Nurse evaluation of hyperactivity in anorexia nervosa: a comparative study

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European Eating Disorders Review (in press)

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Abstract

Up to 80% of patients with anorexia nervosa manifest elevated levels of physical activity or hyperactivity. A variety of methods has been used to evaluate activity levels, mostly questionnaires but also expensive and invasive methods such as actometry or other measurements of energy expenditure. Nurse observations have heretofore not been tested for validity and reliability. In this study, 18 patients with anorexia nervosa under treatment in a specialized eating disorder centre simultaneously rated their own physical activity levels, used an actometer, and were observed for physical activity by trained nurses. We found that nurse ratings of activity correlated significantly with the average actometer activity score ($r= 0.61$, $p< 0.01$). Patients could not rate their own activity levels accurately. Nurse observation of activity levels of anorexia nervosa patients during treatment is a reliable and useful monitoring tool.

Introduction

A large proportion of anorexia nervosa (AN) patients (31-80 % depending on the criteria used and the study methods) exhibits elevated physical activity levels, described as hyperactivity, over-activity, motor restlessness and compulsive exercise (Favaro, Caregaro, Burlina, & Santonastaso, 2000; Hebebrand *et al.*, 2003; Holtkamp *et al.*, 2006). Almost all AN patients show a constant, agitated restlessness when they are emaciated, but before they become lethargic in the final stages of starvation. The different terms used to describe this elevated physical activity reflect different aspects or qualities of this symptom but also uncertainty about the origin of this behaviour that could reflect an altered state of mind and/or a neurobiological phenomenon and also questions about the extent to which patients deliberately reinforce the behaviour to reduce weight. In clinical practice an elevated physical activity level (hyperactivity) is a worrisome symptom. Hyperactivity leads to accelerated weight loss, to potentially lethal cardiovascular complications and because of its obsessive components often to dropout of treatment programs. The exact nature of hyperactivity remains to be clarified and although it is not included in the DSM IV criteria (American Psychiatric Association (APA), 1994), several authors (Hebebrand *et al.*, 2003; Casper, 2006) have described and commented on this seemingly contradictory phenomenon. Some authors state that it might be seen as a core symptom of AN (Casper, 1998). Neurobiological factors and conscious attempts to burn calories in order to loose more weight coexist. Hyperactivity has been described as a pre-morbid feature (Davis *et al.*, 1997) and it accelerates body weight loss during food restriction. Therefore measuring this behaviour is important for treatment, but also for identifying factors for genetic and behavioural susceptibility to AN.

In clinical practice a variety of methods has been used to evaluate hyperactivity: retrospective analysis of medical records (Crisp, Hsu, Harding, & Hartshorn, 1980), self-reports by means of activity diaries, experience sampling (Vansteelandt *et al.*, 2004), questionnaires (Slade, 1973) or self-ratings using visual analogue scales (Exner *et al.*, 2000), expert ratings using semi-structured interviews (Brewerton *et al.*, 1995; Davis & Kaptein, 2006; Davis, Kaptein, Kaplan, Olmsted, & Woodside, 1998; Davis, Kennedy, Ravelski, & Dionne, 1994) or scales of physical activity and motor restlessness (Holtkamp *et al.*, 2003), and devices such

as acto- and pedometers to measure movement (Blinder, Freeman, & Stunkard, 1970; Falk, Halmi, & Tryon, 1985). Although there has been no specific research on the reliability of hyperactivity self-reporting, many authors as far back as Gull (1888) have pointed out the paradoxical and ego-dystonic qualities of this symptom, even in children (Blinder *et al.*, 1970; Davis *et al.*, 1997; Fosson, Knibbs, Bryant-Waugh, & Lask, 1987). It remains uncertain to what extent patients consciously and deliberately exercise to continue to lose weight while their bodies already are wasted. Stone and Shiffman (2002) argue convincingly that self-reports in general are prone to error and bias because of the characteristics of autobiographical memory. Fichter and Quadflieg (2000) point out that comparing the reliability and validity of the self-report and the interview version of the Structured Interview for Anorexic and Bulimic Syndromes lower scores were found for items inquiring about hyperactivity. Both self-ratings and expert interviews soliciting patient recall often are retrospective and thus reflect the patient's memories of the months before the interview (Exner *et al.*, 2000; Holtkamp *et al.*, 2003). The correlation is therefore subject to the expert's ability to rate the patient's recall and prone to the forenamed bias.

As patients tend to exercise solitary, it appears difficult to estimate the quality and quantity of patient hyperactivity. Devices such as actometers measure motor activity mechanically and have been used with patient groups that do not exercise in private have been proven useful, with validity coefficients greater than 0.80 (Bouten, Westerterp, Verduin, & Janssen, 1994; de Vries, Bakker, Hopman-Rock, Hirasing, & van Mechelen, 2006). However the use of actometry has disadvantages. The devices require the cooperation of the individual, are uncomfortable for cachectic patients and are expensive as clinical diagnostic tools.

Because hyperactivity can be an important hampering factor in treatment of patients with eating disorders, and needs to be addressed specifically, we need to establish a reliable method to estimate and evaluate hyperactivity levels in clinical practice. Expert ratings of hyperactivity through observation have shown favourable results with psychiatric populations other than anorexia nervosa (Fitzpatrick & Donovan, 1979; Stevens, Kupst, Suran, & Schulman, 1978). More recently, nursery school teachers were found able to rate activity levels in young children reliably (Chen *et al.*, 2002).

To our knowledge, the reliability of nurse observations of hyperactivity in anorexia nervosa patients has not been tested. We decided to evaluate the reliability and validity of nurse observations of hyperactivity by comparing them to patient self-ratings and to actometer-measured activity levels. With the actometer results as the gold standard, we hypothesized that nurses would provide a more reliable and valid measure of hyperactivity than patient self-reports.

Method

Subjects

All 20 inpatients fulfilling DSM-IV criteria for AN and admitted during the course of the study to two specialized eating disorder treatment centres in the Netherlands (for adolescents in Utrecht and for adults in Zeist) were asked to participate. Patients were enrolled in the study after they, or in case of minors, their parents, gave informed consent.

Patients were able to move freely but were only allowed to remove the actometer when showering. If the data showed long periods without any activity (suggesting misuse of the actometer), patients were to be excluded from the study, this did not occur however.

Measures

Nurse rating

Two nurses were instructed to observe physical activity during three consecutive weekdays defined as the amount of motor restlessness (inability to sit still, moving arms or legs while seated, walking through the ward without reason), abnormal motor activity, and excessive exercise, and to score their observations on a visual analogue scale (0 -10).

Patient self-rating

Patients were asked to rate their own physical activity levels over the same days, in the same way as the nurses, using a similar visual analogue scale. They were also asked to rate their

mood states using the Dutch version (Wald & Mellenbergh, 1990) of the POMS (Profile Of Mood States), a questionnaire widely used in sports medicine research (McNair, Lorr, & Droppelman, 1971). The POMS contains, among others, items rating restlessness, feeling active, lively and tense.

Actometer

In the same observation period an actometer (Actiwatch, Cambridge Neurotechnology, Cambridge, United Kingdom) was strapped to the patient's right ankle, to measure physical activity levels during three consecutive weekdays, from 9 PM on the first day to 9 PM of the fourth day. This procedure was similar to that used by Holtkamp *et al.* (2006). The average activity score (Actiwatch Sleep Analysis 2001) was used for statistics.

Other measures

The degree of patient underweight was calculated using the body mass index (BMI, kg/m^2) computed into Z-scores describing the statistical distance from the mean BMI for that age. Using a software program provided by the Netherlands Organization for Applied Scientific Research TNO, the data were related to Dutch population references (van Buuren & Fredriks, 2001).

Results

Eighteen patients (mean age 17.9 ± 3.5 years) gave informed consent and participated in the study. All patients were underweight with an average BMI of 16 and a BMI Z-score of -3.0 (SD 1.6).

Linear regression analysis indicated that nurse ratings of activity correlated significantly with the average actometer activity score (Actiwatch Sleep Analysis 2001) ($r= 0.61$, $p=0.007$) (Figure 1). The ratings between the nurse raters showed a moderate correlation (Cohen's kappa $=0.57$, $p\leq 0.05$).

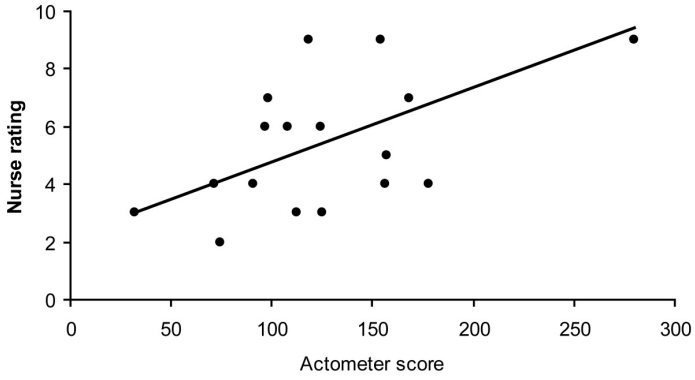

Figure 1. Nurse ratings of activity levels (defined as the amount of motor restlessness, abnormal motor activity, and excessive exercise) compared to actometer scores, r=0.61, p=0.007

Table 1 shows the correlations of the actometer scores with the self- and nurse ratings. Patient self-rating of physical activity on a visual analogue scale did not correlate with actometer scores (r= 0.44, p= 0.24). Also the POMS items restlessness, feeling active, lively, and tense did not show significant correlations with the actometer.

	Actometer score	
	Pearson Correlation	Sig. (2-tailed)
Nurse rating	,608	,007
Patient self-rating	,439	,238
POMS restlessness	,024	,927
POMS active	,471	,122
POMS tense	,148	,646
POMS full of energy	,128	,612

Table 1. Correlations between nurse ratings, patient self-rating (on a visual analogue scale and through questionnaire (POMS)), and actometer scores of activity levels in Anorexia Nervosa patients (N=18)

The physical activity ratings by nurses showed significantly higher results than the patient's self rating, 5.6 ± 2.5 versus 3.9 ± 2.1 respectively, $p < 0.01$.

Conclusion

This study shows for the first time that nurses can reliably rate activity levels of anorexia nervosa patients. The nurses' measurements of a patient's activity levels correlated with activity scores from actometers, the gold standard. Patient self-ratings did not correlate with the actometer scores nor did the use of a questionnaire to rate feelings of restlessness and activity improve the patients' ability to judge their own level of activity. Not surprisingly, patients rated their own level of activity lower than the nurses did, and lower than the actometer results showed.

Very few studies to date have compared self-ratings of activity with actometry measurements. Finn and Specker (2000) compared the Actiwatch with the Children's Activity Rating Scale, the results favouring the use of activity monitors; Rousham, Clarke, & Gross (2006) showed unreliable results for both compliance and correlation between the two methods in a group of healthy pregnant volunteers, and Smith *et al.* (Smith, Pelham, Gnagy, Molina, & Evans, 2000) showed that self-report of hyperactivity by ADHD patients is unreliable. Our findings confirm previous data from non-anorexia nervosa populations, which showed that observations of hyperactivity made by nurses, teachers or trained observers in day clinic or inpatient settings can be reliable and valid (Chen *et al.*, 2002; Fitzpatrick & Donovan, 1979; Stevens *et al.*, 1978). Accurate estimates of the activity levels in anorexia nervosa patients are clinically relevant, and given the complex nature of this phenomenon, should not be evaluated only with self-report, questionnaires or with interviews. Instead, to accurately monitor a patient's activity level during treatment, we should rely on the skills and observation of trained nurses.

Acknowledgements

The authors wish to thank the participating nurses, Vonneke Bosch and Carin Balk, for their collaboration in this study.

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