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A History of Obesity in Severe Anorexia Nervosa Predicts Outpatient Treatment Dropout

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Abstract

Background

Anorexia nervosa (AN) is a psychiatric disorder with a high mortality rate, and low body mass index (BMI), one of features of AN, is a poor prognostic factor. Treatment dropout is common in AN. Treatment dropout is related to the AN binge-eating/purging subtype, low BMI, and age. The relationship between a history of obesity or family involvement and treatment dropout is unknown. We investigated the relationship between treatment dropout in outpatients with AN with low BMI and a history of obesity or family involvement.

Methods

This retrospective study analyzed adult female patients with AN with BMI <16 kg/m². Age and BMI at the initial visit, marital status, AN subtype, maximum weight, a history of obesity, and accompanying persons at the initial visit as a family involvement were assessed. Factors associated with treatment dropout from the initial visit to 6 months were examined.

Results

The 6-month dropout rate was 33.1% (57 dropped out, 115 continued treatment). Treatment dropout was significantly associated with a history of obesity and low BMI at the initial visit. Treatment dropout was not significantly associated with the presence or absence of family members at the initial visit.

Conclusions

To prevent treatment dropout of physical high-risk patients with low BMI, clinicians need to recognize patients with a history of obesity and provide them with psychotherapy considering their perceptions and stigmas of obesity.

Key Words: Anorexia nervosa; Treatment dropout; Obesity; Outpatient

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Introduction

Eating disorders (EDs) are psychiatric disorders characterized by abnormal eating behavior, excessive valuing of weight and shape, and cognitive deficits¹. Anorexia nervosa (AN) is an ED characterized by low body weight and associated with high mortality². Patients with AN are at high risk of early mortality³, and factors that increase the risk of mortality in AN include low body mass index (BMI), long duration of disease, substance abuse, and poor psychosocial functioning^{4,5}. The standardized mortality ratio for patients with AN was reported as 11.7 and that for patients with AN with BMI less than 11.5 kg/m² was over 30⁶.

Dropout rates have been reported to be 31%-50% for inpatients and 23%-57% for outpatients⁷. As studies on treatment dropout differ in treatment methods, definition of dropout, and observation period, the dropout rates have been reported to range widely^{7,8}. Treatment dropout had a severe impact on recovery, and patients who dropped out from treatment early were less likely to recover on their own and had a greater risk for relapse⁹. In a 10-year prognostic study using cognitive behavioral therapy (CBT), the treatment dropout group had a poorer prognosis than the treatment completion group¹⁰. In particular, treatment dropout among patients with AN with low BMI is a serious problem because of the high risk of mortality. Factors affecting dropout need to be examined to prevent treatment dropout. Previous studies have reported on various factors responsible for treatment dropout in patients with AN in hospitalization and outpatient settings^{7,8}. Predictors of treatment dropout were reported to be the AN binge-eating/purging type (AN-BP), age, and BMI for inpatient treatment^{11,12} and the AN-BP subtype, ED-related quality of life¹³, and anxiety level¹⁴ for outpatient treatment.

The association between premorbid overweight or obesity and the development of EDs has been established^{15,16}. Patients with ED with a history of overweight or obesity have been reported to have a higher rate and speed of weight loss, higher physical risk¹⁷, and greater severity of psychopathology related to EDs compared to patients with EDs without a history of obesity¹⁸. Therefore, patients with AN with a history of obesity are likely to be at high risk of treatment dropout, but this is not clear.

It is also known that family involvement in AN treatment is effective in children and adolescents¹⁹. Some reports of adults with AN have examined the association between caregiver interventions and patient treatment effects^{20,21}, but to our knowledge, it is not clear whether family involvement is related to the factors associated with treatment dropout in adults with AN. However, it is assumed that even in adults with AN undergoing treatment, caregiver, i.e., family and partner, cooperation and interest in treatment is associated with the continuation of patient visits to the hospital.

In this study, we examined the association between treatment dropout in the outpatient setting and a history of obesity and family involvement in adult female patients with AN with severe, low BMI.

Methods

Patients

This was a retrospective study based on the medical records of outpatients with AN who visited the Department of Neuropsychiatry at Osaka City University Hospital (now Osaka Metropolitan University Hospital) between January 1, 2014, and November 31, 2021. This institution is a large urban-type general hospital that provides specialized outpatient and inpatient treatment for patients

with EDs. AN was diagnosed by psychiatrists with extensive clinical experience in ED based on the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5)²²⁾. This study included patients with AN who were older than 18 years and had a BMI less than 16 kg/m², classified as severe and most severe based on the DSM-5 criteria. Patients who were aged less than 18 years or had a BMI of 16 kg/m² or higher were excluded. In addition, to investigate patient-initiated dropout, we excluded patients who dropped out for the following reasons: dropout due to not consenting to the treatment agreement at the initial visit, transferring to a different hospital, moving to a distant place, or pregnancy within 6 months from the initial visit. Those who received inpatient treatment within 6 months of the initial visit were also excluded, as inpatient hospitalization is a factor associated with dropout or continued treatment. A total of 172 patients were included in the study.

Procedure

Variables collected included age of onset, duration of illness, AN subtype, i.e., AN restricting type (AN-R) or AN-BP, career status, and marital status. We defined family involvement in treatment as family members accompanying the patients and collected data on accompanying persons at the initial visit. We also collected information on the patients' age, weight, height, and BMI at the time of the initial visit, as well as their lifetime maximum weight, height, and age at that time.

Patients with or without a history of obesity were classified based on maximum weight. If the patients were 18 years or older at their maximum weight, a BMI of 25 kg/m² or more was considered to indicate obesity according to the definition of the Japan Society for the Study of Obesity²³⁾. If the patients were under 18 years of age at their maximum weight, we calculated the standard weight and degree of obesity [degree of obesity = {(actual weight – standard weight)/standard weight}] from their age and height at that time, using the standard weight calculation formula of the Japanese Society for Pediatric Endocrinology²⁴⁾, which was developed based on data from the 2000 Report of the School Health Statistics Survey (5-17 years) by the Ministry of Education, Culture, Sports, Science and Technology²⁵⁾. If the degree of obesity was greater than 20%, the patient was considered to have a history of obesity according to the definition of the Japanese Society for Pediatric Endocrinology²⁴⁾. Patients who dropped out of treatment on their own within 6 months from the initial visit were included in the “Dropout group” and those who continued treatment for more than 6 months from the initial visit were included in the “Continuation group”. Censored patients who improved during the 6 months and completed treatment were included in the continuation group. This study was approved by the Ethics Committee of the Osaka City University Graduate School of Medicine (now Osaka Metropolitan University Graduate School of Medicine) (approval number: 2020-106).

Statistics analysis

We compared the sociodemographic and clinical characteristics of patients between the dropout and continuation groups using the chi-square test and the Mann-Whitney U-test. Kaplan-Meier survival analysis was performed to estimate the treatment continuation rate for the two groups according to whether the patients had a history of obesity. We used multivariate Cox regression analysis to calculate hazard ratios and 95% confidence intervals to examine factors associated with treatment dropout from the initial visit to 6 months. Data were analyzed using SPSS 26 for Mac OS X (SPSS Japan, Tokyo, Japan).

Results

The dropout group consisted of 57 patients, and the continuation group consisted of 115 patients.

The dropout rate for outpatient treatment during the 6-month period was 33.1%. Table 1 shows a comparison of sociodemographic and clinical background data of the patients in the dropout and continuation groups. There was no significant difference in age at the initial visit, duration of illness, or age of onset between the groups. In the AN subtype, the rates of AN-R and AN-BP were 58.7% (n=101) and 41.3% (n=71), respectively. The proportion of patients with AN-BP was higher in the dropout group (50.9%, 29/57) than in the continuation group (36.5%, 42/115), but the difference was not significant. There was a significant difference in marital status (p=0.015), with 28.1% (16/57) of the patients in the dropout group and 19.1% (22/115) of the patients in the continuation group being married. The presence or absence of accompanying persons at the initial visit and career status were not significantly different between the groups.

Table 2 shows a comparison of BMI and presence or absence of a history of obesity between the dropout and continuation groups. There were no significant differences in BMI at the initial visit, maximum BMI, age at maximum weight, or a history of obesity between the groups.

The difference in treatment dropout between patients with and without a history of obesity is shown in Figure 1. The x-axis represents the number of days in the first 6 months of treatment, and the y-axis corresponds to the percentage of patients who continued treatment. One patient was censored because she improved and no longer required to go to the hospital. Although the dropout rate tended to be higher in the group with a history of obesity, the log-rank test showed no significant difference between patients with and without a history of obesity.

Factors associated with treatment dropout were analyzed using Cox regression analysis (Table 3). Covariates included were a history of obesity and the presence of an accompanying person at the initial visit, which were adjusted for previously reported treatment dropout factors including age, AN subtype, and BMI at the initial visit. A history of obesity and low BMI were significantly associated

Table 1. Comparison of sociodemographics of patients at the initial visit between the dropout and continuation groups

		Dropout (n=57)	Continuation (n=115)	
		median [interquartile range]		p
	age (years)	32.6 [23.3-40.3]	25.7 [20.8-37.2]	0.058
	age of onset (years)	19.9 [17.8-30.4]	19.7 [17.7-23.1]	0.197
	duration of illness (years)	5.1 [1.5-12.3]	3.7 [1.2-10.5]	0.206
		n	n	
type	AN-R	28 (49.1%)	73 (63.5%)	0.072
	AN-BP	29 (50.9%)	42 (36.5%)	
marital status	unmarried	32 (56.1%)	87 (75.7%)	0.015*
	married	16 (28.1%)	22 (19.1%)	
	divorce/bereavement	9 (15.8%)	6 (5.2%)	
career status	unemployed	27 (47.4%)	38 (33.0%)	0.183
	employed	18 (31.6%)	44 (38.3%)	
	student	12 (21.0%)	33 (28.7%)	
accompanying person	yes	43 (75.4%)	97 (84.3%)	0.158
	no	14 (24.6%)	18 (15.7%)	

*statistically significant. AN-R, anorexia nervosa-restricting type; and AN-BP, anorexia nervosa binge-eating/purging type.

with dropout from outpatient treatment from the initial visit to 6 months. Age, AN subtype, and the presence of an accompanying person at the initial visit were not significant predictors of treatment dropout.

Table 2. Comparison of body mass index and a history of obesity between the dropout and continuation groups

		Dropout (n=57)	Continuation (n=115)	
		median [interquartile range]		p
BMI at the initial visit (kg/m ²)		13.2 [11.7-14.7]	13.7 [12.6-14.7]	0.097
maximum BMI (kg/m ²)		21.5 [19.8-23.8]	21.2 [19.3-23.0]	0.342
age at maximum weight (years)		19.5 [16.8-21.9]	18.3 [16.7-22.3]	0.583
		n	n	
history of obesity	yes	14	16	0.083
	no	43	99	

BMI, body mass index.

Table 3. Variables predicting dropout from anorexia nervosa outpatient treatment

Variables at the initial visit	HR	95% CI	p
age	1.012	0.989-1.036	0.307
type: AN-R	1	(Reference)	-
type: AN-BP	1.602	0.946-2.713	0.08
BMI	0.851	0.727-0.996	0.045*
history of obesity	1.989	1.062-3.727	0.032*
accompanying person	0.696	0.368-1.318	0.266

*statistically significant. HR, hazard ratio; CI, confidence interval; AN-R, anorexia nervosa-restrictive type; AN-BP, anorexia nervosa binge-eating/purging type; and BMI, body mass index.

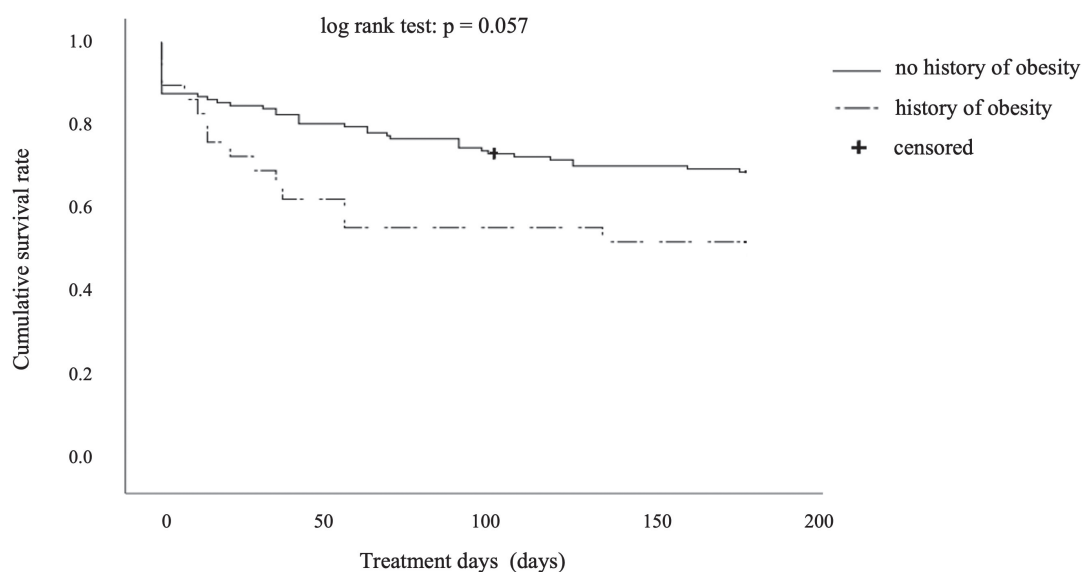


Figure 1. Cumulative survival rate of treatment dropout using the Kaplan-Meier method for patients with and without a history of obesity. One patient was censored because of improvement.

Discussion

We found that a history of obesity and low BMI at the initial visit were associated with dropout from outpatient treatment. The presence of an accompanying person at the initial visit was not significantly associated with treatment dropout. Low BMI has been reported to be a risk factor for early mortality³⁾ and a poor prognostic factor²⁶⁾; thus, prevention of treatment dropout is necessary, especially in outpatients with AN with low BMI. To the best of our knowledge, this was the first study to determine the relationship between a history of obesity and treatment dropout in female outpatients with AN with low BMI.

A history of obesity was a significant factor for treatment dropout in our study. The dropout rates tended to be higher among patients with a history of obesity, although the log-rank test showed no significant difference. When adjusted for factors previously reported to be associated with treatment dropout including age, AN subtype, and BMI at the initial visit, the multivariate Cox regression analysis showed that a history of obesity was significantly associated with treatment dropout. Body dissatisfaction was stronger in individuals who were overweight or obese²⁷⁻²⁹⁾, and stigma and body dissatisfaction in these individuals were risk factors for EDs³⁰⁻³²⁾. Patients with AN with a history of obesity were shown to experience more weight-based teasing from peers and more frequent talks of their weight from their families compared to patients with AN without a history of obesity³³⁾. In addition, patients with AN with a history of obesity were also reported to have more severe ED symptoms such as weight and shape concerns and higher degrees of anxiety and depression³³⁾. Similar to the findings of previous reports, we assumed that the patients with AN with a history of obesity in our study had harbored body dissatisfaction and weight-related stigma due to uncomfortable comments regarding their weight in the past. They appeared to have also experienced anxiety and depression, which may have prevented them from continuing to be motivated to seek treatment. Furthermore, the difference between the adulthood maximum weight and current weight was reported to be associated with overeating^{34,35)} and with greater and faster weight gain in the treatment of AN³⁵⁾. It appears that the patients with a history of obesity in this study were also more likely to overeat and gain weight. As psychological improvement was shown to be slower than weight gain^{36,37)}, patients in this study are assumed to have dropped out of treatment because of increased fear of obesity. Additionally, in our study, we used the Japanese criteria for obesity to consider the difference in body size from Westerners, and the proportion of individuals with a history of obesity in the total sample was 17.4%. Previous studies have indicated that lifetime obesity in patients with EDs was 28.8%¹⁸⁾ and the rate of premorbid overweight or obese in patients with AN was approximately 40%^{33,38)}. The proportions we reported were lower than those reported by previous studies. This result is thought to be related to the lower BMI of Asians than that of Westerners³⁹⁾ and to the fact that there are fewer people with obesity in Japan⁴⁰⁾. In the Japanese culture where few people are obese, the experience of obesity may have caused more intense distress.

We also found that low BMI at the initial visit was associated with treatment dropout. Low BMI was similar to previous reports on dropout factors associated with inpatient treatment^{11,12)}. It has been suggested that patients with low weight have more severe psychopathology⁷⁾, which might have resulted in treatment dropout. In our study, the median BMI of the patients who dropped out was 12.9 kg/m², which was considered low. It is especially important to strive to prevent patients with severely low BMI from dropping out because these patients are exposed to the highest medical risk if they do not receive effective treatment^{5,6)}.

We considered accompanying persons at the initial visit as a representative factor of family involvement in treatment. However, we found no significant difference between treatment dropout and the presence or absence of accompanying persons at the initial visit to the hospital. Dysfunction in a family with a patient with EDs was reported to be related to worse ED psychopathology⁴¹, which suggests that therapeutic family intervention could be needed. It was also found that family members of patients with AN had a poor understanding of the disease, holding the patient responsible for the disease and regarding the disease as an issue of food⁴². A study that investigated a skill training intervention for caregivers during the treatment of inpatients with AN reported that patients in the intervention group had improved ED psychopathology and quality of life²⁰. It is assumed that encouraging family involvement in inpatient and outpatient treatment settings helps families gain a better understanding of the disease, build trust between the patient and family members, and prevent treatment dropout. The rate of accompanying persons present at the initial visit was 75.4% in the dropout group and 84.3% in the continuation group. As is evident from this data, presence or absence of accompanying persons at the initial visit did not have any significant effect on the treatment dropout. Patient's lack of motivation and desire for treatment appears to be a predominant factor for treatment dropout rather than the influence of others, such as accompanying the patient to the hospital or encouraging the patient to visit the hospital. There could be an association between the presence or absence of an accompanying person after the second visit and treatment dropout, which could not be investigated in this study.

The AN-BP subtype was not associated with treatment dropout in our study. The results of previous studies assessing whether AN-BP was associated with treatment dropout were not consistent, with some finding no association⁴³⁻⁴⁵ and others finding an association^{12,13,46}. AN-BP was strongly associated with impulsivity⁴⁷, and controlling impulsivity was more difficult in AN-BP than in AN-R⁴⁸. Impulsivity was suggested as a reason that AN-BP was associated with treatment dropout¹². Since our sample included patients with a low BMI, there may not have been such differences between AN-R and AN-BP.

The dropout rate within 6 months from the initial visit was found to be 33.1%. Previous meta-analyses have reported dropout rates of 23%-57% for outpatient treatment⁷, and our findings were within this range. In the Japanese healthcare system, the treatment of EDs is generally based on patient education and supportive psychotherapy⁴⁹. Institutions that can use specific treatment techniques such as CBT and family-based treatment are limited. Yamada and Motoyama⁵⁰ described that typical treatment for EDs in Japan is similar to specialist supportive clinical management (SSCM)⁵¹. Our unit provides treatment similar to SSCM once every few days to once every 2 weeks, depending on the patient's condition. A study on outpatient psychotherapy for outpatients with AN aged 17-40 years, which defined dropout as failure to attend at least 15 of 20 sessions over a 6-month period, reported a 37.5% dropout rate⁴³. Another study with a longer observation period reported a 50% dropout rate for patients with AN over 16 years of age who continued treatment with enhanced CBT for 1 year⁵². The dropout rate in our study was comparable to that in the study with the same observation period. This indicates that our treatment was as effective as other treatments.

Although treatment dropout may be due to psychological factors such as unpreparedness for recovery on the part of the patient and considered to be unavoidable to some extent, the high rate of treatment dropout in a disease with high mortality, particularly for patients with low BMI, is a serious problem. For patients with AN, the therapist should be aware of whether or not the patient

has experienced obesity in the past. If so, special attention should be paid. 1. Psychotherapy should be provided after confirming the perceptions and stigma that the patient has regarding obesity. 2. Patients should receive psychoeducation that overeating symptoms are likely to occur after treatment begins and that the weight gain is a process of recovery. 3. The therapist should carefully monitor the weight progress.

There were several limitations to our study. First, the sample size was small. If the sample size had been larger, some results might have been statistically significant. Second, although each patient had different backgrounds, such as the circumstances leading to the visit to our hospital and the history of treatment for eating disorders, we did not assess these factors, which possibly created a selection bias in the patients. Third, self-reports by patients of their maximum weight and height at that time may have introduced recall bias. The World Health Organization definition⁵³⁾ of obesity is a BMI of 30 kg/m² or higher, but this study used a BMI of 25 kg/m² or higher as defined by the Japan Society for the Study of Obesity²³⁾; therefore, BMI values cannot be simply compared with those in previous studies. Fourth, we could not follow up continuously on the presence or absence of an accompanying person, which was noted only at the time of the initial visit, and we could not conduct a qualitative study on their involvement in the treatment. Finally, our study is limited in its generalizability because it was conducted at a single institution, a university hospital with a high level of functionality.

In conclusion, factors contributing to treatment dropout in outpatients with AN were investigated in this study. We found that a history of obesity and low BMI were associated with treatment dropout among patients with AN with severe low BMI. Recognizing and addressing a history of obesity may improve treatment continuation rates for patients with AN with low BMI. An association between family members accompanying the patient to outpatient treatment and treatment dropout was not apparent; further research is needed.

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References

1. Treasure J, Duarte TA, Schmidt U. Eating disorders. *Lancet* 2020;395:899-911.
2. Zipfel S, Giel KE, Bulik CM, et al. Anorexia nervosa: aetiology, assessment, and treatment. *Lancet Psychiatry* 2015;2:1099-1111.
3. Button EJ, Chadalavada B, Palmer RL. Mortality and predictors of death in a cohort of patients presenting to an eating disorders service. *Int J Eat Disord* 2010;43:387-392.
4. Franko DL, Keshaviah A, Eddy KT, et al. A longitudinal investigation of mortality in anorexia nervosa and bulimia nervosa. *Am J Psychiatry* 2013;170:917-925.
5. Zipfel S, Löwe B, Reas DL, et al. Long-term prognosis in anorexia nervosa: lessons from a 21-year follow-up study. *Lancet* 2000;355:721-722.
6. Rosling AM, Sparén P, Norring C, et al. Mortality of eating disorders: a follow-up study of treatment in a specialist unit 1974-2000. *Int J Eat Disord* 2011;44:304-310.
7. Gregertsen EC, Mandy W, Kanakam N, et al. Pre-treatment patient characteristics as predictors of drop-out and treatment outcome in individual and family therapy for adolescents and adults with anorexia nervosa: a systematic review and meta-analysis. *Psychiatry Res* 2019;271:484-501.
8. Fassino S, Pierò A, Tomba E, et al. Factors associated with dropout from treatment for eating disorders: a

- comprehensive literature review. *BMC Psychiatry* 2009;9:67.
9. Pike KM. Long-term course of anorexia nervosa: response, relapse, remission, and recovery. *Clin Psychol Rev* 1998;18:447-475.
 10. Okamoto Y, Miyake Y, Nagasawa I, et al. A 10-year follow-up study of completers versus dropouts following treatment with an integrated cognitive-behavioral group therapy for eating disorders. *J Eat Disord* 2017;5:52.
 11. Hubert T, Pioggiosi P, Huas C, et al. Drop-out from adolescent and young adult inpatient treatment for anorexia nervosa. *Psychiatry Res* 2013;209:632-637.
 12. Surgenor LJ, Maguire S, Beaumont PJV. Drop-out from inpatient treatment for anorexia nervosa: can risk factors be identified at point of admission? *Eur Eat Disord Rev* 2004;12:94-100.
 13. Abd Elbaky GB, Hay PJ, le Grange D, et al. Pre-treatment predictors of attrition in a randomised controlled trial of psychological therapy for severe and enduring anorexia nervosa. *BMC Psychiatry* 2014;14:69.
 14. Lockwood R, Serpell L, Waller G. Moderators of weight gain in the early stages of outpatient cognitive behavioral therapy for adults with anorexia nervosa. *Int J Eat Disord* 2012;45:51-56.
 15. Zachrisson HD, Vedul-Kjelsås E, Göttestam KG, et al. Time trends in obesity and eating disorders. *Int J Eat Disord* 2008;41:673-680.
 16. Berkowitz SA, Witt AA, Gillberg C, et al. Childhood body mass index in adolescent-onset anorexia nervosa. *Int J Eat Disord* 2016;49:1002-1009.
 17. Meierer K, Hudon A, Sznajder M, et al. Anorexia nervosa in adolescents: evolution of weight history and impact of excess premorbid weight. *Eur J Pediatr* 2019;178:213-219.
 18. Villarejo C, Fernández-Aranda F, Jiménez-Muricia S, et al. Lifetime obesity in patients with eating disorders: increasing prevalence, clinical and personality correlates. *Eur Eat Disord Rev* 2012;20:250-254.
 19. National Guideline Alliance (UK). Eating disorders: recognition and treatment. London: National Institute for Health and Care Excellence (NICE) 2017.
 20. Hibbs R, Magill N, Goddard E, et al. Clinical effectiveness of a skills training intervention for caregivers in improving patient and caregiver health following in-patient treatment for severe anorexia nervosa: pragmatic randomised controlled trial. *BJPsych Open* 2015;1:56-66.
 21. Magill N, Rhind C, Hibbs R, et al. Two-year follow-up of a pragmatic randomised controlled trial examining the effect of adding a carer's skill training intervention in inpatients with anorexia nervosa. *Eur Eat Disord Rev* 2016;24:122-130.
 22. American Psychiatric AFD. Diagnostic and statistical manual of mental disorders. 5th ed. Washington DC: American Psychiatric Association. 2013.
 23. Japan Society for the Study of Obesity. Determination of obesity. Guidelines for the management of obesity disease 2016. Tokyo: Life Science Publication, 2016. pp. 4-5. (In Japanese)
 24. The Japanese Society for Pediatric Endocrinology. Assessment of the physique of Japanese children [Internet]. Kyoto: The Japanese Society for Pediatric Endocrinology; [cited 2022 Aug 19]. Available from: <http://jspe.umin.jp/medical/taikaku.html> (In Japanese)
 25. Ministry of Education, Culture, Sports, Science and Technology. Fiscal 2000 School Health Statistics Survey II Summary of Survey Results [Internet]. Tokyo: Ministry of Education, Culture, Sports, Science and Technology; [cited 2022 Aug 19]. Available from: https://warp.ndl.go.jp/info:ndljp/pid/11293659/www.mext.go.jp/b_menu/toukei/001/h12/002.htm (In Japanese)
 26. Löwe B, Zipfel S, Buchholz C, et al. Long-term outcome of anorexia nervosa in a prospective 21-year follow-up study. *Psychol Med* 2001;31:881-890.
 27. Shin NY, Shin MS. Body dissatisfaction, self-esteem, and depression in obese Korean children. *J Pediatr* 2008; 152:502-506.
 28. Goldfield GS, Moore C, Henderson K, et al. Body dissatisfaction, dietary restraint, depression, and weight status in adolescents. *J Sch Health* 2010;80:186-192.
 29. Weinberger NA, Kersting A, Riedel-Heller SG, et al. Body dissatisfaction in individuals with obesity compared to normal-weight individuals: a systematic review and meta-analysis. *Obes Facts* 2016;9:424-441.
 30. Stice E. Risk and maintenance factors for eating pathology: a meta-analytic review. *Psychol Bull* 2002;128:825-848.
 31. Almeida L, Savoy S, Boxer P. The role of weight stigmatization in cumulative risk for binge eating. *J Clin Psychol* 2011;67:278-292.
 32. Gerke CK, Mazzeo SE, Stern M, et al. The stress process and eating pathology among racially diverse adolescents seeking treatment for obesity. *J Pediatr Psychol* 2013;38:785-793.
 33. Matthews A, Kramer RA, Mitan L. Eating disorder severity and psychological morbidity in adolescents with anorexia nervosa or atypical anorexia nervosa and premorbid overweight/obesity. *Eat Weight Disord* 2022;27;

- 233-242.
34. Keel PK, Heatherton TF. Weight suppression predicts maintenance and onset of bulimic syndromes at 10-year follow-up. *J Abnorm Psychol* 2010;119:268-275.
 35. Wildes JE, Marcus MD. Weight suppression as a predictor of weight gain and response to intensive behavioral treatment in patients with anorexia nervosa. *Behav Res Ther* 2012;50:266-274.
 36. Couturier J, Lock J. What is recovery in adolescent anorexia nervosa? *Int J Eat Disord* 2006;39:550-555.
 37. Accurso EC, Ciao AC, Fitzsimmons-Craft EE, et al. Is weight gain really a catalyst for broader recovery?: the impact of weight gain on psychological symptoms in the treatment of adolescent anorexia nervosa. *Behav Res Ther* 2014;56:1-6.
 38. Lebow J, Sim LA, Kransdorf LN. Prevalence of a history of overweight and obesity in adolescents with restrictive eating disorders. *J Adolesc Health* 2015;56:19-24.
 39. World Health Organization. THE GLOBAL HEALTH OBSERVATORY. Mean BMI (kg/m²) (crude estimate) [Internet]. Geneva: World Health Organization; 2017 [cited 2022 Aug 19]. Available from: [https://www.who.int/data/gho/data/indicators/indicator-details/GHO/mean-bmi-\(kg-m-\)-\(crude-estimate\)](https://www.who.int/data/gho/data/indicators/indicator-details/GHO/mean-bmi-(kg-m-)-(crude-estimate)).
 40. Ministry of Health and Welfare. The National Health and Nutrition Survey in Japan, 2019 [Internet]. Tokyo: Ministry of Health and Welfare; 2020 [cited 2022 Aug 19]. Available from: <https://www.mhlw.go.jp/content/000711007.pdf> (In Japanese)
 41. Rodríguez Martín A, Novalbos Ruiz JP, Martínez Nieto JM, et al. Epidemiological study of the influence of family and socioeconomic status in disorders of eating behaviour. *Eur J Clin Nutr* 2004;58:846-852.
 42. Dimitropoulos G, Freeman VE. The perceptions of individuals with anorexia nervosa regarding their family's understanding of their illness, treatment, and recovery. *Eat Disord* 2016;24:375-382.
 43. Jordan J, McIntosh VV, Carter FA, et al. Clinical characteristics associated with premature termination from outpatient psychotherapy for anorexia nervosa. *Eur Eat Disord Rev* 2014;22:278-284.
 44. Godart NT, Rein Z, Perdereau F, et al. Predictors of premature termination of anorexia nervosa treatment. *Am J Psychiatry* 2005;162:2398-2399.
 45. Huas C, Godart N, Foulon C, et al. Predictors of dropout from inpatient treatment for anorexia nervosa: data from a large French sample. *Psychiatry Res* 2011;185:421-426.
 46. Bandini S, Antonelli G, Moretti P, et al. Factors affecting dropout in outpatient eating disorder treatment. *Eat Weight Disord* 2006;11:179-184.
 47. Hoffman ER, Gagne DA, Thornton LM, et al. Understanding the association of impulsivity, obsessions, and compulsions with binge eating and purging behaviors in anorexia nervosa. *Eur Eat Disord Rev* 2012;20:e129-136.
 48. Brockmeyer T, Skunde M, Wu M, et al. Difficulties in emotion regulation across the spectrum of eating disorders. *Compr Psychiatry* 2014;55:565-571.
 49. Iguchi T, Miyawaki D, Harada T, et al. Introduction of family-based treatment to Japan with adaptations to optimize the cultural acceptability and advance current traditional treatments of adolescent anorexia nervosa. *Int J Eat Disord* 2021;54:117-119.
 50. Yamada H, Motoyama M. Evidence-based clinical treatment guidelines of eating disorder. *Japanese Journal of Clinical Psychiatry* 2021;50:39-44. (In Japanese)
 51. McIntosh VV, Jordan J, Luty SE, et al. Specialist supportive clinical management for anorexia nervosa. *Int J Eat Disord* 2006;39:625-632.
 52. Frostad S, Danielsen YS, Rekkedal GÅ, et al. Implementation of enhanced cognitive behaviour therapy (CBT-E) for adults with anorexia nervosa in an outpatient eating-disorder unit at a public hospital. *J Eat Disord* 2018; 6:12.
 53. World Health Organization. Health topics. Obesity [Internet]. Geneva: World Health Organization; 2017 [cited 2022 Aug 19]. Available from: https://www.who.int/health-topics/obesity#tab=tab_1.