Published in final edited form as:

Int J Eat Disord. 2010 July ; 43(5): 472–479. doi:10.1002/eat.20829.

A Prevalence Study and Description of alli® Use by Patients with Eating Disorders

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Abstract

Objective—This study examined the frequency and characteristics of alli® use among patients in eating disorder treatment facilities.

Method—Patients from five treatment centers completed the Survey of Eating and Related Behaviors. Diagnoses were determined from survey responses.

Results—Of 417 survey respondents, 26 (6.2%) reported a history of alli® use. Of those, 15 (57.7%) met criteria for an eating disorder, including one of 29 patients (3.4%) with anorexia nervosa binge-purge subtype, six of 66 patients (9.1%) with full or subthreshold bulimia nervosa, four of 49 (8.2%) with binge eating disorder, one of six (16.7%) with purging disorder, and three of 80 (3.8%) with an eating disorder not otherwise specified.

Discussion—The results of this survey suggest that patients with eating disorders use alli®, albeit relatively uncommonly. Therefore, it is worthwhile for clinicians to inquire about alli® use when evaluating or treating these patients in any clinical setting.

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Portions of this manuscript have been presented in poster format at the Eating Disorders Research Society Meeting, Brooklyn New York, 2009.

Keywords

eating disorders; alli; orlistat; anorexia nervosa; bulimia nervosa; binge eating disorder; diet pill; compensatory method

Introduction

Orlistat (Xenical®) has been available by prescription as a weight loss aid in the United States since 1999. In 2007, orlistat was also approved by the U.S. Food and Drug Administration (FDA) for nonprescription sales under the brand name of alli®, at one-half the daily dose of the prescription product. Currently, alli® is the only FDA-approved weight loss medication available over-the-counter. The majority of U.S. adults are currently classified as overweight or obese.[1] For these individuals, the ability to readily obtain orlistat without a prescription may be advantageous. A substantial percentage of patients with an eating disorder engage in over-the-counter medication and herbal product use to promote weight loss[2] and often continue these agents despite experiencing side effects.[3] Therefore, the nonprescription availability of alli® warrants investigation of the frequency of use of this product in patients with eating disorders.

alli® is FDA-approved for nonprescription use in the United States by overweight patients ages 18 and older who are also on a reduced calorie, low-fat diet.[4] alli® is formulated in 60 mg capsules, which are to be taken within 1 hour of each fat-containing meal, up to three capsules per day.[4] Orlistat's pharmacological effect occurs through the inhibition of gastric and pancreatic lipases in the gastrointestinal tract, which prevents triglyceride hydrolysis and results in the decreased absorption of dietary fats, which are excreted through the feces.[5] alli® reduces dietary fat absorption by approximately 25% at the recommended dosage.[4] Efficacy increases in a dose-dependent manner up to approximately 300–400 mg per day, at which point a plateau is observed.[5]

Orlistat's pharmacological actions occur locally in the gut[6] and less than 2% of the drug is absorbed systemically.[7] Therefore, the adverse effect profile associated with orlistat predominantly consists of a variety of gastrointestinal side effects such as soft stools, abdominal pain, steatorrhea, fecal urgency, flatulence, and other less common side effects, such as fecal incontinence.[5] These adverse effects increase in response to the amount of fat consumed,[5] although they typically diminish over time as patients gain experience using the medication.[8] The alli® package label instructs patients to take a multiple vitamin on a daily basis at bedtime while using orlistat since absorption of fat-soluble vitamins may be reduced.[4]

Not uncommonly, patients with eating disorders misuse medications such as laxatives, diuretics, and diet pills to compensate for binge eating and/or to promote weight loss. Rates of laxative abuse among outpatients who have an eating disorder have been reported to be 26.4% in the month prior to assessment in one study.[9] Similarly, a study of patients with bulimia nervosa found that 64% of the sample had used diet pills, with 18% of the sample having used them in the month prior to the study assessment.[10] This study also found the frequency of diuretic use to be 31%, with 21% of the sample having used them in the month

prior to the study assessment. Therefore, it is possible that the nonprescription availability of alli® could lead to inappropriate use by patients with eating disorders. Indeed, a few case reports of use of orlistat by individuals with eating disorders have appeared in the literature. The majority of these case reports were published before orlistat became available over-the-counter. Details of these cases are summarized in Table 1. This study was developed to quantify the frequency of alli® use among patients with eating disorder symptoms. Therefore, a treatment-seeking sample was examined and results are subsequently described.

Method

This study consisted of a survey that was administered at five eating disorder treatment facilities across the United States, including inpatient and outpatient facilities, between June of 2008 and March of 2009. Participants ages 12 and older who presented for evaluation or who were in ongoing treatment programs were eligible to participate. Those who completed the survey were compensated with a 10-dollar gift card. This study was supported through a research grant provided by GlaxoSmithKline.

Participants filled out the Survey of Eating and Related Behaviors, which is a 38-item self-report questionnaire designed for this study to capture demographic and diagnostic information, binge eating frequency, and compensatory behavior methods and frequency. Participant's self-reported height and weight were used to determine body mass index (BMI). Participants were not informed that the purpose of the study was to collect data on alli® use, and the questions concerning this were embedded among multiple other compensatory behavior questions (e.g. diuretics, Syrup of Ipecac). Probable current eating disorder diagnoses were determined based upon participants' responses to survey items according to the criteria sets described in Table 2, which were used to assign each participant to one category.

The study was approved by the Institutional Review Boards for all five study sites and all participants provided written informed consent. In addition, participants ages 12 through 17 were also required to provide written informed consent from a parent or legal guardian prior to taking the survey. All data were de-identified and maintained in a central database at the Neuropsychiatric Research Institute in Fargo, ND. Data were examined using SPSS Version 17.

Data were examined descriptively. The small sample size of alli® users, and the discrepancy between the sample size of those who used alli® and those who had not prohibited performing valid statistical comparisons. Cases of nonresponse to items were treated as a negative response to the question to enhance manuscript readability and this is also indicated as appropriate in Tables.

Results

Participants

A total of 428 participants completed the survey. Of those, 417 completed the question regarding a history of alli® use and were explored in greater detail. Participants who had

prior bariatric surgery ($N = 22$) or who had an undeterminable BMI or bariatric surgery history ($N = 44$) were excluded from eating disorder diagnostic categorization and are presented separately. Survey numbers obtained from each of the study sites are as follows: Neuropsychiatric Research Institute, 99; University of Minnesota, 98; University of Chicago, 100; University of North Carolina, 48; Columbia University, 81.

Data were split on the basis of whether patients reported a history of alli® use or not, and are presented along with descriptive information for the complete sample in Table 3. The majority of the sample was female and Caucasian, with a mean age of 33.2 (±13.1) years and a mean BMI of 28.3 (±11.8) kg/m^2. As expected in a treatment-seeking sample of patients with eating disorder symptoms, binge eating and compensatory methods such as laxatives, diuretics, and vomiting in the past month were relatively common, both in those who had used alli® and in those who had not. The group with a history of alli® use was found to have a higher percentage of patients who engaged in laxative, diuretic, diet pill, Syrup of Ipecac, and herbal fat burner use in the past month compared to the group who had not used alli®. Given the small sample size associated with the group who had used alli®, this observation cannot be confirmed statistically.

Frequency of alli® Use Among Patients with Eating Disorders

Of the 417 participants who responded to the question regarding a history of alli® use, 26 (6.2%) reported that they had taken alli®. Table 4 summarizes the distribution of these patients according to diagnostic category. None of the 26 participants who reported symptoms consistent with anorexia nervosa restricting subtype (AN-R), and one of 29 (3.4%) of those with anorexia nervosa binge-purge subtype (AN-BP) indicated a history of alli® use. The frequency of alli® use was higher in those who were categorized as having full or subthreshold bulimia nervosa (BN), where six of 66 (9.1%) reported that they had used the drug. Reported frequencies of alli® use for the other eating disorder diagnoses were four of 49 (8.2%) for full or subthreshold binge eating disorder (BED), one of six (16.7%) for purging disorder (PD), three of 80 (3.8%) for eating disorder not otherwise specified (EDNOS), one of 10 (10%) for overweight, four of 85 (4.7%) for obese, six of 44 (13.6%) of those with an unknown BMI or bariatric surgery history, and none of the 22 who had previously undergone bariatric surgery.

Six of the 26 (23.1%) participants who had used alli® reported that they had exceeded the maximum recommended dose of alli®. Data on the extent to which they exceeded the recommended dosage were not collected. The majority of these patients ($N = 4$) were in the BN diagnostic category. The mean duration of alli® use varied according to diagnostic category. These data are also presented in Table 4. Ten of the 26 patients who had used alli® (38.5%) reported that they had experienced side effects while using the drug. Summarized according to the descriptions provided by the participants, these included: diarrhea ($N = 3$), extreme diarrhea ($N = 1$), loose bowels ($N = 1$), stomach cramps and pain ($N = 1$), fat/oily diarrhea/stools ($N = 2$), gas ($N = 2$), racing/increased heart rate/palpitations ($N = 2$), panic ($N = 1$), dizziness/faintness ($N = 1$), and depression ($N = 1$).

Characteristics of Patients Who Used alli®

Patients who reported a history of alli® use ($N = 26$) are further described in Table 5 according to mean (±SD) BMI and age. alli® is indicated for adult patients who are overweight. The sample consisted of a small number of participants below age 18 ($N = 20$). One of these patients reported a history of alli® use and was found to be in the EDNOS category. Of the 26 participants who had used alli®, 10 (38.5%) had a BMI below 25 kg/m^2 at the time the survey was conducted. Given the retrospective nature of this survey, however, it is possible that the current BMI does not accurately represent the BMI at the time when alli® was used.

alli® Use in the Past Month

As shown in Table 4, of the 26 participants who reported that they had used alli®, 12 (46.2%) had done so in the past month, consisting of those with BN ($N = 4$), BED ($N = 1$), EDNOS ($N = 1$), overweight ($N = 1$), obese ($N = 3$), and unknown BMI or bariatric surgery history ($N = 2$). Characteristics of patients who met criteria for an eating disorder (or EDNOS), and reported use of alli® in the past month ($N = 6$) are described in a brief case series according to their survey responses in Table 6. Ages ranged from 24 to 58 years old, BMI ranged from 18.9 to 42.9 kg/m^2, most of the patients had a history of using other medications for weight loss or to compensate for binge eating, and all patients shared an extreme fear of weight gain.

Discussion

The population described in this study represents a treatment-seeking sample collected from five eating disorder treatment facilities across the United States. The study was comprised of patients who reported a variety of eating disorder symptoms and the sample represented a broad range of ages and BMIs. The results of this study suggest that a small subset of patients who are presenting for evaluation or are engaged in treatment in eating disorder care facilities have used alli®. The sample size associated with alli® use was too small in several of the diagnostic groups to draw definite conclusions. The rates of alli® use by patients with BN (9.1%) and BED (8.2%) suggest that clinicians should inquire about alli® use along with other compensatory behaviors when interviewing patients with eating disorders.

Patients with BN frequently use medications to compensate for binge eating through purging and/or to promote weight loss. Notably, several of the patients who indicated alli® use in this survey also engaged in the use of other weight loss methods. This is consistent with prior literature which suggests that a subset of patients with BN, as well as AN, use multiple purging methods. This practice has been associated with a higher lifetime prevalence of significant psychopathology, including mood, substance abuse, and cluster B personality disorders.[15] The use of multiple purging methods has also been associated with a higher level of eating disorder severity,[16] and a longitudinal investigation of a college sample showed that multiple purging methods at baseline predicted higher eating disorder severity at 10 year follow-up.[17] Although data addressing this issue are not available, as suggested by Cumella and colleagues (2), the risk of fat-soluble vitamin deficiency with alli® in patients with an eating disorder should be considered.

Orlistat has been examined as a potential treatment for BED.[18,19] Two controlled trials have shown the prescription dosage of orlistat (120 mg three times daily) to be efficacious for reducing body weight in patients who are obese with BED in combination with either cognitive behavioral therapy[18] or a reduced calorie diet.[19] However, prior case reports suggest that unmonitored use of this drug by patients who binge eat can be problematic. Given orlistat's mechanism of action, gastrointestinal side effects are more pronounced following a high-fat meal. Therefore, using alli® as a strategy to compensate for a binge eating episode with high fat content could increase the adverse effect burden associated with the drug. To provide overweight or obese patients who have BED with the highest likelihood of effectiveness from orlistat, clinicians should consider prescribing it in the dosage used in the two extant controlled trials (120 mg three times daily) and providing careful monitoring in the context of a structured treatment program which should also include a diet and exercise component.

Ten of the 26 participants (38.5%) in this study who had used alli® reported that they had experienced side effects with the drug. The adverse effects listed by participants were generally consistent with what is expected with alli®, including a variety of gastrointestinal complaints. Cardiovascular complaints including palpitations and increased heart rate and psychiatric symptoms were each reported by two patients, which are not commonly attributed to orlistat use.[5] From this survey, it is not possible to determine whether these symptoms were related to alli®, to an eating disorder, to concomitant medications, or to another etiology.

Along with the self-report nature of these data, other limitations of this study include the inability to determine the precise temporal sequence of alli® use in relationship to the use of other medications for weight loss and binge eating. Other than asking specifically for information on alli® use, this survey did not include questions designed to collect data regarding which specific types of laxatives, diuretics, and diet pills participants were using. Also, BMI at the time the survey was completed may not have represented the BMI at the time alli® was used since patients were asked if they had ever taken alli®. Therefore, alli® use in the past month may be of greatest relevance for this comparison. Nonpurging weight loss methods were not assessed, such as food restriction and excessive exercise. Data on diuretic use in the last month that were collected in this survey were assumed to be for weight loss purposes, although it is possible that patients were using them for hypertension or other medical purposes.

The results of this survey suggest that patients with eating disorders do use alli®, although in comparison to published prevalence rates of other inappropriate compensatory weight loss methods such as laxative misuse, the use of alli® appears relatively uncommon at this time. The cost to purchase alli®, in comparison to some of the other nonprescription medications, may be one factor that has led to the lower reported rates of misuse of this product relative to other medication classes. No serious adverse effects that could be clearly attributed to the drug were reported. Given the potential for the inappropriate use of this medication by patients with eating disorders, clinicians are encouraged to monitor for alli® use along with all other medications for weight loss in all clinical settings.

Acknowledgments

Supported by GlaxoSmithKline.

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TABLE 1

Prior literature on orlistat use by patients with eating disorders

Authors	Diagnosis, Current (C) and Historical (Hx) Compensatory Methods	Age, Gender BMI (kg/m^2)	Description of Orlistat Use	Comment
Fernandez-Aranda et al.[11]	BN-P, C: orlistat, Hx: vomiting, laxatives, food restriction	26 yo, 22 kg/m^2	Orlistat taken after bingeing, once to twice daily, totaling 120–240 mg/day	Patient experienced soft stools as the only adverse effect of orlistat.
	BN-P, C: orlistat, Hx: vomiting, laxatives, diuretics, food restriction	34 yo, 23.8 kg/m^2	Orlistat taken two-three times daily following binge episodes, totaling 240–360 mg/day	No adverse effects were reported.
Cochrane and Malcolm[12]	BN-P, C: orlistat, phentermine, ephedrine, vomiting, herbal teas, fiber supplements, excessive coffee as a laxative, diuretics, food restriction, Hx: amphetamines, methamphetamine, cocaine, cigarettes	35 yo, "normal weight"	Orlistat taken after eating, 240–480 mg each episode up to two-three times per week for 12 months. In the past 6 months, frequency of use has decreased to once/week and prn for high fat binges.	Patient had bouts of diarrhea after taking orlistat, but never had fecal incontinence. Patient used orlistat at work when it is too difficult to vomit or use laxatives.
Malhotra and McElroy[13]	BN-P, C: orlistat, Hx: occassional use of laxatives to "relieve fullness"	49 yo, 45 kg/m^2	Orlistat was taken prn with binge eating	Patient was considered to have BED prior to orlistat use. Patient experienced 4–8 bowel movements per day along with fecal urgency, oily rectal spotting, and flatulence. Treatment providers felt orlistat reinforced binge eating behavior and encouraged patient to discontinue use.
Hagler-Robinson[14]	BED	45 yo, BMI < 27 kg/m^2	Orlistat was taken in double the indicated dosage and more frequently than recommended. Patient did not limit fat intake, often purposefully binge eating high fat foods after taking orlistat.	Patient experienced adverse effects including oily spotting which made her "feel less guilty" about binge eating. She also experienced cramping and soreness during excretion. During treatment with cognitive-behavioral therapy, patient discontinued orlistat use. Authors discuss the similarity of this orlistat use to BN.

Notes: BED, binge eating disorder; BMI, body mass index; BN, bulimia nervosa; BN-P, bulimia nervosa, purging subtype; C, currently using; Hx, history of use; prn, only taken "as needed"; yo, year-old.

TABLE 2

Criteria for assigning cases to probable eating disorder diagnoses

Anorexia nervosa, restricting type	**1**	Current BMI ≤17.5 kg/m^2
	2	No binge eating, vomiting, laxative or diuretic use in the past month
	3	No history of bariatric surgery.
Anorexia nervosa, binge/purge type	**1**	Current BMI ≤17.5 kg/m^2
	2	Any binge eating, vomiting, laxative, or diuretic use within the past month
	3	No history of bariatric surgery
Bulimia nervosa and subthreshold bulimia nervosa, purging type	**1**	BMI > 17.5 kg/m^2
	2	A minimum average frequency of binge eating of once per week over the past month
	3	A minimum average frequency of vomiting, laxative, or diuretic use of once per week over the past month
	4	No history of bariatric surgery
Binge eating disorder and subthreshold binge eating disorder	**1**	BMI > 17.5 kg/m^2
	2	A minimum average frequency of binge eating of once per week over the past month
	3	No vomiting, laxative, or diuretic use in the past month
	4	No history of bariatric surgery
Purging disorder	**1**	BMI > 17.5 kg/m^2
	2	No binge eating in the past month
	3	A minimum average frequency of vomiting, laxative, or diuretic use of once per week
	4	No history of bariatric surgery
Eating disorder not otherwise specified	**1**	BMI ≤ 25 kg/m^2
	2	Does not meet any other diagnostic criteria
	3	No history of bariatric surgery
Overweight	**1**	BMI > 25 but < 30 kg/m^2
	2	Does not meet any other diagnostic criteria
	3	No history of bariatric surgery
Obese	**1**	BMI ≥ 30 kg/m^2
	2	Does not meet any other diagnostic criteria
	3	No history of bariatric surgery
History of bariatric surgery	**1**	Status-post bariatric surgery
BMI or bariatric surgery history unreported	**1**	Participant did not report current height, weight, or both
	2	No history of bariatric surgery or unknown history of bariatric surgery

Note: BMI, body mass index.

TABLE 3

Characteristics of sample according to history of alli® use

	History Use of alli® *N* (%)[a,b] or Mean ± SD (Range)[b]	No History of Complete alli® Use *N* (%)[a,b] or Mean ± SD (Range)[b]	Sample *N* (%)[a,b] or Mean ± SD (Range)[b]
N	26 (6.2)	391 (93.8)	417
Age (years)	39 ± 13.9 (15–61)	33 ± 13 (13–69)	33.2 ± 13.1 (13–69)
Age < 18 years	1 (3.8)	19 (4.9)	20 (4.8)
BMI (kg/m^2)	28.8 ± 10 (14.9–44.6)	28.3 ± 11.9 (10.6–70.9)	28.3 ± 11.8 (10.6–70.9)
BMI < 25 kg/m^2	10 (38.5)	194 (49.6)	204 (48.9)
Gender			
Female	22 (84.6)	346 (88.5)	368 (88.2)
Male	1 (3.8)	34 (8.7)	35 (8.4)
Race/ethnicity			
White	17 (65.4)	311 (79.5)	328 (78.7)
African American	5 (19.2)	30 (7.7)	35 (8.4)
Native American	0 (0)	2 (.51)	2 (.48)
Hispanic	3 (11.5)	29 (7.4)	32 (7.7)
Asian	0 (0)	4 (1)	4 (1)
Other/unknown	1 (3.8)	14 (3.6)	15 (3.6)
Eating disorder behaviors in the past month[c]			
Binge eating	16 (61.5)	230 (58.8)	246 (59)
Self-induced vomiting	10 (38.5)	137 (35)	147 (35.3)
Laxative use	7 (26.9)	52 (13.3)	59 (14.1)
Diet pill use	15 (57.7)	46 (11.8)	61 (14.6)
Diuretic use	9 (34.6)	26 (6.6)	35 (8.4)
Syrup of Ipecac use	2 (7.7)	4 (1)	6 (1.4)
alli® use	12 (46.2)	—	12 (2.9)
Herbal “fat burner” use	10 (38.5)	56 (14.3)	66 (15.8)

[a]Percentages in each column were computed as the number of positive responses divided by the total sample in the respective alli® use group or the complete sample (*N* = 26, *N* = 391, or *N* = 417). Only participants who responded to the question asking if they had ever used alli® are included.

[b]Values based upon available data; not all participants completed all questions.

[c]Missing data were treated as a negative response to the question.

TABLE 4

Description of alli® use among patients with eating disorders

Diagnostic Category	*N*	Ever Used alli® *N* (%)[a]	Used alli® in Last Month N (%)[a,b]	Exceeded Recommended Dose of alli® *N* (%)[a,b]	Side Effects from alli® *N* (%)[a,b]	Mean ± SD Duration of alli® Use in Days (Range)[c]
Anorexia nervosa restricting subtype	26	0 (0)	—	—	—	—
Anorexia nervosa binge/purge subtype	29	1 (3.4)	0 (0)	0 (0)	0 (0)	Not reported
Bulimia nervosa or subthreshold bulimia nervosa	66	6 (9.1)	4 (6.1)	4 (6.1)	4 (6.1)	107.4 ± 144.7 (10–360)
Binge eating disorder or subthreshold binge eating disorder	49	4 (8.2)	1(2)	0 (0)	2 (4.1)	20 ± 26.8 (3–60)
Purging disorder	6	1 (16.7)	0 (0)	1 (16.7)	1 (16.7)	240
Eating disorder not otherwise specified	80	3 (3.8)	1 (1.3)	0 (0)	0 (0)	14
Overweight	10	1 (10)	1 (10)	0 (0)	0 (0)	Not reported
Obese	85	4 (4.7)	3 (3.5)	0 (0)	2 (2.4)	110.7 ± 176.2 (4–314)
History of bariatric surgery	22	0 (0)	—	—	—	—
Unknown BMI or bariatric surgery history	44	6 (13.6)	2 (4.5)	1 (2.3)	1 (2.3)	86 ± 88.9 (14–210)
Total	417	26 (6.2)	12 (2.9)	6 (1.4)	10 (2.4)	85.9 ± 114.3 (3–360)

[a]Percentages in each column were computed as the number of positive responses divided by the total sample in each diagnostic group who responded to the question asking if they had ever used alli®.

[b]Missing data were treated as a negative response to the question.

[c]Values based upon available data; not all participants completed all questions.

TABLE 5

Age and BMI characteristics of patients with eating disorders who reported a history of alli® use

	N	BMI Mean ± SD (Range)	BMI < 25 kg/m^2 *N* (%)	Age Mean ± SD Range[a,b]	Age < 18 *N* (%)[a,b]
Anorexia nervosa, restricting type	0	—	—	—	—
Anorexia nervosa, binge/purge type	1	14.9	1 (100)	Unknown	0
Bulimia nervosa and subthreshold bulimia nervosa, purging type	6	24.9 ± 9.3 (17.7–42.9)	4 (66.7)	31.2 ± 13.3 (24–55)	0
Binge eating disorder and subthreshold binge eating disorder	4	33.9 ± 9.6 (19.9–41.8)	1 (25)	48.8 ± 9.3 (36–58)	0
Purging disorder	1	20.8	1 (100)	19	0
Eating disorder not otherwise specified	3	21 ± 1.5 (19.7–22.6)	3 (100)	32.3 ± 15.0 (15–42)	1 (33.3)
Overweight	1	27.6	—	37	0
Obese	4	39.8 ± 6.2 (30.8–44.6)	—	33 ± 11 (21–45)	0
History of bariatric surgery	0	—	—	—	0
BMI or bariatric surgery history unreported	6	34.8	—	52 ± 8.2 (43–61)	0
Total	26	28.8 ± 10 (14.9–44.6)	10 (38.5)	39 ± 13.9 (15–61)	1 (3.8)

[a]Percentages in each column were computed as the number of positive cases divided by the total sample in each diagnostic group who responded to the question asking if they had ever used alli®.

[b]Values based upon available data; not all participants completed all questions.

Int J Eat Disord. Author manuscript; available in PMC 2017 August 08.

TABLE 6

Description of participants who have probable eating disorders who used alli® in the past month

Probable Eating Disorder Diagnosis	Age, BMI	Description of alli®	Binge Eating and Compensatory Behaviors In the Past Month	History of Binge Eating and Compensatory Behaviors	Fear of Weight Gain
Bulimia nervosa	24 yo, 22.3 kg/m^2	alli® use on a daily basis in the past month. Three month duration of alli® use. Reports having taken more than the recommended amount of alli® and experiencing a side effect of "diarrhea."	BE several times a week, vomiting more than once a day, diet pill usage once per day	Began BE 2×/wk on a regular basis at age 21, began vomiting 2×/wk on a regular basis at age 19, used laxatives beginning at age 23 but not on a regular basis, used OTC diet pills beginning at age 23	Extreme
Bulimia nervosa	26 yo, 26.5 kg/m^2	alli® use of once per month or less during the last month, did not exceed the recommended amount, but did experience "extreme diarrhea, loose bowels, stomach cramps and pain, fat and oily diarrhea." Duration of alli® use was 10 days.	BE more than once/day, vomiting more than once/day, laxatives once/week, diet pills once/day, diuretics once a month or less, herbal fat burners once/day	Began BE 2×/wk on a regular basis at age 20, began vomiting 2×/wk on a regular basis at age 20, began using laxatives 2×/wk on a regular basis at age 20, diuretic use 2×/wk on a regular basis at age 24, began using OTC diet pills at age 14	Extreme
Subthreshold bulimia nervosa	25 yo, 18.9 kg/m^2	alli® use on a daily basis in the past month. Has exceeded the recommended amount of alli® and has experienced side effects including "scarily increased heart rate, lots of panic, particularly when alone." Duration of alli® use was 3 weeks.	BE once/week, laxatives once/day, diet pills more than once/day, diuretics once a month or less, herbal fat burners more than once/day	History of binge eating, history of vomiting, syrup of Ipecac usage not reported. Began using laxatives 2×/wk on a regular basis at age 25. Began using diuretics at age 25, but has not used them on a regular basis. Began using OTC diet pills at age 21	Extreme
Subthreshold bulimia nervosa	55 yo, 42.9 kg/m^2	alli® use on a weekly basis in the past month. Has exceeded the recommended amount of alli® but has not experienced side effects. Duration of alli® use was 8 weeks.	BE once/week, vomiting once a month or less, laxatives several times/week, diet pills several times/week, herbal fat burners once a month or less	Began BE 2×/wk on a regular basis at age 50, began using laxatives 2×/wk on a regular basis at age 54. Has engaged in self-induced vomiting beginning at age 51, but not on a regular basis.	Extreme
Binge eating disorder	58 yo, 36 kg/m^2	alli® use once per month or less in the past month. Has not exceeded the recommended amount of alli® and has not experienced side effects. Duration of alli® use was 2 months.	BE several times/week, diet pills once a month or less, herbal fat burners several times a month.	Began BE at age 25 and began BE 2×/wk on a regular basis at age 40. Began using OTC diet pills at age 25.	Extreme
Eating disorder not otherwise specified	40 yo, 22.6 kg/m^2	alli® use several times in the last month. Has not exceeded recommended dosage of alli® and has not experienced side effects. Duration of alli® use was 2 weeks.	No binge eating, vomiting, laxatives, diet pills, diuretics, syrup of Ipecac, or herbal fat burner use in the past month.	Used laxatives starting at age 16, but not on a regular basis. Used OTC diet pills beginning at age 17.	Extreme

Notes: yo, year old; BE, binge eating; BMI, body mass index; OTC, over-the-counter.