Effects Of KM2-HPB01 Consumption And Training Program For 8 Weeks On Muscular Maximum Strength And Running Endurance

Dae Taek Lee[1, *], Moon-Hee Sung[2], Jihwan Park[1], Somang Son[1], Jooyoung Lee[1], Jaeyeop Lee[1], Haryeong Lee[1], Mi-Sun Kwak[2], Ye-Jin Jeong[2], Ji-Eun Kim[2]

[1]Exercise Physiology Lab., Kookmin Univ., Seoul, Korea, [2]R&D Center, KookminBio Corporation, Seoul, Korea

* dtlee@kookmin.ac.kr

ABSTRACT

PURPOSE KM2-HPB01 is a heat-treated lyophilized powder obtained by culturing *Lactiplantibacillus plantarum* KM2. We examined the effects of KM2-HPB01 consumption and a combined exercise program for 8 weeks on muscular strength and running performance.

METHODS A randomized, double-blind, placebo-controlled trial is adopted. Twenty-nine healthy men are randomly assigned either one of two groups; control (CON, n=13, 24.5±2.3 yrs, 173.3±6.1 cm, 75.6±10.2 kg, 25.1±2.6 kg/m^2, 19.4±5.8 %fat) or experimental (EX, n=16, 24.4±3.2 yrs, 178.2±5.9 cm, 75.1±8.7 kg, 23.6±2.0 kg/m^2, 15.9±4.9 %fat). Participants in EX are administered with KM2-HPB01 (twice a day, 4.5 gram each) while CON with placebo for 8 weeks. All participated in a 8-week training program consisted of resistance training (7 types of exercise, 8-12 reps for 3 sets for 60-min per session) once a week and 60-min treadmill running (at intensity ranged 60-65 % of maximal aerobic capacity (VO_2max)) twice a week. Before and after training, physical characteristics, muscular strength (1-repetition maximum (1RM) of bench press, squat, and deadlift) and running performance (running time during VO_2max test) are examined.

RESULTS Physical characteristics including muscle mass, fat mass, and circumference (upper arm, waist, hip, and thigh) are not different between groups at both before and after the program. 1RM of squat and bench press are increased after program, but no group difference is noticed (ANOVA, p>0.05). 1RM of deadlift increases from 115.0±20.3 to 126.0±16.7 kg in EX after program, but not in CON (from 116.5±17.2 to 119.2±15.9 kg), and group difference is noticed after program (ANOVA, p<0.05). VO_2max after program is not changed in both groups, but the running time after program increases greater (t-test, p<0.05) in EX (from 751.1±64.2 to 818.4±62.8 sec) than CON (from 774.6±70.5 to 815.1±70.0 sec).

CONCLUSIONS KM2-HPB01 clearly demonstrates its effect on an enhancement of both muscular maximum strength and running endurance. This substance can be a potential candidate for enhancing both anaerobic and aerobic exercise capacity.

INTRODUCTION & PURPOSE

- Exercise performance is influenced by both non-modifiable factors (e.g., sex, age) and modifiable factors (e.g., diet, exercise, training). Recent reviews suggest that athletes may have distinct gut microbiota and that exercise variables such as intensity and duration are associated with microbial composition (Clauss et al., 2021; Mohr et al., 2020). However, Gross et al. (2024) found that supplementation with Veillonella atypica FB0054 did not significantly affect performance or blood lactate levels.
- Exercise may alter gut microbiota in ways that enhance performance, potentially mediated by short-chain fatty acids (SCFAs), with probiotics proposed to amplify these adaptations (Clauss et al., 2021; Framton et al., 2020). Nevertheless, direct evidence linking gut microbiota changes to improved exercise performance remains limited. KM2-HPB01 is a heat-treated lyophilized powder obtained by culturing *Lactiplantibacillus plantarum* KM2 (Won et al., 2024). It is postbiotics-based health functional ingredient being developed by KookminBio Corporation.
- We examined the effects of KM2-HPB01 consumption and a combined exercise program for 8 weeks on muscular strength and running performance.

METHODS

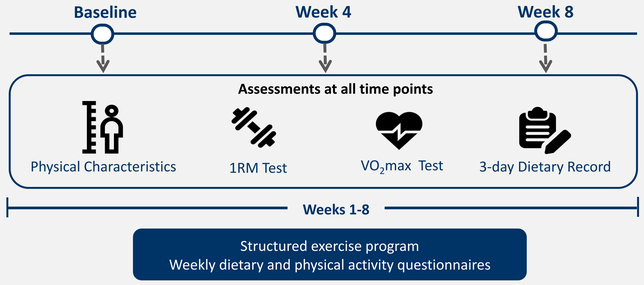
Table 1. Characteristics of the Participants (M±SD)

	Age (yrs)	Height (cm)	Weight (kg)	BMI (kg/m^2)
CON (n=13)	24.54 ± 2.33	173.29 ± 6.12	75.57 ± 10.20	25.10 ± 2.57
EX (n=16)	24.56 ± 3.12	178.24 ± 5.94	75.14 ± 8.69	23.60 ± 1.96



Figure 1. KM2-HPB01 Supplement

STUDY TIMELINE



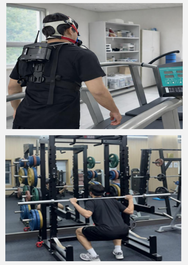


Figure 2. Experimental Timeline and Assessments

- Participants consumed the investigational food supplement KM2-HPB01 (or placebo) daily for 8 weeks in combination with a structured exercise program.
- Throughout the intervention period, participants were instructed to refrain from consuming other probiotic products, muscle-enhancing supplements or functional foods, antibiotics, and alcohol. This restriction was implemented to minimize potential confounding effects.
- Training intensity for all participants was individually prescribed based on baseline assessments. Specifically, aerobic exercise intensity was set based on VO_2max, and resistance training loads were set at 60-70% of 1RM.
- All assessments, including 1RM, VO_2max, and dietary intake records, were conducted at baseline, week 4, and week 8.

EXERCISE INTERVENTION

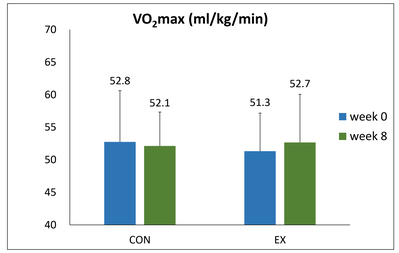
Table 2. Aerobic Training

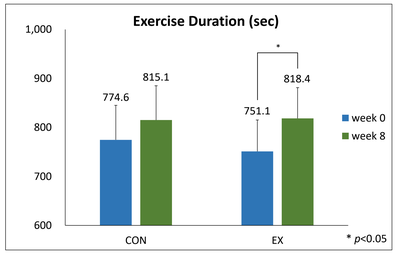
Period	Phase	Intensity (%HRR) & Duration				Duration
Weeks 1-5	1	40-49 % 10 min	50-59 % 20 min	70-79 % 20 min	50-59% 10 min	60 min
	2	40-49 % 5 min	50-59 % 5 min	70-79 % 30 min	50-59% 10 min	50 min
Weeks 6-8		40-49 % 10 min	50-59 % 10 min	70-79 % 30 min	50-59% 10 min	60 min

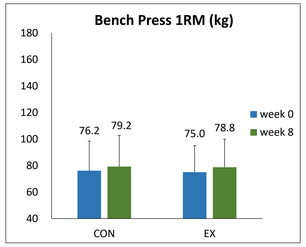
Table 3. Resistance Training

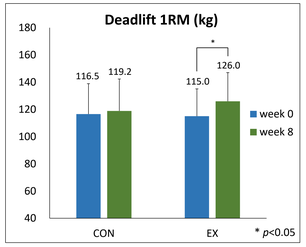
Body Region	Exercise Type	Repetitions / Sets	Duration
Upper body	Bench Press	8-12 reps 3 sets	60 min
	Chest Press		
	Lat. Pull Down		
	Shoulder Press		
Lower body	Squat or Deadlift		
	Leg Extension		

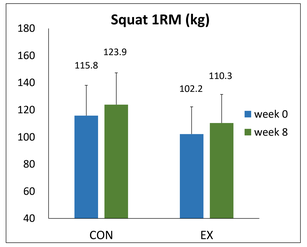
RESULTS











CONCLUSION

- KM2-HPB01 clearly demonstrates its effect on an enhancement of both muscular maximum strength and running endurance. This substance can be a potential candidate for enhancing both anaerobic and aerobic exercise capacity, which is presumed to be due to the enhancement of exercise tolerance derived from it.

REFERENCE

- Clauss et al. Interplay between exercise and gut microbiome in the context of human health and performance. Front Nutr. 2021 Jun 10:8:637010.
- Frampton et al. Short-chain fatty acids as potential regulators of skeletal muscle metabolism and function. Nat Metab. 2020 Sep;2(9):840-848.
- Gross et al. Impact of probiotic Veillonella atypica FB0054 supplementation on anaerobic capacity and lactate. iScience. 2023 Dec 8;27(1):108643.
- Mohr et al. The athletic gut microbiota. J Int Soc Sports Nutr. 2020 May 12;17(1):24.
- Won et al. Evaluation of the safety and impact of heat-treated Lactiplantibacillus plantarum KM2 fermentation on gut microbiome architecture. J Microbiol Biotechnol. 2024 Dec 27:35:e2411069.

ACKNOWLEDGEMENT

- This research was financially supported by the R&D Center of KookminBio Corporation (Seoul, Korea) through the project 'KL-Biome' (initiated in September 2023) for the development of innovative new drug and also health functional ingredient candidate.