

Article

Improvement of Bacterial Vaginosis by Oral *Lactobacillus* Supplement: A Randomized, Double-Blinded Trial

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Featured Application: VGA-1, a combination formula of GMNL *Lactobacillus* strains, shows improvement effects in bacterial vaginosis (BV) patients and it can potentially be used for BV intervention as a single agent or in combination with the current antibiotics.

Abstract: Bacterial vaginosis (BV) is the most common vaginal infection globally, with a high recurrent rate after antibiotic treatment. Probiotics consumption is known to improve BV with different efficacy among species or strains. After in vitro selection of *Lactobacillus* strains with growth inhibition and preventing adhesion to HeLa cervical epithelial cells, a randomized and double-blinded trial of two *Lactobacillus* formula, namely, VGA-1 and VGA-2, in BV patients with Nugent scores of 4–10 was conducted. Among 37 subjects who completed the trial, we observed significantly decreased Nugent scores in both VGA-1 ($n = 18$) and VGA-2 ($n = 19$) consumption groups. VGA-1 consumption significantly improved vaginal discharge odor/color and itching at both 2-week and 4-week-consumption, but those only observed after a 4-week-consumption in the VGA-2 group. We also observed a tendency to reduce recurrent rates among enrolled participants after VGA-1 or VGA-2 consumption. The improvement effect of VGA-1/VGA-2 was associated with the significant reduction of interleukin-6 expression after 4-week-consumption and the restoration of normal vaginal microflora by quantitative polymerase chain reaction analysis. In conclusion, VGA-1 or VGA-2 displayed beneficial effects in BV patients, but the VGA-1 formula showed a better efficacy, potentially used for BV intervention.

Keywords: bacterial vaginosis; *Lactobacillus*; probiotics



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1. Introduction

Bacterial vaginosis (BV) is the most common vaginal infection in adult women of reproductive age, with an incidence rate of 15% to 50% [1]. Half of BV patients show no symptom; clinical symptoms of BV include a burning feeling during urination, itching around the outside of the vagina, and an increased vaginal pH (>4.5), abnormal color of vaginal discharge, and an unpleasant fishy odor [2]. The most widely used laboratory examination of BV is the Nugent scoring system (0 to 10), which is a Gram stain test for vaginal smears. Scores of 0 to 3, 4 to 6, or 7 to 10 are considered negative, intermediate, or indicative of BV, respectively [3]. The untreated BV increases the risk for infections of human immunodeficiency virus [4] or human papilloma virus infection [5], higher rates of