

## Original Article

# Does omeprazole cause functional hypoparathyroidism?

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### Abstract

Proton pump inhibitors are widely used worldwide and are misused classes of drugs, especially in developing countries. Several case reports, case series, and review studies suggest proton pump inhibitors may cause hypomagnesemia hypoparathyroidism. Therefore, the goal of this case-control study is to determine whether there is a link between omeprazole and functional hypoparathyroidism, and this case-control study is the first study on animal models regarding this project. Twenty mature male rabbits were randomly divided into two groups (10 rabbits/group); Group 1 – the control group, was given distilled water (1ml/kg/day for 45 days) via intraperitoneal (I/P) injection and Group 2 – treated with omeprazole (PPI) (1 ml/kg/day for 45 days) I/P injection to induce hypoparathyroidism. The serum used in the PTH and electrolyte studies was obtained from blood samples taken through cardiac puncture. The results show a significant decrease in PTH, Mg<sup>2+</sup> and Ca<sup>2+</sup> concentration in the treated group compared to the control group. Omeprazole (PPI) induced hypomagnesemia, a potential cause for functional hypoparathyroidism.

**Keywords:** hypomagnesemia, hypoparathyroidism, proton pump inhibitor (PPI), parathyroid hormone resistance.

### Introduction

Hypoparathyroidism is defined as a deficiency or absence of parathyroid hormone secretion [1]. Resorption of soluble calcium by the skeleton slows down and the osteoclasts go into near-total hibernation when parathyroid glands do not release enough parathyroid hormone (PTH). As a result, there is less calcium in the blood and other bodily fluids because calcium reabsorption from the bones is greatly reduced [2]. The blood calcium level lowers from 9.4 mg/dl to 6 or 7 mg/dl within 2 to 3 days after parathyroid gland removal, while the blood phosphate concentration may quadruple during this time. In the event that calcium levels drop to this, tetany symptoms appear. The laryngeal muscles are particularly susceptible to tetanic spasms. This muscular spasm obstructs breathing and is the typical cause of mortality in tetany in the absence of adequate therapy [3].

Peptic ulcer disease, gastroesophageal reflux disease, and conditions associated with increased gastric acid secretion are all treated with Proton pump inhibitors (PPIs) (e.g., omeprazole) and PPIs are also used to prevent gastric ulcers in patients who need to take nonsteroidal anti-inflammatory drugs or corticosteroids for extended periods of time [4]. PPIs work by inhibiting the gastric H<sup>+</sup>/K<sup>+</sup>-ATPase by binding to cysteine residues in the proton pump, hence decreasing acid production in the stomach [5]. However, the recommended treatment period for acute gastric and duodenal ulcers is 4 to 8 weeks. A 2–3 week treatment sessions per year are the maximum the U.S. Food and Drug Administration (FDA) recommends [6].

Growing evidence suggests that PPIs, especially when used for longer periods of time, may have a role in the onset of hypomagnesemia hypoparathyroidism [7]. In 2006, the first cases of hypomagnesemia hypoparathyroidism caused by proton pump inhibitors

