

Nutritional Rehabilitative Treatment in a Residential Centre for Eating Disorders: A Case Series Report

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Abstract

Purpose: Patients with Eating Disorders (ED) could benefit of temporary leaving from their family and social environment, hosting in specialized residential centers.

Methods: Fifty-one female patients (23.5 ± 6.1 years), 22 with Anorexia Nervosa (AN), 14 with Bulimia Nervosa (BN), 9 with Binge Eating Disorders (BED) and 6 with not-otherwise specified eating disorders (EDNOS) were followed in a residential regimen for at least 3 months.

Anthropometric, clinical, biochemical and body composition parameters were evaluated at entry, at 1, 3 and 5 months, while residents and 6 months after discharge. A multidisciplinary team, including specialized medical doctors, psychotherapists and dieticians was involved in the treatment.

Results: A significant ($p<0.001$) and progressive weight gain in 22 AN patients, both at the end of the residential period and at 6 month follow-up was observed, with no signs of refeeding syndrome. Resting Energy Expenditure (REE) progressively increased, reaching significance ($p<0.02$) at 5 month treatment. Menses spontaneously recovered in 12 patients, after 17 (5-48) months amenorrhea. In 14 BN patients, binge eating and purging episodes were eliminated. Nine BED patients gradually lost weight (-14.5 ± 3.2 kg) and in particular Fat Mass (FM), with a significant ($p<0.05$) improvement in blood lipids and serum transaminases. No significant changes were observed in the 6 EDNOS patients, possibly due to the low number and wide variability of patients gathered in this disease definition.

Conclusion: These observations suggest the safety, with the improvement of several clinical and nutritional parameters, of a multi-disciplinary and integrated

approach carried out in a residential setting, in particular for AN patients.

Keywords: Eating disorders; Nutritional rehabilitation; Residential treatment

Introduction

Eating Disorders (EDs) incidence is constantly increasing and spreading among female (and to a lesser extent male) adolescents from all social and cultural environments [1-4]. On the other hand, adolescence nowadays comprises a wider age range of individuals compared to the past, also due to the continuous and fast cultural and socio-economic changes [5-7].

For the treatment of EDs a multi-disciplinary approach is suggested. Basically, the therapeutic team should include physicians specialized in clinical nutrition, psychiatrists, psychologists, dieticians and other supportive rehabilitative professionals [8-11]. Generally, these disorders are treated on an outpatient basis; only in selected/severe cases hospital admission is required [12-16].

For the treatment of the disease, patients can take advantage from the temporary leaving from the family/social environment often described to cause and sustain the dysfunctional behaviour [17-21]. This kind of intervention is obtained by hosting ED patients in specialized Centers, usually for a period of time longer than 90 days. However, in the literature, at least at our knowledge, there is little description of the short and long term outcome (relapse, complications, effectiveness) of this therapeutic approach.

Aim of the Study

To evaluate in a group of ED patients (Anorexia Nervosa (AN), Bulimia Nervosa (BN), Binge Eating Disorders (BED), Not

Otherwise Specified Eating Disorders (EDNOS) tolerability, safety and clinical nutritional effects of a 3-5 months multidisciplinary residential rehabilitative treatment

Methods

Seventy-nine patients were admitted at the Center for the Treatment of Eating Disorders "G. Gioia" in Chiaromonte (PZ), Italy, from 2010 to 2012. Permanence in the residential Center lasted at least 3 months.

Four male patients and 24 patients (age 24, 1 ± 7 years) who did not attend the follow-up (FU) visit were not included in the study. Therefore, 51 female patients, suffering from ED (AN, BN, BED, EDNOS) and attending the scheduled follow up visit, were studied. Social and demographic data as well as clinical and biochemical characteristics, anthropometry, body composition, Resting Energy Expenditure (REE) and some psychometric parameters (data not shown) at different steps of the treatment were evaluated.

Before admission at the rehabilitative residential Center, patients were evaluated by a psychiatrist. The diagnosis of ED was made according to DSM-IV criteria [22], because the data were collected from 2010-2012, and lately confirmed according to DSM-V criteria [23]. Patients with major psychiatric disorders, acute diseases and/or Body Mass Index (BMI=weight/squared height) <13 Kg/m² were not admitted to the residential therapeutic program.

Socio-demographic characteristics and disease history were collected at entry. Anthropometry (weight, height, BMI), clinical (Blood Pressure, Heart Rate, ECG), biochemical and body composition parameters were registered at entry and at 1-3 and 5th month of the residential period and 6 months after discharge.

Body composition was evaluated by BIA (Human II Plus DS Medica) and Resting Energy Expenditure (REE) by indirect calorimetry (VMax Sensor Medics) in standardized conditions: after an overnight fasting in a quite, thermo-neutral (22°C temperature) environment. Nutritional intervention was prescribed by the nutritionist according to patient's energy requirements measured by indirect calorimetry and to the diet history collected at entry. Diet energy content variations during the residential period were allowed according to REE measurements. The prescribed diet was prepared following the Mediterranean Diet style and the National Guidelines for a healthy diet. At entry and at discharge, liver ultrasonography (Esaote Mpx Biomedica) was performed to evaluate the presence and grade of steatosis. Both a convex (3.5-MHz) and a linear high frequency (7-13 MHz) probes were used. The presence of liver steatosis was classified according to Saverymuttu et al. [24] criteria with a semi-quantitative method on a 0-3 scale: (0: normal liver; 1: slight steatosis; 2: moderate steatosis; 3: severe steatosis).

At entry, after 1-3-5 months of residential treatment and at the following FU routine haemato-biochemical parameters were evaluated: serum glucose, total cholesterol, HDL and LDL cholesterol, triglycerides, urea, electrolytes (Na, K, Cl, Ca, P,

Mg), blood count, transaminases, GGT, CK, fibrinogen, total proteins and albumin. Serum uric acid, Sedimentation Rate (SR), iron and ferritin, amylase and thyroid hormones within the normal range at admission, were not measured again.

Collected data were analysed with SPSS 15.0 software for statistical analysis. Parameters measured at specific time points were compared with values at admission by using t-test for paired data. Significance was considered for p values <0.05 .

Therapeutic protocol

Patients were supervised by professional educators: daily activities occurred in defined areas of the residential structure and each outdoor activity was accurately planned. Diet was prescribed by a clinical nutritionist, calculated and discussed with the patient by the dietitian, according to the individual needs measured by indirect calorimetry, BIA and to the dietary history collected at entry, with adaptations and integrations, when necessary. Meals were prepared in the hospital dining hall, and offered in personalized trays. Five meals a day were scheduled with the assistance and supervision of a dietitian and a professional educator, in a dedicated room furnished with tables each with 4 seats. Rules of conduct, such as: no comments on food, no break into pieces, no refuse, no ruminate/voracity, etc were warned. Hygienic services were locked for 2 hours after each meal, to discourage compensatory behaviors. According to the therapeutic protocol, no foods or drugs could be brought in without previous approval. Daily nurse assistance and weekly clinical monitoring (Blood Pressure (BP), Heart Rate (HR), review of symptoms) by the physicians were scheduled.

Weekly psychotherapeutic and nutritional, either individual (on average lasting 20-30 min) or group meetings (on average lasting 90 min), were scheduled. Gynecological counseling at entry was offered, when necessary. Integrative activities with dedicated operators (music-therapy, art-therapy, communication groups, pet-therapy with horses and donkeys, shiatsu and physiotherapy, on average corresponding to 10-15 h/weekly activity, subdividing patients in 2-3 groups) were planned. For overweight/obese patients 30-40 minutes/day aerobic (tapis-roulant, fast walking) physical activity was scheduled. Therapeutic rehabilitative program was individually scheduled and monitored during weekly team meetings.

On average, 6 weeks after admission, patients could eat some snacks and meals without supervision, out of the residential environment; parents presence was eventually accorded after team discussion. At about 8 weeks after admission, patients could return home to spend their weekends. Patients were prepared for this experience, among others, participating to a cooking laboratory in the hospital dining hall with the supervision of a dietitian. In this experience, patients progressively learnt how to manage their nutritional therapy, preparing, weighting and flavouring foods.

Fortnightly family meetings with psychologist and clinical nutritionist were scheduled to discuss difficulties and strategies to face individual and relational problems; monthly

meetings of all patients' families were organized with the presence of social assistants for reciprocal help.

Results

General characteristics of the 51 patients evaluated and divided in groups according to baseline ED are reported in Table 1.

Table 1: General characteristics of 51 patients with Eating Disorders, divided according to their diseases.

Eating Disorder	Anorexia Nervosa		Bulimia Nervosa		Binge Disorders		Eating		EDNOS		TOTAL	
Number of patients, (%)	22, (-43.2)		14, (-27.5)		9, (-17.6)		6, (-11.7)		51, (-100)			
Age (years), (range)	23.1 ± 5.3 (13-32)		24 ± 7.7 (14-39)		24 ± 7.4, (16-40)		23.3 ± 4.2, (16-29)		23.5 ± 6.1, (13-40)			
Age of onset (years), (range)	17 ± 4.1, (10-28)		15.5 ± 2.3, (13-23)		15.4 ± 4.6, (10-24)		16.7 ± 3, (14-21)		16.3 ± 3.7, (10-28)			
Disease length (years), (range)	5.9 ± 4.3, (1-17)		8.5 ± 7.9, (1-24)		8.5 ± 5.6, (2-17)		6.7 ± 4.6, (1-14)		7.2 ± 5.7, (1-24)			
Residential period, (months)	4.9 ± 0.7, (3-5)		5.0 ± 0.0, (5)		5.0 ± 0.0, (5)		4.7 ± 0.8, (3-5)		4.9 ± 0.5 (3-5)			
Region of Provenience	n	%	n	%	n	%	n	%	n	%	n	%
Southern Italy	19	86.4			9	100	6	100	48	94		
Basilicata	4	18.2	8	57.2	3	33.3	2	33.3	17	33.3		
Campania	9	40.9	2	14.3	0	0	1	16.7	12	23.5		
Puglia	3	13.6	0	0	3	33.3	1	16.7	7	13.7		
Calabria	2	9.2	3	21.4	3	33.3	2	33.3	10	19.6		
Sicilia	1	4.5	1	7.1	0	0	0	0	2	3.9		
North- Centre Italy	3	13.6	0	0	0	0	0	0	3	6.0		
School Degree	n	%	n	%	n	%	n	%	n	%	n	%
Elementary school	1	4.5	0	0	0	0	0	0	1	2.0		
Junior high school	4	18.2	2	14.3	1	11.1	0	11.1	7	13.7		
High school Degree	13	59.1	12	85.7	7	77.8	4	6.7	36	70.6		
	4	18.2	0		1	11.1	2	3.3	7	13.7		
Head of the household work	n	%	n	%	n	%	n	%	n	%	n	%
Retail merchant/ employee/ worker	11	50.0	9	64.3	7	77.8	4	66.7	31	60.8		
Self-employed/ manager/director	8	36.4	3	21.4	2	22.2	0	0	13	25.5		
Retired/died	3	13.6	2	14.3	0	0	1	16.7	6	11.7		
Unemployed	0	0	0	0	0	0	1	16.7	1	2.0		
Profession	n	%	n	%	n	%	n	%	n	%	n	%
Student	12	54.5	8	57.2	5	55.6	3	50	28	55.0		
Retail merchant/ employee/ worker	5	22.6	1	7.1	1	11.1	0	0	7	13.7		
Self-employed/ manager/director	2	9.2	2	14.3	0	0	0	0	4	7.8		

Housewife	1	4.5	2	14.3	1	11.1	0	0	4	7.8
Unemployed	2	9.5	1	7.1	2	22.2	3	50	8	15.7
Marital status										
Unmarried/engaged	20/5	90.9	12/2	85.7	7/2	77.8	6/3	100	45/12	88.2
Married	2	9.1	2	14.3	2	22.2	0	0	6	11.8
Divorced	0	0	0	0	0	0	0	0	0	0
Children	n	%								
No	21	95.5	12	85.7	8	88.9	6	100	47	92.2
Yes	1	4.5	2	14.3	1	11.1	0	0	4	7.8
Offsetting Behaviours										
No	8	36.4	0	0	9	100	2	33.3	19	37.3
Vomiting	2	9.1	12	85.7	0	0	3	50	17	33.4
Laxatives/diuretics /physical hyperactivity	9	40.9	0	0	0	0	1	6.7	10	19.6
Vomiting+others	3	13.6	2	14.3	0	0	0	0	5	9.7
Smoking	n	%								
No	18	81.8	6	42.9	2	22.2	5	83.3	31	60.8
<10/day	3	13.6	7	50	4	44.4	1	16.7	15	29.4
>10/day	1	4.5	1	7.1	3	33.3	0	0	5	9.8
Menstrual cycle	n	%								
Amenorrhea*	22	100	1	7.1	1	11.1	2	33.3	26	51.0
Regular	0	0	13	92.9	8	88.9	4	6.7	25	49.0
Calories prescribed at admission										
1300-1500	10	45.5	4	28.6	0	0	3	50	17	33.3
1500-1700	9	40.9	10	71.4	3	33.3	3	50	25	49.0
1700-1900	1	4.5	0	0	6	66.7	0	0	7	13.7
1900-2100	2	9.1	0	0	0	0	0	0	2	4.0
Calories prescribed at discharge	n	%								
1300-1500	0	0	2	14.3	0	0	0	0	2	4.0
1500-1700	3	13.6	12	85.7	3	33.3	4	66.7	22	43.1
1700-1900	12	54.5	0	0	6	66.7	2	33.3	20	39.2
1900-2100	7	31.8	0	0	0	0	0	0	7	13.7
Liver Ultrasound at admission	n	%								
Normal	21	95.5	13	72.9	4	44.4	6	100	44	86.3
I grade Steatosis	1	4.5	1	7.1	1	11.1	0	0	3	5.9
II grade Steatosis	0	0	0	0	4	44.4	0	0	4	7.8
Liver Ultrasound at discharge	n	%								
Normal	21	95.5	13	72.9	4	44.4	6	100	44	86.3
I grade Steatosis	1	4.5	1	7.1	4	44.4	0	0	6	11.8
II grade Steatosis	0	0	0	0	1	11.1	0	0	1	1.9

EDNOS=Eating Disorder not otherwise specified

*14 patients (12 AN, 2 EDNOS) recovered menstruations

**8 AN and 1 EDNOS received ONS (300 kcal/day)

In details, Table 2 highlights a significant and progressive weight gain in AN patients both during the residential stage and at the following FU. BMI and FM significantly increased since the first month, whilst FFM (Fat Free Mass) and TBW (Total Body Water) later.

At entry, 45.5% AN patients received a 1300-1500 Kcal/day diet; eight patients (36.4%) received oral nutritional

supplements (ONS) accounting for an additional calorie amount of about 300 kcal/day. Resting Energy Expenditure (REE) progressively increased, reaching significance at 5th month. Menstruation spontaneously occurred in 12 patients, after an average of 17 (5-48) months amenorrhea and without estro-progestin prescription. As regards haemato-biochemical data, there were no significant differences at entry, 1-3-5th month and at FU observation (data not shown).

At discharge, dietary regimen was 1700-1900 Kcal/day without ONS integration in 12 patients (54.5% of the whole group).

Table 2: Body composition and Resting Energy Expenditure changes in 22 patients with Anorexia Nervosa.

	At Entry	1 month	3 months	5 months	Follow Up +++
Weight (kg)	37.5 ± 4.4 (30.9-46.0)	38.9 ± 4.2 * Δ1.4 ± 0.2	42.3 ± 3.9 * Δ4.8 ± 0.5	44.7 ± 4.2 * Δ7.2 ± 0.2	46 ± 5 * Δ8.5 ± 0.6
BMI (kg/m²)	15.2 ± 1.5 (12.8-18.3)	15.8 ± 1.5 * Δ 0.6 ± 0	17.1 ± 1.3 * Δ 1.9 ± 0.2	18.1 ± 1.5 Δ 0.6 ± 0	18.6 ± 1.6 * Δ 3.4 ± 0.1
FFM (kg)	35.1 ± 3.1 (30.9-42.0)	34.8 ± 3.6 Δ-0.3 ± 0.5	36.7 ± 3.7 Δ1.6 ± 0.6	37.9 ± 4.2 *** Δ2.8 ± 1.1	37.1 ± 4.4 *** Δ 2 ± 1.3
FFM (%)	91 ± 6.7 (76.4 -100)	87 ± 6.2 ** Δ- 4 ± 0.5	85.3 ± 5.9 ** Δ-5.7 ± 0.8	83.6 ± 6.2 *** Δ-7.4 ± 0.5	80.8 ± 4.9 ** Δ-10.2 ± 1.8
FM (kg)	3.7 ± 2.9 (0-8)	5.3 ± 2.6 kg lt Δ1.6 ± 0.3	6.4 ± 2.6 * Δ2.7 ± 0.3	7.5 ± 2.8 * Δ3.8 ± 0.1	8.8 ± 2.3 * Δ5.1 ± 0.6
FM (%)	9.8 ± 8.7 (0-35.7)	12.9 ± 6.3 % Δ 3.1 ± 2.4	14.7 ± 5.9 *** Δ4.9 ± 2.8	16.4 ± 6.2 *** Δ6.6 ± 2.5	19.2 ± 4.9 ** Δ9.4 ± 3.8
TBW (lt)	25.9 ± 2.3 (21.4-30.6)	25.5 ± 2.8 lt Δ -0.4 ± 0.5	27 ± 2.7 lt Δ 1.1 ± 0.4	27.9 ± 3.1 lt *** Δ 2 ± 0.8	27.2 ± 3.1 lt Δ 1.3 ± 0.8
TBW (%)	67.1 ± 4.7 (56.7 -73.0)	63.5 ± 4.5 *** Δ -3.6 ± 0.2	62.7 ± 4.3 ** Δ-4.4 ± 0.4	61.5 ± 4.5 ** Δ- 5.6 ± 0.2	59.3 ± 3.6 * Δ-7.8 ± 1.1
REE (kcal)	941 ± 246 (550-1373)	982 ± 237 Δ 41 ± 9	1013 ± 137 Δ 72 ± 109	1129 ± 156 *** Δ 188 ± 90	1090 ± 149 Δ 149 ± 97
RQ	0.9 ± 0.1 (0.63-1.38)	0.89 ± 0.1	0.94 ± 0.01	0.95 ± 0.01	0.93 ± 0.1
REE/FFM Kcal/Kg	26.6 ± 6.1	27.7 ± 5.7	27.9 ± 4.6	29.5 ± 5.7	29.6 ± 4.7

+++Follow Up 1 month after discharge

Values are expressed as mean ± Standard Deviation and range values (first column);

Δ expresses the difference compared to the basal values;

*p<0.001; **p<0.01; ***p<0.05 express the significance compared to the basal values.

FFM=Fat Free Mass; FM=Fat Mass; TBW=Total Body water; REE=Resting Energy Expenditure; RQ=Respiratory Quotient;

Body weight remained substantially stable in the 14 BN patients (Table 3), with a slight decrease at the 1st month. Haemato-biochemical exams were normal and stable all over the time of observation (data not shown), as well as BP and HR, whilst REE slightly decreased after 3 months. Dietetic prescription remained substantially unchanged for BN patients, at the Residence and at discharge, with a mean energy intake of 1500-1700 kcal/day.

Table 3: Body composition and Resting Energy Expenditure changes in 14 patients with Bulimia Nervosa.

	At Entry	1 month	3 months	5 months	Follow Up +++
Weight (kg)	66.2 ± 16.5 (49.2-102)	65.2 ± 15.6 ***	64.7 ± 14.9	64.5 ± 14	65.1 ± 15.5
BMI (kg/m²)	25.4 ± 6.8 (18.5-43)	25 ± 6.5 ***	24.7 ± 6.3	24.7 ± 6	24.8 ± 6.7
FFM (kg)	44.3 ± 4.5 (38-52.6)	43.9 ± 3.6	44.6 ± 3.6	44.3 ± 3.6	44.7 ± 3.6
FFM (%)	69.2 ± 10.5 (47-84.7)	69.6 ± 10.6	70.8 ± 9.7	70.3 ± 8.7	70.7 ± 9.4
FM (kg)	21.8 ± 13 (7.5-54.1)	21.3 ± 13	20.1 ± 11.7 Δ -1.1	20.2 ± 10.7	20.3 ± 12.8
FM (%)	30.7 ± 10.5 (15.3-53)	30.4 ± 10.6	29.1 ± 9.7	29.7 ± 9.7	29.2 ± 9.4
TBW (lt)	32.1 ± 3.2 (27.8 -37.5)	31.9 ± 2.7	32.3 ± 2.9	31.8 ± 2.8	32.4 ± 3
TBW (%)	50.1 ± 7.7 (35.6-61.9)	50.6 ± 7.7	51.2 ± 7.1 ***	50.6 ± 6.6	51.2 ± 6.6
REE (kcal)	1363 ± 160 (1051-1757)	1292 ± 192	1158 ± 202 ***	1288 ± 264	1284 ± 252
RQ	0.85 ± 0.1 (0.54-1.6)	0.91 ± 0.1	0.92 ± 0.1	0.9 ± 0.1	0.87 ± 0.1
REE /FFM (kcal/kg)	30.7 ± 4.4	29.2 ± 3.5	25.6 ± 3.2 **	29 ± 5	28.6 ± 4.8

+++ Follow Up 1 month after discharge.

Values are expressed as mean ± Standard Deviation and range values (at entry only) (in the first column);

*p<0.001; **p<0.01; ***p<0.05 express the significance compared to the basal values.

FFM=Fat Free Mass; FM=Fat Mass; TBW=Total Body water; REE=Resting Energy Expenditure; RQ=Respiratory Quotient;

Table 4 describes a significant and gradual weight loss in 9 BED patients, both during the residential period and at the first FU. BIA exam showed a progressive FM loss, both in

percent and absolute values, during the therapeutic residential period and at the first FU.

REE progressively and significantly decreased after 3 months and at the first FU. Main dietary regimen prescribed to BED patients was of about 1700-1900 Kcal, and remained unchanged at the discharge. Of interest, in 3/4 BED patients, liver steatosis ameliorated, from grade 2 (moderate) to grade 1 (slight). Haemato-biochemical exams, as well as systolic and diastolic BP remained substantially unchanged (data not shown).

Table 4: Body composition and Resting Energy Expenditure changes in 9 patients with Binge Eating Disorders.

At Entry	1 month	3 months	5 months	Follow Up +++	At Entry
Weight (kg)	122.5 ± 25	118.5 ± 24*	111.5 ± 22.2*	106.9 ± 21.3*	106 ± 21.8*
	(85.9-181.3)				
BMI (kg/m²)	45.3 ± 9.4	43.9 ± 9*	41.4 ± 8.6*	39.7 ± 8.4*	39.3 ± 8.5*
	(30.9-63.5)				
FFM (kg)	58.5 ± 6.4	57.6 ± 6.1	55.6 ± 5.6**	56.3 ± 5.3	55.2 ± 6.2
	(47.0 -71.0)				
FFM (%)	48.6 ± 6.1	49.4 ± 5.7***	50.7 ± 6.3*	53.7 ± 6.6*	53.2 ± 8.3***

	(39.0 -39.7)				
FM (kg)	63.9 ± 20	60 ± 18.9*	55.9 ± 17.2*	50.6 ± 17.3*	50.9 ± 19**
	(36.0 -110.0)				
FM (%)	51.4 ± 6.1	50.5 ± 5.7***	49.2 ± 6.3*	46.3 ± 6.6*	46.7 ± 8.3***
	(40.3-60.9)				
TBW (lt)	43.1 ± 5.2	42 ± 5.7	40.9 ± 5.0**	41.4 ± 4.3*	41.4 ± 5.0
	(34.7 -54.0)				
TBW (%)	35.7 ± 3.6	35.9 ± 3.4	37.3 ± 4.4***	39.4 ± 4.3*	39.6 ± 4.8 **
	(29.9-42.0)				
REE (kcal)	1960 ± 396	1672 ± 231	1584 ± 315***	1806 ± 376	1669 ± 367***
	(1439-2511)				
RQ	0.95 ± 0.05	0.92 ± 0.03	0.95 ± 0.04	0.94 ± 0.1	0.91 ± 0.05
	(0.75-1.0)				

+++ Follow Up 1 month after discharge

Values are expresses as mean ± Standard Deviation and range values (in the first column);

FFM=Fat Free Mass; FM=Fat Mass; TBW=Total Body water; REE=Resting Energy Expenditure; RQ=Respiratory Quotient;

*p<0.001; **p<0.01; ***p<0.05 express the significance compared to the basal values.

Table 5 shows no significant clinical change for EDNOS patients, possibly due to the wide variability of symptoms

gathered in this definition and the small number of patients evaluated. Nonetheless, when considering separately the 4 EDNOS patients with $BMI < 18.5 \text{ kg/m}^2$, body weight and FM gain was observed at the 3rd and 5th month of the residential stage.

Three of these 4 patients had amenorrhea at entry; 2 of them recovered menstruation after a mean period of 9 ± 5 months. EDNOS patients received a dietetic regimen of 1300-1700 kcal/day. At the discharge all patients received a dietetic prescription of about 1500-1700 kcal/day.

Table 5: Body composition and REE changes in 6 EDNOS patients.

	AT ENTRY	1 MONTH	3 MONTHS	5 MONTHS	1 Follow Up
					(6 months)
Weight (kg)	51.3 ± 13.6	51.2 ± 12.4	50.7 ± 10	51 ± 5.8	55.8 ± 10.2
	(36.8-74.3)				
BMI (kg/m ²)	20.5 ± 4.9	20.2 ± 5.5	20.8 ± 4.6	19.7 ± 1.3	22 ± 4.8
	(14.7-31.7)				
FFM (kg)	40.5 ± 5.3	39.5 ± 5.3	40 ± 4.8	41 ± 3.5	41.6 ± 2
	(32.4-45.3)				
FFM (%)	81.3 ± 12.3	78.8 ± 11	77 ± 9.3	80.6 ± 3.8 ***	76 ± 10
	(58.8-95.0)				
FM (kg)	11 ± 10	11.7 ± 9.1	12.7 ± 7.6	10 ± 3 ***	14.3 ± 8.7
	(2.2-30.6)				
FM (%)	18.7 ± 12.2	21.1 ± 10.6	22.9 ± 9.3	19.4 ± 3.8 ***	24 ± 10
	(5.0-41.2)				
TBW (lt)	29.4 ± 4.4	28.7 ± 3.8	29 ± 3.1	30 ± 2.5	30.2 ± 1.8
	(22.2-33.0)				

TBW (%)	58.8 ± 8.5	57.5 ± 7.7	56 ± 7***	58.9 ± 3.5	55 ± 7.5
	(43.6-69.6)				
REE (kcal)	1122 ± 333	ns	ns	ns	ns
	(802-1540)				
RQ	0.88 ± 0.01	ns	ns	ns	ns
	(0.82-1.7)				

Values are expresses as mean ± Standard Deviation and range values (in the first column);

*p<0.001; **p< 0.01; ***p<0.05 express the significance compared to the basal values;

ns=not significant variations versus at admission values.

FFM=Fat Free Mass; FM=Fat Mass; TBW=Total Body water; REE=Resting Energy Expenditure; RQ=Respiratory Quotient;

Discussion

The study retrospectively describes a clinical nutritional experience in a Residential Centre for Eating Disorders, unique in Southern Italy, and has the objective to collect information on short term clinical and nutritional outcome of 51 out 71 patients affected by EDs, AN being the most frequent. This Residential Centre for Eating Disorders mostly hosts female patients, in particular AN with a $BMI > 13 \text{ kg/m}^2$. In the Residence, patients follow a strictly supervised dietary regimen plus several rehabilitative activities.

As emerged from our patients characteristics, EDs involve a wide age range, from early adolescence to the adult age. As a matter of fact, age range of the patients admitted at the rehabilitative program was 13–40 years with disease duration of 1–24 years. Twenty (4 m, 16 f) patients have been excluded because not attending the follow up at the first month. These patients did not differ as far as age and socio-demographic characteristics from the patients described in the study. Disease length was longer (8.5 ± 5.6 years) for BN and BED than AN (5.9 ± 4.3 years) patients. This finding could be due to a poor awareness for BN by family, society and public health operators than in the case of AN. Patients birthplace reflects the location of Center. The Center is in Basilicata region, is a referring center and unique in Southern Italy.

From the analysis of patients' socio-cultural level, it is confirmed that these patients belong not only to high social level classes, 61% patients coming from medium-low social classes.

The restoration of a healthy eating behavior, according to patients' need, and careful clinical supervision succeeded in reducing and often interrupting binge eating and purging behaviors.

As regards the clinical nutritional view, we underscore the gradual weight gain in AN patients, with no refeeding syndrome episodes, the improvement of body composition parameters at discharge and at the FU, with a mean 200

kcal/day REE increase at 5th month observation and the restoration of menstruation in 12 patients after a mean length of amenorrhea of 17 months (min 5-max 48).

In AN patients, weight recovery, accompanied by FM, FFM and TBW restoration, has certainly favored restoration of the menstrual cycle. This finding is also explained, among others, by the described increased leptin production by the adipose tissue, at least partially recovered.

BN patients did not have baseline severe clinical and biochemical abnormalities, had a normal body weight, remained substantially stable with a slight final decrease of FM and TBW. Even if not statistically significant, we consider these decreases as a possible effect of adopting regular food behaviors, with the elimination of binge or purging conducts. In fact, no vomiting episodes during the stage were recorded.

The strict cooperation and integration of several professional figures in a specialized team, as suggested by the American Psychiatric Association (APA) Guidelines, seems mandatory for the treatment of ED as confirmed in our experience, in particular to avoid/face nutritional complications such as the refeeding syndrome, educate the patient to an healthy diet and behaviors, help to consider beliefs, motivations, conflicts and dysfunctional feelings linked to ED and finally to reduce and progressively eliminate binge eating and purging behaviors. The specialized team also supports the family and works to prevent relapse at home.

In order to prepare patients (and family) to return to their family and social environment in the last two years, among other interventions, The Assisted Family Nutrition Therapy (AFNT) was introduced. AFNT starts from the 45th day of residency, after the first snacks consumed with parents and a series of informative/training meetings. An ad hoc buffet is set up in the Residence which is made up of dishes similar to those supplied during the Nutritional Therapy trays (1st course, 2nd course, side dish, bread and fruit). The family is united to eat, often for the first time after months of separation!

Nutritional Rehabilitation (NR), which is the main aim of the present study, has no primary weight objectives and is focused on a gradual normalization of food behavior and education to appropriate food choices, by considering individual energy requirements with the progressive and agreed reintroduction of initially refused foods, going out from the dichotomy "allowed-forbidden foods" with the recovery of taste and physiological signals of appetite and satiety.

The safety and the beneficial effects of the nutritional intervention, in particular in AN patients, is also confirmed by the increase of REE with the harmonious increase of both FFM and FM: the occurrence of menstruation, without pharmacological intervention, as well as the amelioration of some haemato-biochemical and clinical parameters such as increased blood pressure values (data not shown).

Finally, in AN patients, Nutritional Rehabilitation avoided the onset of the refeeding syndrome. For these patients recommended food intake gradually increased to an isocaloric diet (1700-1900 kcal/day) without the prescription of liquid ONS at discharge.

In BED patients, the prescribed diet is only mildly hypocaloric (in 67% between 1700-1900 Kcal/day), without qualitative and quantitative reductions, complete and varied, in contrast with the frequently unsuccessful too restrictive prescriptions usually characterizing the case histories of these patients which could also contribute to the endurance of the disease.

This study has some limitations. It is mono-centric; sample size is rather small; patient's selection excluded severe cases of eating disorders diseases, long term follow-up observations are not yet available. On the other hand, quite unexpected, not many data are available on the safety and clinical nutritional outcome of residential rehabilitative programs for the treatment of eating disorders. In this study we have mostly focused our attention on clinical nutritional outcome: it is noteworthy to record that weight gain/loss characteristics were optimal, without refeeding syndrome, abnormal FM increase or FFM loss respectively. Further observations are necessary and multicentre case-control studies are needed to confirm our short term observations and to verify the effectiveness in the long term of this therapeutic procedure.

Conclusion

In conclusion despite data in literature are lacking and the study group is quite small, we can confirm the safety, at least in the short term, of a residential approach for EDs, without side effects, a reasonable adherence to therapeutic protocol, with satisfying clinical nutritional improvements.

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