

# Social Media Trends, Dry Scooping, and Extensive Esophageal Ulcerations



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## ABSTRACT

We describe a case of severe odynophagia and dysphagia caused by *dry scooping* of multi-ingredient pre-workout powder (MIPS) with diffuse esophageal ulcerations on upper endoscopy. Dry scooping refers to ingesting workout supplements without the recommended doses of solvent. This trend has been the subject of TikTok and other social media sites aimed at enhancing workout performance. While caustic ingestions leading to esophageal ulcers and strictures are well known, *dry scooping* ingestion of pre-workout powder as an etiology has not been described. Though caffeine may be the predominant content in such powders, the exact composition and ratios of other constituents, including amino acids, are less clear. Complete abstinence from ingestion of the pre-workout formulation and the use of a proton pump inhibitor therapy led to significant clinical and endoscopic recovery over a 4-week period. A thorough history of ingestions, including supplements, is critical when unraveling emerging etiologies of esophageal ulcerations.

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## INTRODUCTION

Over the past few years, *dry scooping* of multi-ingredient pre-workout supplements (MIPS) has gained traction on social media platforms such as TikTok. MIPS are a popular class of dietary supplements used by athletes, body builders, and fitness enthusiasts. It is rich in caffeine and other ingredients that may elicit a synergistic effect by increasing energy levels and exercise performance of the user.<sup>1</sup> Pre-workout powder is the second most consumed supplement after multivitamins, with 30% of young adults reporting regular usage.<sup>2</sup> Typically, MIPS is ingested as intended by the manufacturer: a scoop or two of powder is dissolved in water or other solvents and consumed as a beverage. Dry scooping refers to the act of swallowing a scoop of dry pre-workout powder, usually with a small sip of water, before exercising. The trend has

become a part of pop culture, especially in the world of fitness. Dry scooping is perceived as an exciting way to “jump-start” a workout and is a practice not dissimilar to smelling salts. There are numerous news reports of adverse reactions from dry scooping, most describing the overconsumption of pre-workout powder and its cardiovascular effects primarily linked to caffeine content. There is very little scientific literature published about the harmful effects of dry scooping itself and none describing dry scooping as a cause of esophageal mucosal injury. We report the practice of *dry scooping* as the etiology of dysphagia and odynophagia with extensive esophageal ulcerations in this case.

## CASE REPORT

A 22-year-old male with no medical history presented to the emergency department with a 4-day history of fevers, dysphagia, and odynophagia which progressively prevented intake of both solids and liquids. He denied the sensation of food getting stuck in his throat. He reported associated shortness of breath with retrosternal pleuritic chest pain. A full review of systems was negative for nausea, vomiting, hematemesis, melena, or weight loss. He denied use of non-steroidal agents, illicit drugs, and tobacco products. On exam, he appeared non-toxic. Copious amounts of sputum were noted in a bedside cup. He had a fever of 101°F. There was no thrush or cervical lymphadenopathy. Other than transient tachycardia at 110 bpm, his blood pressure, oxygen saturation on room air, and cardiopulmonary exam were normal. The rest of the exam was unremarkable. The EKG revealed sinus tachycardia. Labs included a creatinine of 1.5 mg/dL (baseline 1.3 mg/dL) and a D-dimer of 595 ng/mL FEU. CT angiogram of the chest prompted by pleuritic chest pain showed no evidence of pulmonary embolism but noted abnormal circumferential distal esophageal thickening (Fig. 1). An esophageal gastroduodenoscopy was performed and revealed severe punctate esophageal ulcerations, linear ulcers, and scattered linear gastric erosions (Fig. 2a, b). HIV, CMV, and HSV tested negative. The fevers subsided spontaneously, and the tachycardia and elevated creatinine normalized with IV hydration.

Upon further questioning, it was discovered that the patient was a competitive weightlifter and often ingested MIPS. In the weeks leading up to his admission, he had run out of the solvent he normally used to dissolve the powder

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**Figure 1** Abdominal window of CT chest angiogram with contrast showing distal esophageal thickening as indicated by an arrow.

and had begun “dry scooping.” The patient explained that he put a dry scoop of powder (8 g per scoop) directly into his mouth and would swallow it with a sip of water. The patient noted that the powder was not completely dissolved when swallowing, and pockets of dry powder were ingested. He did this 30 min before exercising 3–4 times per week for 2 weeks prior to admission. The powder he reported using had ingredients that included caffeine, L-citrulline,

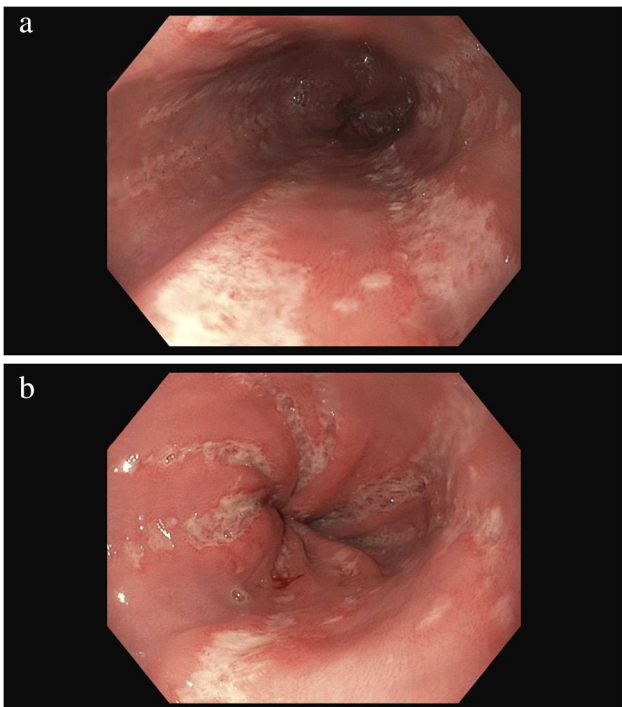
beta-alanine, malic acid, sodium citrate, citric acid, and tartaric acid. It was concluded that “dry scooping” resulted in esophageal mucosal injury including extensive ulceration.

The pathology demonstrated moderate to severe chronic inflammation of squamous mucosa with basal cell hyperplasia, focally increased intraepithelial eosinophils (up to 15 cells/hpf), and superficial erosions with fibrinous exudate on the surface. There was no evidence of Barrett’s esophagus. These findings represent damage to the esophageal mucosa from “dry scooping” of pre-workout powder. Counseling against this increasingly popular practice was provided. The patient was started on a proton pump inhibitor and continued for 8 weeks with progressive symptomatic and endoscopic improvement seen approximately 4 weeks after initiating therapy.

## DISCUSSION

Esophageal ulcers, defined as discrete breaks within the esophageal mucosa with clearly circumscribed margins, can be a cause of upper gastrointestinal symptoms such as nausea, vomiting, dysphagia, and odynophagia. The prevalence of esophageal ulcers in patients undergoing endoscopy has been shown to range anywhere between 0.5 and 4%.<sup>3</sup> A wide range of etiologies have been identified for esophageal ulcers utilizing endoscopic, clinical, and pathologic findings. The most common causes are typically due to gastroesophageal reflux disease and the use of non-steroidal anti-inflammatory drugs; however, other causes include malignancies, pill esophagitis, radiation, and infections such as CMV, HSV, and HIV.<sup>3</sup> Caustic ingestions are also an important etiologic agent of esophageal and gastric injury and remain a public health concern. While most of such ingestions are accidental or with suicidal intentionality based on bimodal age representation, the role of poorly regulated constituents in MIPS and their propensity to induce caustic injury is unknown.<sup>4,5</sup> Identifying the etiology of ulceration is important as it influences the choice of treatment and outcome. Complications of esophageal ulcers are typically rare but can include strictures, hemorrhage, or perforation.<sup>6</sup>

Endoscopic evaluation is the gold standard for diagnostic and therapeutic interventions of esophageal ulcerations. Multiple studies have described patterns of findings seen with esophageal ulcers. GERD-induced esophageal ulcers usually involve esophagitis located distally in the esophagus at the squamocolumnar junction, whereas NSAID-induced ulcerations are typically large, shallow, and discrete lesions.<sup>6</sup> Many drugs have been implicated in pill esophagitis to varying degrees, including tetracyclines, potassium, bisphosphonates, and NSAIDs. Typical endoscopic findings seen with pill esophagitis include esophageal mucosal erythema and erosion, ulcers with and without bleeding, coating with drug material, strictures, and kissing ulcers.<sup>9</sup> Most ulcers due to pill ingestion are located in the mid-esophagus.<sup>10</sup>



**Figure 2** a Multiple columns of linear esophageal ulcerations appreciated in the distal esophagus. b Deeper ulcerations visualized as the endoscope advanced distally toward the GE junction.

To the best of our knowledge, there have been no previously reported cases of esophageal ulcerations caused by “dry scooping,” or the ingestion of MIPS with a small amount of water. Pre-workout powders include a combination of amino acids, electrolytes, and high levels of caffeine. The MIPS powder used in this case included L-citrulline, beta-alanine, arginine, L-tyrosine, taurine, alpha-GPC, and caffeine in large amounts. While the exact ingredient in MIPS responsible for the ulcerations is unknown, caffeine in dry powder form is a likely culprit given previous reports of caffeine-induced injury.<sup>7,8</sup> There is no current literature outlining the amount of caffeine that may cause ulcerations; however, reports have described cases of acute ingestion of caffeine tablets with suicidal intent, leading to severe erosive esophagitis and diffuse esophageal ulcers.<sup>7,8</sup> The exact mechanism by which caffeine tablets cause mucosal injury is unclear. Patient-related factors such as the lack of an adequate volume of water used for the ingestion of the pills are thought to be a contributing factor, as this can lead to increased esophageal transit time. Similarly, dry scooping may lead to prolonged contact between the esophageal lumen and the pre-workout powder, promoting mucosal injury and ulceration. In the above case, direct endoscopic visualization and pathology findings supported this correlation with numerous punctate ulcerations in the proximal esophagus and severe deep linear ulcerations throughout the mid-distal esophagus. Treatment consisted of discontinuation of the offending agent and a course of proton pump inhibitor therapy, which eventually led to symptomatic and endoscopic improvement.

In conclusion, meticulous history taking is important in the initial assessment of patients presenting with upper gastrointestinal symptoms to evaluate for possible caustic ingestion. Esophageal gastroduodenoscopy is essential to exclude other diagnoses and to assess the extent of injury and its potential complications. Dry scooping is a common practice known to most weightlifters. However, it is a relatively unknown cause of esophageal ulcers and further research is

needed to identify injury-provoking ingredients in MIPS and their mechanisms in ulcer formation. Long-term follow-up on this population of users and its association with this and other esophageal pathologies should be conducted.

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**Declarations:**

**Conflict of Interest:** The authors declare that they do not have a conflict of interest.

## REFERENCES

1. Martinez N, Campbell B, Franek M, Buchanan L, Colquhoun R. The effect of acute pre-workout supplementation on power and strength performance. *J Int Soc Sports Nutr.* 2016;13:29.
2. Hoffman JR, Kang J, Ratamess NA, Hoffman MW, Tranchina CP, Faigenbaum AD. Examination of a pre-exercise, high energy supplement on exercise performance. *J Int Soc Sports Nutr.* 2009;6:2.
3. Cohen, D L et al. (2021) Real world management of esophageal ulcers: analysis of their presentation, etiology, and outcomes. *Acta Gastroenterologica Belgica* 84(3): 417-422
4. De Lusong MAA, Timbol ABG, Tuazon DJS. Management of esophageal caustic injury. *World J Gastrointest Pharmacol Ther.* 2017;8(2):90-98.
5. Ramasamy K, Gumaste VV. Corrosive ingestion in adults. *J Clin Gastroenterol.* 2003;37:119-124
6. Higuchi, D., Sugawa, C., Shah, S.H. *et al.* Etiology, treatment, and outcome of esophageal ulcers: a 10-year experience in an urban emergency hospital. *Journal of Gastrointestinal Surgery* 7, 836-842 (2003).
7. Arhinful JS, Arhinful B, Akins TA, Hossain S. Caffeine-induced severe erosive esophagitis. *Cureus.* 2021;13(7):e16253.
8. Miyata J, Ito Y, Ito S. Pill-Induced Esophagitis Caused by Ingesting Excessive Caffeine Tablets. *Clin J Gastroenterol.* 2020;13(3):334-339. doi: <https://doi.org/10.1007/s12328-019-01055-w>.
9. Kim, Su Hwan et al. (2014) Clinical and endoscopic characteristics of drug-induced esophagitis. *World Journal of Gastroenterology* 20(31): 10994-9.
10. Dağ, Muhammed Sait et al. (2014) Drug-induced esophageal ulcers: case series and the review of the literature. *The Turkish Journal of Gastroenterology: the official journal of Turkish Society of Gastroenterology* 25(2): 180-4.

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