

Introduction

Bulimia nervosa serves as a disease model for a variety of physiological problems associated with improper nutritional intake. Bulimia occurs in women whose daily routine involves binge eating followed by attempts to rid their bodies of the excess food (1). The most common method of compensation following a binge involves self-induced vomiting. Other methods include laxative use, enemas, diuretics, severe caloric restriction, and compulsive exercising (2). It is estimated that 1.1 to 4.2 percent of females have bulimia nervosa in their lifetime (3).

Five to 10 years after the diagnosis of bulimia, approximately 50% of women fully recover from their disorder. About 20% continue to meet criteria for bulimia (4). Of those who have recovered, approximately 30% relapse. Bulimia can also become a chronic disorder for some women. Physicians monitor a patient's nutritional status and physiological health while a patient is bulimic. But follow-up on these women when they have recovered from bulimia is also of crucial importance because of the potential long term health consequences of their eating disorder. Unfortunately, research on the long-term outcome for women diagnosed with bulimia nervosa is rare (5).

Amenorrhea, anemia, constipation, severe dehydration, arrhythmias, osteoporosis, and diabetes can all be health risks due to impaired nutrition while a patient is bulimic (3). For active bulimics, the more frequently their binge/purge episodes occur, the more serious their electrolyte abnormalities are (6). Although there is a higher frequency of hypokalemia and hypochloremia in active bulimics, once their nutritional intake is steadier and the compensatory mechanisms are no longer being used, such imbalances are not a problem. Additionally, once a woman is no longer regularly bingeing and purging, problems such as amenorrhea, anemia, severe dehydration, and acute heart dysrhythmias are not big risk factors. However, because of their impaired nutrition, past bulimics may remain at increased risk for osteoporosis, reproductive problems, diabetes, and cholesterol elevation.

Bulimia Nervosa and Bone Health

In women with a past history of bulimia nervosa, the risk of bone disease depends on how long they were amenorrheic, how calcium deficient they were, and the amount of physical exercise they did (7). More than half of all bulimic women in one study had less than two-thirds the RDA for calcium (8). Since calcium deficiency causes osteoporosis and because the onset of bulimia coincides with an age when a woman should be achieving peak bone mass, there is certainly cause for concern. After all, it is estimated that the onset of bulimia nervosa is generally during adolescence or early adulthood (1).

Some studies indicate that in women with a past history of bulimia and anorexia, bone density is lower than normal (9). Additionally, in bulimic women with prolonged amenorrhea and low body mass index, there is an increased risk of osteopenia (7). In cases where a woman is bulimorexic and is underweight, amenorrhea and lack of estrogen can also be bad for bones. But in cases where a woman has a past history of bulimia alone, menstrual irregularities do not have the same serious impact on bone loss, as they do in patients with anorexia (10).

Interestingly, in women with a past history of bulimia, a higher total body bone mineral density (BMD) was found in those who exercised regularly during their illness as compared to those who were sedentary (11). The higher BMD was found in the lumbar vertebrae, femoral neck, and legs. Furthermore, weight-bearing exercise was shown to prevent or decrease bone loss at specific skeletal sites in woman of normal weight who had bulimia.

Once a woman has recovered from bulimia, improved nutrition and regularity of menses can be associated with increased bone health (12). Yet it is unlikely that these women can completely regain normal bone mineral density. So even if a woman maintains proper calcium and vitamin D levels for the rest of her life, the inability to achieve an adequate peak bone mass is cause for concern of premature onset of osteopenia and osteoporosis.

Bulimia Nervosa and Diabetes

Unlike patients with anorexia nervosa, most bulimic women do not have an overall calorie-deficient diet. This also explains why bulimic women, unlike anorectics are often normal weight or overweight. Even though bulimic women do not experience the same calorie-deficiency that anorexic women do, this does not mean that the quality of their calories is very ideal (13). Binges often involve unhealthy foods that a bulimic woman normally tries to restrict herself from. During binges, bulimic women tend to take in foods that are high in sucrose, fat, saturated fatty acids, monounsaturated fatty acids, and low in protein (8). Even when compared to patients with binge eating disorder, bulimics tend to choose foods higher in carbohydrates and sugar (13).

A certain portion of calories remain in the GI tract even with compensatory methods following a binge. Whether a bulimic patient has a small binge (mean = 1,549 kcal) or large (mean = 3,530 kcal) binge, they retain similar amounts of kilocalories (1,128 to 1,209 kcal) after vomiting (14). Retaining some of those calories can cause high blood sugar levels and can lead to hyperinsulinemia, even when a lot of the food is purged out. Chronic states of hyperinsulinemia can cause insulin resistance and diabetes mellitus type 2 (DM-2). Research has shown that eating a single large daily meal results in metabolic changes in glucose, insulin, and leptin secretion (15). Even in healthy women, fasting glucose increases much more following a binge as compared to following a normal diet. Accordingly, the insulin response to a binge is significantly increased as compared to the insulin response following a normal meal. The doubling of insulin levels in response to similar glucose levels could give rise to future insulin resistance. Since bulimic individuals do retain a significant number of binge calories even after purging, their binges are cause for concern with regards to DM-2.

Overall, diabetes has been found to be more common in women who have had bulimia than among women who have not (16). Of course, it can not be said that bulimia is a causal factor, because women with pre-existing diabetes can progress towards bulimic behaviors as well. As a matter of fact, in a study that followed women for three years after they presented with bulimic symptoms, women with no eating disorder at 3-

year follow-up had a significant mean decrease in plasma glucose in comparison to those who still had an eating disorder (17). So this bodes well in cases where women can overcome their bulimia.

The prevalence of bulimia nervosa may be increased among patients with diabetes mellitus type 1 (DM-1) as well. Although there is no causative explanation for this, an earlier onset of microvascular complications has been reported among these patients (18). Women with DM-1 who have had bulimia in the past have been shown to consume more energy, total fat and cholesterol in comparison to women with eating disorders and no diabetes. DM-1 alone can alter lipid metabolism, and some data indicates that DM-1 along with an eating disorder results in additional alterations in lipid metabolism (19).

Bulimia Nervosa and Cholesterol

Patients with bulimia nervosa have elevated serum levels of cholesterol (20). This is thought to be related to their cholesterol and fat intake during binge eating, but not during their normal eating (21). One study showed that bulimic women consume more calories in 24 hours (4446 kcal) than do controls without bulimia (1845). Fortunately, in women who no longer have an eating disorder at a 3-year follow-up, there is a significant decrease in serum cholesterol (17). This same decrease is not seen in women who still fulfill criteria for an active eating disorder.

Bulimia Nervosa and Reproductive Health

Some researchers claim that unsatisfactory nutrition due to bulimia is as serious a threat as being an anorectic with low weight when it comes to hormonal balance, menstrual regularity and fertility (22). About half of adolescents with bulimia nervosa are thought to have hypothalamic dysfunction and oligoamenorrhea because of improper nutritional intake (23). Infertile women with clinical and sub-clinical bulimia nervosa have pathologically low FSH and LH levels (22). Although irregular menses affect fertility and are common during episodes of active bulimia, future ability to conceive is not impaired in patients who recover from bulimia (24).

Perhaps this success rate is due to how quickly irregular menstrual cycles can resolve in women with bulimia. In one study, 45% of bulimic women reported having an irregular menstrual cycle. Of those with menstrual irregularity 56.8% became regular at 12 months follow-up after treatment for their bulimia. Additionally, the menstrual irregularity of bulimia differs from that of anorexia because it is associated with nutritional restriction that is not reflected by low body weight or energy intake (25).

Discussion

Fortunately, some of the health problems caused by impaired nutrition in women with bulimia nervosa do not persist after recovery. Of course, the severity of nutritional complications varies based on a woman's underlying health and the duration of her bulimia. Not every woman who overcomes bulimia will have the same health risks.

Regarding bone health, proposed treatments for women who have recovered from bulimia include nutritional improvement, weight gain, calcium supplementation, moderate exercise, and estrogens if needed (7). In women that have a past history of both

bulimia and anorexia, physicians should use bone densitometry to assess their risk for osteopenia and osteoporosis. It is more difficult to study the nutritional impact of a past history of bulimia on future diabetes, because there is no evidence that shows one disease as being a precursor to the other. However, the presence of diabetes in these patients can complicate their recovery, and physicians and health care providers should be aware of this while providing follow-up care for diabetic women who have overcome bulimia. Fortunately, even though cholesterol levels may be elevated during active bulimia, resumption of a lifestyle without binge eating can allow the serum level of cholesterol to normalize. This is not an issue of serious concern for health care providers treating past bulimics. As for reproductive health, studies indicate that women with a past history of bulimia do not have trouble conceiving. Once again, results do vary depending on how long a history of bulimia and amenorrhea a woman has had. Physicians do need to monitor patients with a history of bulimia in cases of relapse during pregnancy. A recurrence of active bulimic episodes can result in low birth weights, prematurity, malformations, and low Apgar scores (26).

For patients with active bulimia nervosa, a multidisciplinary team is considered to be the best form of management (27). This ideal approach involves a physician, a nutritionist, and a mental health professional. Even after the ritual of bingeing and compensation has been overcome, it is important for health care providers to monitor the long-standing effects of a past history of bulimia in their patients. Although daily nutritional care and psychological treatment may not be necessary anymore, there are certain health risks that women who have overcome bulimia are at increased risk for. Longitudinal studies in this recovered population are lacking, and really should be conducted to truly assess what health risks these women have because of their impaired nutrition in the past. Bulimia nervosa is a disease where impaired nutrition can not only have adverse effects on a woman's health while she is actively bingeing and purging, but later in her life as well.

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