

## Obsessive-compulsive symptoms and physical activity in patients with anorexia nervosa – possible relationships

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### Summary

**Aim.** The aim of the study was to find relationship between obsessive-compulsive symptoms and level and characteristic of physical activity among patients with anorexia nervosa (AN).

**Material and methods.** 76 female patients, aged 14.8  $\pm$  1.8 years with AN completed the Polish version of the Leyton Obsessional Inventory-Child Version (LOI-CV). In order to assess the level and type of physical activity, Physical Activity Questionnaire was developed.

**Results.** 35 (46%) subjects were qualified to HR group (Obsessive-Compulsive Disorder “High-risk group”) (25 or more points on the Interference Score of LOI-CV) and 41 (54%) to nHR group (no “High-risk group”). nHR patients spent less studying in a standing position, significantly more often used elevators rather than stairs and, according to their parents, devote less time for physical activity. Positive correlation between the caregiver’s perception of patient’s weekly activity and the number of “YES” answers in LOI-CV, positive trend between Patient’s Activity Index or summarised Activity Index and the number of “YES” answers in LOI-CV were found. We also found negative correlation between the time spent studying at school and the number of “YES” answers in LOI-CV.

**Conclusions.** The results show that there is a connection between obsessive-compulsive symptoms and the hyperactivity in AN patients.

**Key words:** anorexia nervosa, obsessive-compulsive symptoms, physical activity

### Introduction

Numerous clinical observations and results of many studies have shown increased occurrence of obsessive thoughts and repetitive and ritualised behaviours in patients

with anorexia nervosa (AN), especially the restricting subtype [1–4]. Obsessive thoughts observed in patients with AN most often centre around diet, appearance and weight and as a consequence they take form of rumination about food and excessive concentration on one's body image [5]. Compulsive behaviours most often manifested by excessive and repetitive physical activities aimed at continual weight loss, compulsive restriction of food, calories counting and meticulous regulation of consumed meals. Both the content and the character of obsessive-compulsive symptoms (OC symptoms) are inscribed in the clinical picture of anorexia nervosa and congruent with DSM-IV-TR [6] criteria for AN, and rule out the diagnosis of comorbid obsessive-compulsive disorder (OCD). Another issue is the co-occurrence of OC symptoms in patients with AN, not related thematically with weight and appearance.

It seems that co-occurrence of obsessive compulsive symptoms is characteristic for AN patients with pre-dominant excessive physical activity [7–9]. Neither DSM-IV nor ICD-10 [6, 10] include excessive physical activity as a criterion for AN. The presence of excessive physical activity defined as a wilful act of weight loss activities can be helpful in diagnostics process. Physical activity in AN patients can be manifested in performing activities which require physical effort, physical restlessness or excessive and exhausting exercise. In a group of AN patients, excessive physical activity can resemble obsessive-compulsive rituals, thus meeting the definition of compulsion [11]. Davis et al. [8] have shown that such a form of physical activity is close to OCD symptomatology. The authors suggested that presence of such excessive physical activity may be linked with paradoxical behaviours observed among animals which avoid food while forced to increased and exhausting physical activity. Excessive physical activity, observed in 40–80% of cases of AN [13, 14], should not be seen only as an extra mean of calories burn out – some patients treat physical activity as means reducing weight while others use it as a hunger reduction strategy [12].

It seems important to determine whether there is a correlation between number and intensity of OC symptoms in patients with AN, and the increased physical activity or whether the symptoms co-exist independently.

### **Aim**

The aim of the study was to find a possible relationship between presence of obsessive-compulsive symptoms, thematically unrelated with weight or appearance and level and characteristic of physical activity among patients with AN.

## Material and method

76 female patients, aged 14.8  $\pm$  1.8 years, admitted to the Department of Child and Adolescent Psychiatry and diagnosed with AN, according to ICD-10 and DSM-IV [6, 10] were included in the study. Thorough psychiatric, physical and neurological examination was performed on admission. No patient met the criteria for other psychiatric disorders. All participants received no pharmacological treatment.

In order to evaluate the presence of obsessive-compulsive symptoms patients completed the Polish version of the 20-item self-report version of the Leyton Obsessional Inventory-Child Version (LOI-CV) [15] constructed for the assessment of the presence of obsessive compulsive symptoms in children and adolescents above 12 years of age. The main part of the inventory is divided in four categories: 1) questions based on the definition of obsessions and compulsions and questions about multiple checking, repetitions, difficulties finishing activities, indecisiveness and remorse; 2) questions related to contamination and dirt; 3) questions about lucky numbers and bad luck; 4) questions about school and school activities. The subject answers "YES" or "NO" for each question and if the answer is "YES" than the subject marks numbers 0 through 3 to assess the influence of the behaviour on his/her functioning.

LOI-CV questionnaire is not a diagnostic but a screening tool. According to the authors of the original version [15] LOI-CV is useful for identification of persons at risk for the presence of obsessive-compulsive disorder and further verification of the diagnosis with other methods is required. The criteria which justify further diagnosis were based on epidemiological studies as well as studies on patients and healthy control subjects assessed with LOI-CV [16] and refer to two categories of results. The first and basic criterion (which is also the most sensitive parameter of the presence of OCD) is a score of 25 pts or more on Interference Scale (irrespective of the number of "YES" answers). On the other hand, the high risk of the presence of OCD exists if the number of "YES" answers is 15 or more and is accompanied by minimal influence on functioning, as perceived by the patient (less than 10 pts on interference scale). It has been shown that these are subjects who confirm the presence of symptoms which are perceived as ego-syntonic and, thus having small influence on functioning as well as in subjects who confirm the presence of symptoms but purposefully minimise their influence due to high level of criticism toward symptoms and tendency to conceal them.

As a consequence the same cut off scores were used in the current study. Subjects who scored either (1) 25 pts on Interference Scale regardless of the number of YES answer or (2) marked 15 of more "YES" answers and less than 10 pts on Interference Scale were qualified to the risk group for OCD (HR group). Subjects who did not meet the score criteria could thus be qualified to the group of no-risk for OCD (nHR group).

Psychometric proprieties of the Polish version of the questionnaire were established in the course of epidemiological studies on the group of Polish adolescents [17].

In order to assess the level and type of physical activity in AN patients, Physical Activity Questionnaire (PAQ) was used. The psychometric and clinical proprieties of the questionnaire have been tested on the group of 107 patients with AN, and the control group of 40 females with no psychiatric diagnosis [18, 19]. The questionnaire has two parts – one is filled by the patient and the other by the caregiver. The construction of the assessment tool allows the comparison to be made between the patient's and caregiver's perception of activity.

Two indexes were created based on patients' and parents' PAQ data on declared physical activity: Patient's activity index as well as Caregiver's perceived activity index. Points were allocated to each PAQ item – an item scored more points if it evidenced greater physical activity (Table 1). A response which confirmed increased or above-average levels of physical activity was granted with more points (e.g. spending more than 12hrs/week on physical activity or studying or reading in standing position). No points were given if a response suggested behaviours typical for general population. The maximum score for both indexes was 12 points. In order to assess theoretical validity of Activity index, factor analysis was performed for all scales (principal component analysis with first main component representing theoretical construct measured by a scale). The reliability was tested with internal consistency method – (Cronbach's  $\alpha = 0.75$  for the whole scale). Next, correlations were tested between caregiver's perceived activity index and patient's activity index. High correlation coefficient ( $r = 0.72$ ;  $p < 0.0005$ ) justified merging the indexes into one activity index. Three parameters were created based on PAQ: Caregiver's perceived activity Index, Patient's activity index and merged Activity index.

### Statistical analysis

SPSS for Windows Release 14.0 (Standard Version) was used for statistical analysis. The comparison of different groups of patient was done with one-way analysis of variance and chi-square test. The Pearson's correlation coefficient was used to test correlation between LOI-CV results and the level of physical activity. For all analyses the level of significance was  $p < 0.05$ .

### Results

Out of 76 subjects included in the research, 35 (46%) qualified to HR group and 41 (54%) to nHR group. All subjects from HR group got 25 or more points on the Interference Score of LOI-CV; no subject got 15 or more "Yes" answers and 10 or less points on the Interference Score scale. The most frequent obsessive-compulsive

symptoms in HR group in LOI-CV were hate of dirt and contamination (70%), worry about being clean enough (67%), lack of sureness (repetition) (62%), indecisiveness (60%), fussiness about hands (58%), doing things in exact manner (58%), repeated thoughts or words (55%).

The results of comparison of physical activity between HR and nHR groups are shown in Table 1. Significant and tendency level intergroup differences were revealed for items which formed activity index as well as the total scores of Caregiver's perceived activity index, Patient's activity index and merged Activity index. nHR patients spent significantly less time studying in standing position than HR group ( $U = 10.37$ ;  $p = 0.01$ ), in patients' perception; the differences were mainly found between standing and sitting studying position. Moreover, nHR patients significantly more often used elevators rather than stairs in comparison to HR group ( $U = 7.39$ ;  $p = 0.02$ ). Differences on tendency level were found between the amount of time spent weekly on physical activity, in caregivers' perception – according to caregivers nHR patients spent less time on physical activity weekly than HR group patients ( $U = 3.28$ ;  $p = 0.07$ ). A trend was also found in the difference between Patient's activity index ( $U = 3.58$ ;  $p = 0.06$ ) and merged Activity index ( $U = 3.33$ ;  $p = 0.07$ ). nHR group patients scored less on both indexes.

**Table 1. HR vs. nHR group – comparison of physical activity for questions which formed activity indexes and total scores for Patient's activity index, Caregiver's perceived activity index and merged Activity Index**

	Question	t/U	P
Patient's activity index	How many hrs a week did you spend doing physical activities? < 3hrs/week(0 pts); 3–7hrs/week (1 pt); 7–12 hrs/week (2 pts); >12 hrs/week (4 pts)	0.04	0.84
	What was your study position? Lying (0 pts); Sitting (0 pts); Standing(1 pt)	10.37	0.01
	What is your reading position? Lying (0 pts); Sitting (0 pts); Standing (1 pt)	0.36	0.56
	Within the last 3 months you were not so much/quite/very physically active? Little (0 pts.); Quite (1 pt); Very (2 pts)	1.46	0.24

*table continued on the next page*

Patient's activity index	Are you a member of a school sports club or any other sports club? No (0 pts); Yes (1 pt)	0.19	0.66
	Do you choose to take stairs? No (0 pts); Yes (1 pt)	7.39	0.02
	Do you choose to walk? No (0 pts); Yes (1 pt)	0.93	0.35
Patient's activity index		3.58	0.06
Caregiver's perceived activity index	How many hrs a day did your daughter spent doing physical activity? < 3hrs/week (0 pts); 3–7hrs/week (1 pt); 7–12 hrs/week (2pts); >12 hrs/week (4 pts)	3.28	0.07
	Was your daughter more active during illness? No (0 pts); Yes (1 pt)	0.37	0.55
	In the last 3 months your daughter was slow/not so/quite/very active/active all the time? Slow (0 pts); Not so active (0 pts); Quite active (1 pt); Very active (2 pts); Active all the time (3 pts)	1.77	0.20
	Before the illness your daughter was not so much/quite/very physically active? Little (0 pts); Quite (1 pt); Very (2 pts)	1.64	0.21
Caregiver's perceived activity index		0.23	0.63
Activity index (merged)		3.33	0.07

The following correlations were found between the number of “YES” answers and the number of points on Interference Scale of LOI-CV as well as the type and frequency of physical activities:

- A positive trend ( $t = 0.44$ ;  $p = 0.07$ ) was found between the patient's perception of the number of hours spent weekly on physical activities of any type and the number of "YES" answers;
- A positive correlation ( $t = 0.52$ ;  $p = 0.03$ ) was found between the caregiver's perception of patient's weekly activity and the number of "YES" answers.
- A positive trend was also found between Patient's activity index ( $t = 0.41$ ;  $p = 0.07$ ) or merged Activity index ( $t = 0.42$ ;  $p = 0.07$ ) and the number of "YES" answers.

## Discussion

An import limitation of the study is the lack of analysis of additional factors which could have influenced the amount of physical activity among patients such as place of residence (country vs. city), distance to school, bus availability or others. On the other hand, the positive aspect of the presented study is the activity assessment method. The items of PAQ are formed in non-suggestive way, so in our view the questionnaire gives an objective measure of the parameter and it does not measure the patient's insight into symptoms. In comparison, widely used SIAB questionnaire (Structured interview for anorexia and bulimia nervosa) [20] has only one item identifying conscious behaviours aimed at weight reduction, including physical activity, along with questions about body image, family relationships and social contacts. Therefore SIAB does not allow for obtaining sufficiently detailed information regarding physical activity.

The results of the present study, especially the correlation between the number of declared obsessive-compulsive symptoms and total score of Activity index, show that there is a relationship and connection between obsessiveness and the development of hyperactivity in AN patients. Patient qualified to HR group (with potentially higher risk of comorbid OCD) reported more intentional physical activities aimed at weight loss, such as studying in standing position or choosing stairs instead of elevator. The results have multiplied the results of other studies on hyperactivity in AN patients. Davis et al. [8] tested 53 adult female AN patients aged 18–35 years with The Maudsley Obsessional-Compulsive Inventory (MOCI) [21]. The MOCI tests the presence of obsessive – compulsive symptoms with no interference level check. Patients classified as more physically active scored more on MOCI scale than the low physically active group. Taking the results of study conducted by Davis et al. and our study together, it can be concluded that the relationship between physical activity and obsessive-compulsive symptoms in AN patients is age-independent.

In the study conducted by Davis et al. the method differed from the method used in our study. The relationships between parameters were tested interchangeably (activ-

ity level vs. level of obsessiveness in the study conducted by Davis et al., and level of obsessiveness vs. activity level in our study). In the study conducted by Davis et al. the patients were first qualified to high and low physical activity groups and then tested for the presence of obsessive compulsive symptoms. In our study, the patients were first tested for the presence and intensity of obsessive-compulsive symptoms (HR and nHR groups) and then for the level of physical activity. AN patients with high physical activity level reported greater intensity of obsessive traits [8], and AN patients in “high-risk” group for OCD showed more physical activities (our study). Two different procedures used in both studies lead to a conclusion that there is an age independent relationship between excessive physical activity and obsessive-compulsive symptoms/traits in patients with AN.

### Recapitulation and Conclusions

The findings of the current study point to a possible relationship between the presence and intensity of comorbid obsessive-compulsive symptoms in patients with anorexia nervosa and excessive physical activity. The findings do not justify categorical conclusions to be drawn and more research is needed in that field. Nevertheless the results can have important clinical implications and form grounds for the development of modified treatment procedures for patients with AN and comorbid obsessive-compulsive symptoms which not necessarily meet the DSM-IV-TR criteria for obsessive compulsive-disorder [6]. For this group of patients additional interventions aimed at the reduction of obsessive-compulsive symptoms should be taken into consideration. Behavioural interventions combining exposure to a stimulus triggering ritual and response prevention of the activity performed in order to reduce discomfort should be included in such treatment plan [22]. On the other hand, interventions should also include cognitive techniques aimed at reformulation of over-responsibility, perfectionism, control, perception of risk and low tolerance of uncertainty [23] as the nature of distortions of cognitive schemas is similar for patients with obsessive-compulsive disorder and anorexia nervosa [24]. The reduction of obsessive-compulsive symptoms may result in the decrease in physical activity in patients and positively influence AN treatment outcome.

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