

# Self-induced Vomiting and Laxative and Diuretic Use Among Teenagers

## Precursors of the Binge-Purge Syndrome?

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● **Bulimia (binge-purge syndrome) is a recently described but apparently common eating disorder. Purging behaviors associated with bulimia can cause serious medical complications. Prevalence data on purging behaviors are lacking for younger adolescents. A survey was conducted with 1,728 tenth-grade students to assess their attitudes about eating, dieting, weight control, and frequency of purging. Height, weight, and skin-fold thicknesses were also measured. Thirteen percent reported purging behavior. Female purgers outnumbered male purgers 2 to 1. Male purgers were significantly heavier than male nonpurgers and had significantly greater skin-fold thicknesses and weight/height<sup>2</sup> ratios. Both male and female purgers felt guiltier after eating large amounts of food, counted calories more often, dieted more frequently, and exercised less than nonpurgers. Our findings suggest that an alarming number of young adolescents may employ unhealthy weight regulation strategies. Physicians who see adolescents should look for the presence of the attitudes and behaviors that characterize bulimia; this will enhance the likelihood of detection of the disorder and prevention of its complications.**

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BULIMIA (binge-purge syndrome) is a recently described but apparently common eating disorder with significant medical complications. Bulimia is characterized by a self-perpetuating pattern of binge eating followed by fasting and/or various methods of purging, including self-induced vomiting and abuse of laxatives and diuretics.<sup>1</sup> Binge eating and the various forms of purging behavior can cause serious medical complications, including acute gastric dilation<sup>2</sup> and rupture,<sup>3</sup> aspiration pneumonitis,<sup>4</sup> metabolic alkalosis,<sup>5,6</sup> hypochloremia,<sup>6</sup> hypokalemia,<sup>4,6</sup> dental enamel and dentin erosion<sup>7,9</sup> and tooth loss,<sup>9</sup> esophageal rupture,<sup>4</sup> esophagitis,<sup>4</sup> and benign parotid enlargement.<sup>4,6</sup>

While binge eating and purging frequently occur in conjunction with anorexia nervosa, recent research indicates that the behaviors may occur in normal-weight and overweight individuals.<sup>5,6</sup> Although the

prevalence of bulimia is unknown, the syndrome may be increasing in the general population.<sup>10,12</sup>

The specific factors influencing the onset and development of bulimia have not been identified. Sociocultural factors that link beauty, success, and happiness to a thin body shape may be partly responsible for the possible increase of bulimia.<sup>13</sup> Most women, for example, view slenderness as the major salient aspect of physical attractiveness.<sup>14</sup> The pressure to maintain a slender physique may, in psychologically vulnerable individuals, lead to weight control efforts that result in bulimia. Weight loss attempts typically begin with restrictive dieting that results in hunger. The hunger is satisfied by binging. Fear of weight gain and associated guilt are then relieved by self-induced vomiting. However, self-induced vomiting leads to further hunger. Ultimately, a vicious cycle is established in which emotional disturbances and the desire to lose weight perpetuate the binge-purge syndrome.<sup>13</sup>

Many patients report that their

bulimia began in adolescence and was associated with attempts to regulate weight. Given the seriousness of the disorder and its possible increase, research on the prevalence of behaviors in young adolescents that might predispose them to bulimia is needed. However, research on younger age groups is quite limited. Published research has focused on late-teen and adult age groups. Estimates of the incidence of bulimia among high school students have appeared in the literature only recently.<sup>15,16</sup> Only two articles have reported on the specific incidence of purging behaviors in high school populations.<sup>17,18</sup> This article reports prevalence data on self-induced vomiting and laxative and diuretics use in a population of normal 15-year-old high school students and examines variables that may be linked to adoption and use.

### SUBJECTS AND METHODS

#### Subjects

During January 1985, tenth-grade students (N=1,728) enrolled in four northern California high schools completed a survey designed to detect the presence of coronary heart disease risk factor behaviors. Of those studied, 52.4% were male and 47.6% were female. Ethnic breakdown of the students was as follows: white, 71.1%; black, 2%; Asian, 14.1%; Latino, 4.8%; American Indian, 1.2%; Pacific Islander, 1.5%; and other, 5.3%. Sixty-five percent of the students' fathers and 58% of their mothers received at least some college-level education.

#### Assessments

Assessments were carried out over a five-day period in each of the high schools by trained staff led by the principal investigators. Students were surveyed in four school classrooms during each class period. Class sizes ranged from 20 to 30 students. Boys and girls were separated.

**Health Survey.**—An 85-page self-administered questionnaire assessed behaviors, knowledge, attitudes, and intentions in

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each of the following areas: physical activity, nutrition/diet, substance use, and stress. Thirteen items, included in the nutrition/diet component of the questionnaire, provided data on the prevalence of purging behaviors, recent weight loss/weight gain history, dieting behavior, body image, and attitudes about eating and weight control.

**Anthropometric Measurements.—Height/Weight.**—Height and weight were recorded on a standard balance-beam scale. Participants wore lightweight gym clothing and removed shoes and jackets before they were measured. Height was rounded down to the nearest inch. Weight was rounded down to the nearest pound.

**Skin-Fold Thickness.**—Subcutaneous skin-fold thickness measurements were made with a skin-fold caliper, according to established guidelines.<sup>19</sup> Measurements were taken with the subjects standing. The measurements were taken from the right side of the body, and the average of two separate determinations was used. If the two measurements differed by more than 1.0 mm, a third measurement was taken. Two sites were measured: triceps and subscapular. The triceps skin fold was located with a tape measure at the midpoint of the upper arm, with the arm bent at a 90° angle, using the acromion and olecranon as landmarks. The measurement was made with the arm fully extended at the subject's side, with the skin fold parallel to the longitudinal axis of the upper arm. The subscapular skin fold was located 1.0 cm below the inferior angle of the scapula, in line with the natural cleavage lines of the skin. All skin folds were measured to the nearest 0.2 mm.

**Quetelet Index.**—Weight/height<sup>2</sup> is generally considered to be the preferred index of relative body weight as an estimate of adiposity.<sup>20,21</sup> A good relative weight measure should be weakly correlated with height and strongly correlated with weight. In this study, weight/height<sup>2</sup> correlated ( $r=-.16$ ) with height and ( $r=.79$ ) with weight.

## RESULTS

### Purging Behaviors and Diet Pill Use

Table 1 presents data on the use of diet pills, laxatives, and diuretics and the practice of self-induced vomiting. About 13% of adolescents in the study population reported some form of purging behavior. Female purgers outnumbered male purgers 2 to 1. The  $\chi^2$  tests of independence were computed to compare frequencies of purging behavior between boys and girls. Diet pill use ( $P<.0005$ ), diuretics use ( $P<.02$ ), and self-induced vomiting ( $P<.0005$ ) were significantly higher among girls.

Table 1.—Frequency of Purging Behaviors and Diet Pill Use Among 15-Year-Olds

	Frequency, %							
	Diet Pills		Laxatives		Diuretics		Vomiting	
	M	F	M	F	M	F	M	F
Never	96.2	91.7	94.3	93.2	97.6	96.3	95.0	89.4
Monthly or less	2.5	6.6	4.1	6.1	1.0	3.1	3.2	8.6
Weekly	0.5	0.5	0.6	0.5	0.6	0.1	0.8	1.1
Several times a week or more	0.8	1.2	1.1	0.2	0.8	0.4	1.0	0.9
Total yes responses (M vs F subjects)	3.8	8.3*	5.8	6.8	2.4	3.6†	5.0	10.6‡

\* $\chi^2=22.1$ ,  $P<.0005$ .

† $\chi^2=13.5$ ,  $P<.02$ .

‡ $\chi^2=29.3$ ,  $P<.0005$ .

Table 2.—Anthropometric Measures: Purgers and Nonpurgers

	Mean $\pm$ SD				Analysis of Variance (Purgers vs Nonpurgers)	
	M		F		F	P
	Purgers	Nonpurgers	Purgers	Nonpurgers		
Weight, kg	68.4 $\pm$ 12.6	63.8 $\pm$ 11.1	56.3 $\pm$ 9.4	56.0 $\pm$ 9.4	4.92	<.03
Triceps skin fold, mm	13.4 $\pm$ 6.6	11.8 $\pm$ 5.5	19.9 $\pm$ 5.3	19.2 $\pm$ 5.9	4.32	<.05
Subscapular skin fold, mm	11.1 $\pm$ 4.9	10.1 $\pm$ 4.5	14.2 $\pm$ 4.5	13.5 $\pm$ 5.3	4.24	<.05
Quetelet index (weight/ height <sup>2</sup> )	23	21	22	22	4.82	<.03

### Anthropometric Measures: Purgers vs Nonpurgers

A two-way analysis of variance was computed to compare purgers and nonpurgers and boys and girls on the anthropometric variables (Table 2). Subjects were classified as purgers if they responded affirmatively to at least one of the three questions assessing incidence of purging (vomiting, laxatives, diuretics). Purgers compared with nonpurgers were significantly heavier ( $P<.03$ ) and had significantly greater triceps ( $P<.05$ ) and subscapular skin-fold thicknesses ( $P<.05$ ) and Quetelet scores ( $P<.03$ ). *T* tests were then computed to compare purgers and nonpurgers within each sex group. Male purgers were significantly heavier than male nonpurgers ( $P<.005$ ) and had significantly greater triceps ( $P<.04$ ) and subscapular ( $P<.04$ ) skin-fold thicknesses and Quetelet scores ( $P<.001$ ). Female purgers and nonpurgers were not significantly different on any of the anthropometric measures. When boys and girls were compared without regard to purging status, boys were significantly heavier ( $P<.001$ ) than girls and had significantly lower triceps ( $P<.001$ ) and subscapular skin-fold thicknesses ( $P<.001$ ). Quetelet scores of boys and girls were not significantly different.

### Eating Habits and Weight-Related Behaviors: Purgers vs Nonpurgers

The  $\chi^2$  tests of independence were conducted to compare purgers and nonpurgers on a variety of self-reported eating and weight-related behaviors. Male purgers, in contrast to their nonpurging counterparts, felt significantly more guilty after eating large amounts of food ( $P<.0001$ ), counted calories more frequently ( $P<.0001$ ), dieted more often ( $P<.0002$ ), and exercised less frequently ( $P<.002$ ).

Female purgers, compared with their nonpurging peers, counted calories more often ( $P<.0001$ ), exercised less ( $P<.06$ ), felt more guilty after overeating ( $P<.0001$ ), dieted more frequently ( $P<.0001$ ), and fasted for an entire day more often ( $P<.0001$ ). In addition, short-term weight fluctuations were more frequent among female purgers ( $P<.02$ ).

### COMMENT

Thirteen percent of the 15-year-olds in this study population reported some form of purging behavior. Most purged on an occasional basis. Few reported purging as much as once per week.

The results invite comparison with studies that have assessed purging in conjunction with binge eating in older populations. Most published research

suggests that purging behavior begins in late adolescence and early adulthood.<sup>22,23</sup> This study suggests that purging may occur frequently among younger adolescents. Bulimia appears to occur more frequently in women.<sup>10,12</sup> The prevalence of purging among tenth-grade girls in this study was almost twice that of boys.

Research has produced conflicting findings on the weight history of bulimic patients. Several studies suggest that bulimia occurs predominantly among thin or anorectic individuals.<sup>5,23</sup> However, two recent large-scale investigations suggest that many bulimics are somewhat overweight for their respective heights.<sup>12,22</sup> Young male adolescent purgers in this study were heavier, with more of their weight as adipose tissue, than nonpurgers. In contrast, female purgers did not differ from female nonpurgers on measures of weight and body fat.

Among bulimics, self-induced vomiting occurs more frequently than other purging behaviors, followed by laxative and diuretics use.<sup>12,23</sup> A recent study of adolescent girls in the ninth through 12th grades reported vomiting rates of 11.2% and laxative use rates of 4.7%.<sup>17</sup> These results are consistent with our findings, in which 10.6% of tenth-grade girls reported vomiting, 6.8% reported laxative use, and 3.6% reported using diuretics (Table 1).

Bulimics appear to be preoccupied with their weight and dieting.<sup>22,23</sup> Obsessive fear of weight gain and body-image distortions are common among bulimic populations. Abrupt swings from periods of dieting or fasting to gorging characterize bulimia. Both male and female purgers in this study exhibited a heightened concern with weight and eating. In contrast to nonpurgers, purgers of both sexes dieted more, counted calories more often, and felt greater guilt after a period of excessive eating. In addition, young female purgers reported more pronounced weight fluctuations.

This study suggests that an alarming number of young adolescents may employ unhealthy strategies to regulate weight. While the frequency of purging for most in this study was too low to be considered pathologic, the presence of purging behaviors coupled with dysfunctional attitudes about

eating and body weight may place these young people at risk for developing eating disorders. At present, little, if any, research has focused on education for primary prevention of eating disorders. Instructional programs aimed at prevention of eating disorders and adoption of healthful weight control procedures may need to be developed. Theoretical models from which treatment programs could be developed presently exist. Adolescent smoking prevention programs based on social influence-resistance models have provided encouraging results.<sup>24</sup> Educational programs that (1) unveil the social influence mechanisms promoting unrealistic and unhealthy attitudes about body weight and (2) impart accurate knowledge and effective influence-resistance techniques offer one potentially promising approach.

Our findings suggest that physicians who see adolescents and young adults should look for the presence of the attitudes and behaviors that characterize (and may be precursors to) bulimia; this may enhance the likelihood of detection of the disorder and prevention of its complications. In particular, young female adolescents appear to be more likely to practice purging behaviors, which may place them at a higher risk for developing a frank binge-purge syndrome and its medical complications. In general, we would suggest that physicians can play an important role in preventing adoption of maladaptive weight control behaviors by helping younger patients to distinguish between healthful and harmful weight control methods and to select sensible weight-loss goals. If a physician should decide to recommend weight loss for adolescent and younger-aged patients, a weight control program emphasizing normalization of eating habits, increased physical activity, and other techniques promoting constructive regulation of weight should be selected.

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