

## Adipose Tissue, Appetite, and Obesity INTEGRATED PHYSIOLOGY OF OBESITY AND METABOLIC DISEASE

### *Greater Adherence to Treatment After Bariatric Surgery by the Implementation of a Standardized Protocol for Delivering Care*

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Bariatric surgery reference centers adopt different protocols of postoperative care including vitamins and minerals supplementation, since there is no consensus in the literature supporting the best approach. We sought to assess the impact of implementing a standardized postoperative care protocol on the adherence to a multidisciplinary team follow-up and the use of vitamin and mineral supplementation for one year after bariatric surgery in a tertiary care public hospital. This study compared a retrospective cohort of patients [n=70; usual care (UC)] who had undergone Roux-en-Y gastric bypass (RYGB) between April 2017 and April 2018 with a prospective cohort of patients [n=64; standardized postoperative protocol (SPP)] who had undergone RYGB between May 2018 and May 2019. The protocol included (1) a pre-scheduled calendar for one-year appointments with surgeons, nutritionists, and endocrinologists, (2) a systematic follow-up through phone calls by a trained nurse, (3) a standardized vitamins/minerals supplementation during one year, and (4) pre-scheduled laboratory assessment. The initial approach started in the day after the surgery, when the nurse explained post-operative procedures and delivered printed material with the information and schedules. Patients received a standard supplementation free of charge (daily multivitamins with minerals, calcium carbonate 1,500 mg/day, vitamin D 20,000 IU/week, and 5,000 µg of intramuscular vitamin B12 if serum levels were lower than 400 pg/mL). This study was approved by the local Ethics Committee (2018-0183). Among the 134 patients, 86.7% were women, 42.4 ± 10.1 years-old, with preoperative body mass index of 48.5 ± 8.2 kg/m<sup>2</sup>. Adherence to the postoperative care (multidisciplinary team follow-up and laboratory analyses) was 96.9% in the SPP and 81.7% in the UC (p = .003). The SPP attended a greater number of appointments (11 ± 2 vs. 7 ± 2, p < .001), showed a lower prevalence of suboptimal vitamin B12 at 3 months (18.7% vs. 39.5%, p = .03), and had a higher serum vitamin D levels at 3, 6, and 12 months (p < .001). Prevalence of vitamin D deficiency (lower than 20 ng/mL) one year after surgery was 1.6% vs. 24.3% (p < .001) in the SPP and UC, respectively. Only 18.3%, 26.8% and 41% of patients were using vitamin D supplements in the UC after 3, 6 and 12 months, respectively. We conclude that the proposed standardized protocol led to a greater adherence to the postoperative bariatric surgery care, adding attendance to appointments and reducing the incidence of vitamin deficiencies. Further cost-effectiveness analysis may be needed to evaluate properly the implementation

feasibility of the protocol in other centers. **Financial support:** CNPq, CAPES, FIPE (HCPA)

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### *Gut Microbiome and Intestinal Permeability Are Promising Targets for Treating Nonalcoholic Fatty Liver Disease*

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**Background:** Nonalcoholic fatty liver disease (NAFLD) is a leading liver disease worldwide with a prevalence of approximately 24% among adult population. It is a spectrum of liver disorders ranging from simple steatosis to nonalcoholic steatohepatitis (NASH). Obesity, insulin resistance, inflammation, disrupted gut microbiome (dysbiosis), and increased intestinal permeability (“leaky gut”) are important risk factors associated with and/or contributing to NAFLD. In the absence of specific drugs to treat NAFLD, management relies mainly on lifestyle changes (diet and exercise). Gut microbiome and intestinal permeability are becoming promising targets for the treatment of several diseases including NAFLD. **Methods:** A systematic search of literature was conducted using the search terms nonalcoholic fatty liver disease, obesity, insulin resistance, inflammation, gut microbiome, intestinal permeability, and targeted therapy. **Results:** Several clinical studies have shown the association of qualitative and quantitative changes in gut microbiome (e.g., increased *Lactobacillus* and Gram-negative bacteria) with NAFLD and its severity. The increased gut microbiome taxa may produce more short-chain fatty acids (SCFAs), alcohol, and lipopolysaccharides (LPS). Increased SCFAs, alcohol, and LPS (endotoxins) associated with increased intestinal permeability are implicated in the pathogenesis of NAFLD and its evolution to NASH (promotion of obesity and inflammation). Gut microbiome and intestinal permeability can be modified with diet, prebiotics, probiotics, synbiotics, and fecal microbiota transplantation. A high-fiber diet for 6 months in NAFLD subjects caused a decrease in intestinal permeability (as assessed by serum zonulin) and a reduction of liver enzymes and fatty liver. Treatment with a prebiotic (oligofructose) for 8 weeks in NASH subjects showed a significant decrease in markers of liver inflammation. Administration of probiotics (e.g., *Lactobacillus*, *Bifidobacterium*, and VSL#3) for 8 to 16 weeks in NAFLD subjects had several beneficial effects including reduction of liver enzymes and fatty liver. Clinical studies using fecal microbiota transplantation in NAFLD subjects are currently ongoing. To optimize the efficacy of therapies using prebiotics, probiotics, synbiotics, and fecal microbiota transplantation in NAFLD subjects, focus should be on the altered gut microbiome taxa responsible for high SCFAs, alcohol, and LPS production. **Conclusion:** NAFLD is the most common chronic liver disease. NAFLD subjects have disrupted gut microbiome associated with increased intestinal permeability. In addition to weight loss (when excess body weight is present), targeting gut microbiome and intestinal permeability with diet, prebiotics, probiotics,