	
Men	26.3
Women	73.7
Race (n=290)	
White	77.2
Nonwhite	22.8
Education (n=279)	
<High school	6.5
High school	37.3
College	38.0
Graduate school	18.3
Occupation (n=258)	
White collar	50.8
Blue collar	43.0
Other	6.2
Marital status (n=280)	
Single	24.6
Married	57.1
Divorced	14.3
Other	3.9

NOTE: Numbers vary because of missing data.

TABLE 2

Mean and Standard Deviations of Adjusted SF-36 Scores for Obese Study Participants and General US Population Norms

SF-36 Items	SF-36 Scores: Study Participants (N=312)	SF-36 Scores: US Norms (N=2474)	Effect Size*
Physical functioning	72.6 (25.4)	84.5 (22.8)	-0.49
Role–physical	71.5 (37.2)	81.1 (33.7)	-0.28
Bodily pain	52.8 (26.5)	75.4 (23.5)	-0.90
General health	64.2 (20.1)	72.2 (20.1)	-0.39
Vitality	47.4 (20.9)	61.0 (20.8)	-0.65
Social functioning	77.1 (25.0)	83.5 (22.3)	-0.27
Role–emotional	75.4 (37.1)	81.2 (33.0)	-0.16
Mental health	69.7 (18.5)	74.8 (18.0)	-0.28

*Effect size calculated as the difference between obese and norm scale score divided by average deviation of the two populations. For example, obese participants have an adjusted score on the SF-36 physical functioning scale that is just under one half (–0.49) of a standard deviation lower than US population norms, a moderately large difference.

NOTE: All comparisons are significant at $P<.001$ by single mean t test.

SF-36 denotes Medical Outcomes Study Short Form-36 Health Survey.

participants classified by severity of obesity as either mildly (mean BMI = 29.2 ± 2.4), moderately to severely (mean BMI = 34.5 ± 2.8), or morbidly (mean BMI = 48.7 ± 8.1) obese. One-way analysis of variance revealed a significant difference among the three groups in six of the eight SF-36 scales. With the exception of the role–emotional and mental health domains, Tukey's HSD tests indicated that the morbidly obese scored significantly worse (lower) on physical functioning, role limitations due to physical problems, general health perception, vitality, social functioning, and bodily pain than did either of the less obese participant categories.

Bodily Pain: Comparison with Chronic Medical Conditions

Because of the large difference between the obese and US norms on bodily pain, we used single-mean t tests to contrast our participants' adjusted SF-36 bodily pain scores with published data from several chronic conditions: clinical depression, congestive heart failure, symptomatic patients positive for human immunodeficiency virus (HIV+), and migraineurs.[7,10,16] These patient groups were chosen for comparison because they represent diverse medical conditions. With the exception of those with migraine, obese participants reported significantly greater (P <.005) bodily pain (lower scores) than did those with all other chronic conditions (mean, obese = 52.8 ± 26.5 vs depression = 58.8 ± 26.7, HIV+ = 59.1 ± 23.2, congestive heart failure = 62.6 ± 30.9). There was no difference between the bodily pain scores of migraine sufferers and the obese on the SF-36 (mean, 51.3 ± 29.1 vs 52.8 ± 26.5, NS).

DISCUSSION

Our study found that: (1) relative to US population norms, obese persons seeking university-based weight loss treatment reported substantial decrements in HRQL; (2) the impact of obesity on HRQL varied with severity of obesity; and (3) functional disability due to bodily pain was particularly common—comparable to that of chronic migraine sufferers—among obese persons seeking university treatment.

We observed significant negative effects of obesity in all eight SF-36 domains, including physical, social, and mental functioning, role limitations, perceptions of general health, and bodily pain. Compared with the US general population, obese participants on average scored at only the 20th percentile on bodily pain, the 23rd percentile on vitality, and the 32nd percentile on mental health. It is important to note that a variety of comorbid conditions, such as hypertension and arthritis, can be eliminated as likely explanations for our findings because they were controlled for statistically.

There were also differences found within the sample as a function of severity of obesity. Compared with patients in the other obesity severity classifications, the morbidly obese scored worse in all SF-36 domains except mental health and role limitations due to emotional problems. The pattern of these results indicates that as weight increases, HRQL related to the physical domains becomes more adversely affected.

Interestingly, obesity had the most adverse

effect on the bodily pain scale. Although obesity has been known to be associated with musculoskeletal or joint-related pain,[9,18,19] the impact of this pain on functioning and well-being has not been well documented. Because the SF-36 bodily pain scale measures the severity of pain as well as the extent to which it affects normal day-to-day activities, it can serve as a marker of disability associated with excessive body weight.

It should be noted that, while high, the prevalence of hypertension and type II diabetes—two conditions known to be more common among the obese—is less striking than the prevalence and impact of pain associated with obesity. In this study, it was greater than that of a variety of other chronic conditions and comparable to that experienced by migraineurs. We have observed that one of the primary reasons people report for attending our clinic is to lose weight in an effort to reduce or eliminate debilitating bodily pain. The SF-36 bodily pain severity item was found to be associated with longer attendance in the weight management program. To our knowledge, however, the effect of weight loss on chronic pain has not been investigated.

TABLE 3

Comparison of Adjusted SF-36 Scores Between Mildly, Moderately to Severely, and Morbidly Obese Study Participants (n = 278)

SF-36 Scale	SF-36 Scores (Standard Deviation) Mildly (n=35)	Moderately (n=163)	Morbidly (n=80)	F
Physical functioning	85.6* (17.5)	79.4† (21.0)	51.9 (26.8)	45.6‡
Role–physical	85.0* (26.1)	77.8† (33.1)	46.3 (37.6)	23.8‡
Bodily pain	66.4* (27.7)	54.5† (27.5)	43.2 (22.1)	9.6‡
General health	72.0* (20.5)	65.7† (20.3)	54.3 (18.0)	11.8‡
Vitality	49.5* (18.6)	48.1† (21.3)	38.0 (19.1)	6.9‡
Social functioning	84.9* (17.2)	79.3† (24.1)	67.9 (26.9)	7.3‡
Role–emotional	85.4 (32.3)	75.3 (36.6)	69.3 (40.1)	2.4
Mental health	74.3 (11.8)	68.6 (18.7)	65.6 (19.6)	2.6

*Mildly obese differed significantly ($P<.05$) from morbidly obese.
†Moderately to severely obese differed significantly $P<.05$).
‡$P<.001$, two-tailed probability.
SF-36 denotes Medical Outcomes Study Short Form-36 Health Survey.

The generalizability of our results depends on the degree to which our outpatient sample is representative of obese persons seeking weight loss treatment. Many of our participants were white, well-educated women with white-collar jobs. With respect to selection bias, we note that the majority of our clients were self-referred and not a selected group who had been unsuccessful in other weight loss efforts. Moreover, 71% of our sample was composed of those classified as mildly or moderately to severely obese, suggesting that our results are not a function servicing only the morbidly obese end of the weight spectrum. Finally, it should be noted that with respect to SF-36 bodily pain scores, even the mildly obese in our sample were significantly impaired relative to population norms. Nevertheless, whether our results generalize to obese persons who do not seek treatment or to those who seek commercial weight loss treatment remains to be determined.

Another possible limitation is that our pretreatment evaluations may not have assessed or recorded every relevant comorbid medical or psychiatric condition contributing to patients' SF-36 scores. Thus, our adjusted scores may still overestimate the unique effect of obesity on HRQL. It is interesting to note, however, that particularly with respect to SF-36 bodily pain scores, we controlled for the potent alternative explanation that the reporting of somatic complaints may be associated with depression.[19] It is also possible that other psychological dimensions that were not assessed, eg, personality disorders, may have served to amplify somatic concerns.[20]

We examined the effect of obesity on HRQL among those seeking outpatient university-based weight loss treatment. We observed profound limitations in their health status and well-being relative to the general population, and, with respect to bodily pain, relative to medically impaired populations. Our study suggests that chronic bodily pain may occur in over one half of the population seeking medically based treatment for obesity and that this pain is perceived to have a debilitating effect on normal daily activities. If bodily pain is itself a significant motivator for obese persons to seek medical care, it may be useful for primary care physicians to engage patients in weight loss efforts by validating the patient's pain experience and

underscoring the potential benefits of weight loss in reducing or ameliorating pain. Focusing on the pain rather than other medical complications associated with obesity may help reduce the tendency of obese persons—most notably women—to delay or cancel physician appointments perhaps because of concerns that they will be lectured about their weight.[21] Thus, a greater emphasis on the diagnosis and treatment of bodily pain may be an important and frequently overlooked component of the medical management of obese persons.

REFERENCES

1. Kuczmarski RJ, Flegal KM, Campbell SM, et al. Increasing prevalence of overweight among US adults. JAMA 1994; 272:205-11.
2. Cheskin LJ. Obesity. In: Bayless TM, ed. Current therapy in gastroenterology and liver disease. 4th ed. St Louis, Mo: Mosby, 1994.
3. Colditz GA. Economic costs of obesity. Am J Clin Nutr 1992; 55(suppl):503S-7S.
4. Pi-Sunyer FX. Medical hazards of obesity. Ann Intern Med 1993; 119:655-60.
5. Kolotkin RL, Head S, Hamilton M, et al. Assessing the impact of weight on quality of life. Obes Res 1995; 3:49-56.
6. Sullivan M, Karlsson J, Sjostrom LV, et al. Swedish obese subjects (SOS) an intervention study of obesity: baseline evaluation of health and psychosocial functioning in the first 1743 subjects examined. Int J Obes Rel Metab Dis 1993; 17:503-12.
7. Osterhaus JT, Townsend RJ, Gansdek B, et al. Measuring the functional status and well-being of patients with migraine headache. Headache 1994; 34:337-43.
8. Ware JE, Sherbourne CD. The MOS Short-Form Survey (SF-36) I. Conceptual framework and item selection. Med Care 1992; 30:473-81.
9. Hartz AJ, Fischer ME, Bril G, et al. The association of obesity with joint pain and osteoarthritis in the HANES data. J Chron Dis 1986; 39:311-9.
10. Ware JE, Snow KK, Kosinski M, et al. SF-36 health survey: manual and interpretation guide. Boston, Mass: New England Medical Center, 1993.
11. Cleary PD, Epstein AM, Oster G, et al. Health-related quality of life among patients undergoing percutaneous transluminal coronary angioplasty. Med Care 1991; 29:939-50.
12. Weinberger M, Samsa GP, Hanlon JT. An evaluation of a brief health status measure in elderly veterans. J Am Geriatr Soc 1991; 39:691-4.
13. Mahler DA, Mackowiak JI. Evaluation of the short form 36-item questionnaire to measure health-related quality of life in patients with COPD. Chest 1995; 107:1585-9.
14. Stewart AL, Greenfield S, Hays RD, et al. Functional status and well-being of patients with chronic conditions: results from the Medical Outcomes Study. JAMA 1989; 262:907-13.
15. Kazis LE, Anderson JJ, Meenan RF. Effect sizes for interpreting changes in health status. Med Care 1989; 27:S178-89.
16. Wachtel T, Piette J, Mor V, et al. Quality of life in persons with human immunodeficiency virus infection: measurement by the Medical Outcomes Study instrument. Ann Intern Med 1992; 116:129-37.
17. Norussis M. SPSS for Windows: Base system user's guide: release 6.0. Chicago, Ill: SPSS Inc, 1993.
18. van Saase JLC, Vandenbrouke JP, van Romunde LK, et al. Osteoarthritis and obesity in the general population: a relationship calling for an explanation. J Rheumatol 1988; 15:1152-8.
19. Haythornthwaite JA, Sieber WJ, Kerns RD. Depression and the chronic pain experience. Pain 1991; 46:177-84.
20. Sansone RA, Sansone LA, Morris DW. Prevalence of borderline personality symptoms in two groups of obese subjects. Am J Psychiatry 1996; 153:117-8.
21. Olson CL, Schmaker HD, Yawn BP. Overweight women delay medical care. Arch Fam Med 1994; 3:888-92.