

# Effectiveness of Vitamin D level in Patients who had Sleeve Gastrectomy Surgery for Morbid Obesity; Retrospective Clinical study

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## ABSTRACT

**Background:** Obesity is associated with various comorbidities in addition to increased mortality. Indeed, a modest 3-5% weight loss results in an improvement in various health outcomes. Various treatment options are currently available for weight management, including surgical and non-surgical approaches. Weight loss varies widely between interventions and is highest following bariatric surgery. Body mass index, and particularly fat mass, is a known determinant of Vitamin D deficiency is common in individuals with obesity. Such a deficiency is multifactorial. Low vitamin intake and supplements, poor dietary habits and low sun exposure are important risk factors. In addition, changes in the activity and expression of enzymatic pathways involved in vitamin D metabolism have been observed, including a decrease in the expression of hydroxylation enzymes, namely 25-hydroxylase and 1 $\alpha$ -hydroxylase in adipose tissue, and a decrease in hepatic 25-hydroxylation. The aim of this study is to evaluate the relationship between vitamin D level and weight loss in patients after Laparoscopic sleeve gastrectomy, a Bariatric Surgery.

**Methods:** The files of all patients who had bariatric surgery between January 2017 and January 2021 were reviewed. All patients who underwent sleeve gastrectomy were retrospectively evaluated for weight loss and Vitamin D levels in the specified time period. We see very good results in 6 months, maximum excess weight loss in one year, lower weight loss between one year and three years.

**Results:** Eighty-five patients who managed to be evaluated for weight loss at 6 months, 1 year, and 3 years after surgery during the analyzed period were included in the study. Of 85 patients, 65 (77%) were female, 20 (23%) were male, and the mean age was 43 (27-51 years). The mean preoperative BMI was 46.7 kg/m<sup>2</sup> (range 44.6-57.4).

**Conclusion:** Despite the increase in vitamin D levels due to weight loss in the early period in patients who have undergone bariatric surgery, patients need vitamin D support after a certain period of time. The effect of this vitamin D supplement on weight loss is not clearly understood. Double-blind randomized clinical studies are needed to obtain clearer results.

**Keywords:** Sleeve gastrectomy, vitamin D level, obesity

## INTRODUCTION

Obesity is associated with various comorbidities in addition to increased mortality. Indeed, a modest 3-5% weight loss results in an improvement in various health outcomes.<sup>1</sup> Various treatment options are currently available for weight management, including surgical and non-surgical approaches.<sup>2</sup> Weight loss varies widely between interventions and is highest following bariatric surgery.<sup>1</sup> Body mass index, and particularly fat mass, is a known determinant of Vitamin D deficiency is common in individuals with obesity.<sup>2</sup> Such a deficiency is multifactorial. Low vitamin intake and supplements, poor dietary habits and low sun exposure are important risk factors. In addition, changes in the activity and expression of enzymatic pathways involved in vitamin D metabolism have been observed, including a decrease in the expression of hydroxylation enzymes, namely 25-hydroxylase and 1 $\alpha$ -hydroxylase in adipose tissue, and a decrease in hepatic 25-hydroxylation.<sup>2</sup>


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It has been noticed that individuals with obesity have an increased risk of D hypovitaminosis.<sup>2</sup> Recommended doses of vitamin D in obese patients are also higher than those for the general healthy adult population.<sup>2,4</sup> The target 25(OH)D level in the general healthy population is a matter of debate and a range of 20-40 ng/ml has been suggested. In a recent review by experts, the target level in obese individuals could not be defined. Although there are no specific guidelines on vitamin D supplementation in obese patients, various guidelines on medical weight loss and perioperative care of patients after bariatric surgery have recommended doses of vitamin D ranging from 3000 IU/d to 50,000 IU 1-3 times per week.<sup>4</sup>

Laparoscopic sleeve gastrectomy has an important role in bariatric surgery.<sup>1</sup> Evidence for the efficacy and safety of laparoscopic sleeve gastrectomy as an independent bariatric surgical procedure is based on data from large case series.<sup>3</sup> Observational evidence indicates that laparoscopic sleeve gastrectomy has better outcomes in terms of morbidity and efficiency between laparoscopic adjustable gastric banding and laparoscopic Roux-en-Y gastric bypass.<sup>5</sup> Numerous systematic reviews have investigated various aspects of the efficacy of Laparoscopic sleeve gastrectomy in obese patients and support the efficacy of this technique in the treatment of type 2 diabetes mellitus.<sup>1</sup> To evaluate the safety, efficacy of laparoscopic sleeve gastrectomy, weight loss, comorbidity and efficacy of management of patients with T2DM.<sup>1,3,5,6,7</sup>

The aim of this study is to evaluate the relationship between vitamin D level and weight loss in patients after Laparoscopic sleeve gastrectomy, a Bariatric Surgery.

## METHODS

The files of all patients who had bariatric surgery between January 2017 and January 2021 were reviewed. All patients who underwent sleeve gastrectomy were retrospectively evaluated for weight loss and Vitamin D levels in the specified time period.

Patients who initially underwent another treatment or surgical procedure for obesity were excluded from the study.

Laparoscopic sleeve gastrectomy patients who needed any reoperation to correct postoperative early or late complications (bleeding or sepsis) such as obstruction and GERD were excluded from the study.

Preoperative evaluation data including age, gender, preoperative BMI and postoperative weight, BMI, and evolution of comorbidities 6 months, 1 year, and 3 years after LSG were analyzed.

## RESULTS

Eighty-five patients who managed to be evaluated for weight loss at 6 months, 1 year, and 3 years after surgery during the analyzed period were included in the study. Of 85 patients, 65 (77%) were female, 20 (23%) were male, and the mean age was 43 (27-51 years).

The mean preoperative BMI was 46.7 kg/m<sup>2</sup> (range 44.6-57.4). Patients with persistent comorbidities such as hypertension, type II diabetes, dyslipidemia and sleep apnea prior to treatment are shown in table 1.

Laparoscopic sleeve gastrectomy was performed in all patients with the laparoscopic approach without converting

to open surgery and without intraoperative complications. No mortality was encountered.

No patient was lost for follow-up, but phone calls were made in 35 patients (41.1%) for 3-year postoperative evaluation. Demographic data, perioperative vit D level, BMI, 6 months, 1 year and 3 years after laparoscopic sleeve gastrectomy are summarized.

Table 1: Demographic details.

Sex, n(%)	
Male, n (%)	20 (23.0)
Female, n (%)	65(77.0)
Age (year)	43 ± 11
Body weight (kg)	129.2 ± 12.3
BMI (kg/m <sup>2</sup> )	46.7 (44.6; 57.4)
Obesity classes, I/II/IIIa	1.03.1943
Comorbidities, n (%)	
Hypertension	28 (32,9)
Diabetes mellitus	14 (16,4)
Arthrosis	3 (3,5)
Depression	5(5,8)
Obstructive sleep apnea	27(31,7)
Degenerative alterations	37 (43,5)
25- Hydroxycholecalciferol(nmol/l)	60 ± 3
Parathyroid hormone (pmol/l)	4.1 ± 0.3
Albumin (g/l)	3,7 ± 1
Calcium (mmol/l)	9.14 ± 0.71
Magnesium (mmol/l)	0.81 ± 0.01
Alkaline phosphatase (U/l)	77 ± 3

We see very good results in 6 months, maximum excess weight loss in one year, lower weight loss between one year and three years.

## DISCUSSION

Weight loss reduces fat mass and may result in a spontaneous increase in 25(OH)D concentration secondary to the release of vitamin D sequestered in adipose tissue. Many weight loss studies have shown an improvement in vitamin D status in linear increments parallel to weight loss; A clinically significant increase in vit D concentration has been demonstrated at ≥10% weight loss.<sup>2</sup>

For this reason, some researchers have argued that to improve results, focus should be on weight loss rather than vitamin D supplementation. Parallel to this progress has been found to be insufficient for weight control and supplementation with vitamin D to be beneficial for some.<sup>2,4,8</sup> A previous systematic review of observational studies evaluating vitamin D status before and after bariatric surgery showed that the 25(OH)D concentration remained b30 ng/ml in most studies despite supplementation at various doses.<sup>2,4</sup> Results in a significant weight loss of 15-35%, lasting between 5 and 10 years, depending on the surgical

procedure. However, in addition to weight loss, there are various surgery-specific changes, including anatomy and physiology, in the gastrointestinal tract, and hence digestive upset, changes in secretion of incretins, and malabsorption, all of which contribute to vitamin D deficiency. Accordingly, vitamin D replacement is required after bariatric surgery. The effect of vitamin D on weight loss is limited. In our study, there was no correlation between preoperative vitamin D level and weight loss.

## CONCLUSION

Despite the increase in vitamin D levels due to weight loss in the early period in patients who have undergone bariatric surgery, patients need vitamin D support after a certain period of time. The effect of this vitamin D supplement on weight loss is not clearly understood. Double-blind randomized clinical studies are needed to obtain clearer results.

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