A randomized, double-blind, placebo-controlled trial of four weeks of resistance training combined with Bang® Master Blaster™ supplementation on lean body mass, maximal strength, mircoRNA expression, and serum hormones

Neil A. Schwarz, Sarah K. McKinley-Barnard, and Zachary J. Blahnik

Department of Health, Kinesiology, and Sport
University of South Alabama, Mobile, AL, USA

UNIVERSITY OF SOUTH ALABAMA

UNIVERSITY OF SOUTH ALABAMA

Purpose

The purpose of this study was to determine if Bang® Master Blaster™ (BMB) in conjunction with resistance training increases lean body mass (LBM) and maximal strength more than resistance training while consuming a placebo (PLA; fibersol-2). Secondly, changes in hemodynamics, skeletal muscle microRNA (miR) expression (miR-15a, -16, -23a, -23b, and -126), and serum hormones (IGF-1 and brain-derived neurotrophic factor, BDNF) were investigated.

Methods

Participants

Sixteen recreationally-active men completed the study (BMB group: *n* = 8, age = 22.5 ± 2.9 years; height = 181.7 ± 9.2 cm; PLA group: *n* = 8, age = 22.5 ± 3.1 years; height = 175.3 ± 8.1 cm). Participants were familiarized to the study protocol via a verbal and written explanation outlining the study design and signed an informed consent document approved by the University IRB.

Study Design (Figure 1)

Participants completed a four-week periodized resistance training program consisting of two lower-body and two upper-body sessions per week. Each resistance exercise session was supervised by study personnel and consisted of seven exercises with 60 to 120 seconds rest between sets. Participants consumed one serving of BMB or placebo 30 to 45 minutes prior to exercise on training days and in the morning on non-training days. Hemodynamics, body composition, and maximal strength were assessed and blood and muscle samples were obtained before and after the resistance training program.

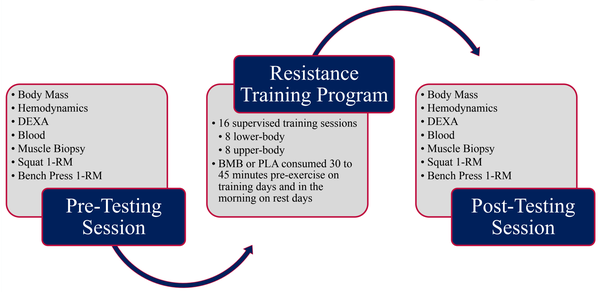

Figure 1. Overview of the study. Participants completed a 3-day diet recall and fasted for 10 hours prior to each testing session.

Statistical Analyses

Separate 2x2 (group x time) mixed-model ANOVA were run for each variable to determine the effect of each supplement over time. Post-hoc analyses were performed using one-way ANOVA.

Results

Hemodynamics and Diet Analysis

No significant changes were observed for dietary analyses or hemodynamics (Figure 2).

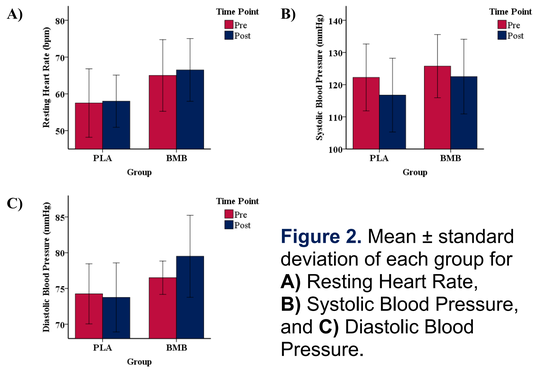

Figure 2. Mean ± standard deviation of each group for **A)** Resting Heart Rate, **B)** Systolic Blood Pressure, and **C)** Diastolic Blood Pressure.

Body Composition

An interaction between group and time was observed for total body mass (TBM). An greater increase ($p < .01$) in TBM was observed for the BMB group (3.19 ± 1.45 kg) compared with PLA (.44 ± 1.13 kg). No significant changes were observed for fat mass, or body fat %. A significant interaction between group and time was observed for LBM ($p < .01$). Post-hoc analyses revealed a greater increase ($p < .01$) in LBM for the BMB group (3.15 ± 1.61 kg) compared with PLA (.89 ± 1.24 kg; Figure 3).

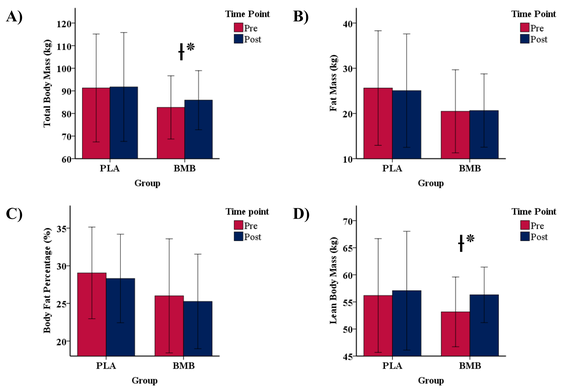

Figure 3. Mean ± standard deviation for each group and time point for **A)** Total Body Mass, **B)** Fat Mass, **C)** Body Fat %, and **D)** Lean Body Mass.*significant difference from Pre to Post; ŧsignificantly greater increase in BMB group compared with PLA

Results (cont.)

Maximal Strength

A significant interaction between group and time was observed for combined strength (squat + bench 1-RM; $p = .02$) and squat 1-RM ($p = .04$). Post-hoc analyses revealed a greater increase in combined strength for the BMB group (34.38 ± 15.10 vs. 18.75 ± 8.22 kg; $p = .03$). Additionally, a greater increase in squat 1-RM was observed for the BMB group (23.86 ± 8.50 vs.14.20 ± 8.57 kg; $p = .04$). Both groups increased bench press 1-RM over time ($p < .01$, with no difference between groups, although a trend was observed ($p = .08$; Figure 4).

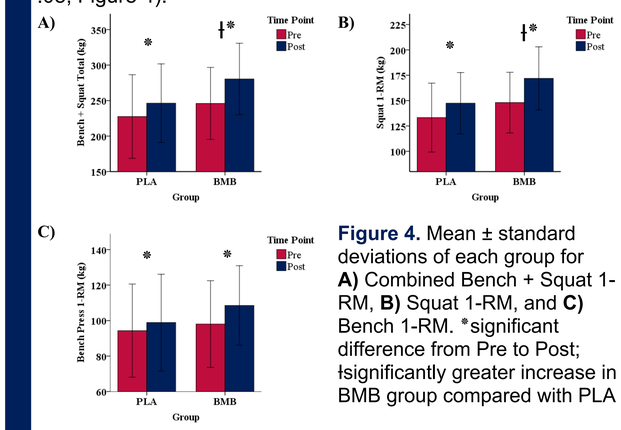

Figure 4. Mean ± standard deviations of each group for **A)** Combined Bench + Squat 1-RM, **B)** Squat 1-RM, and **C)** Bench 1-RM. *significant difference from Pre to Post; ŧsignificantly greater increase in BMB group compared with PLA

Serum Hormones and MicroRNA Expression

No significant changes were observed for serum IGF-1 or serum BDNF. No change was observed in miR-15a, -16, -23b, or -126 expression. MicroRNA-23a significantly increased as a result of resistance training ($p = .03$), without any difference between groups ($p > .05$).

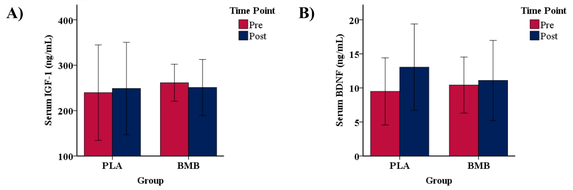

Figure 5. Mean ± standard deviations for each group and time point for **A)** Serum IGF-1 and **B)** Serum BDNF

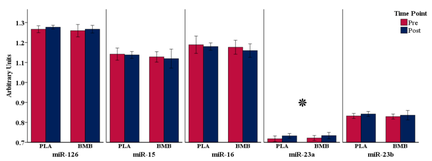

Figure 6. Mean ± standard deviation of miR expression at each time point for both groups.*significant difference between Pre and Post as a result of exercise.

Results (cont.)

Whole Blood and Clinical Chemistry Markers

An increase for time was observed for eosinophil count ($p = .047$), glucose ($p = .01$), and albumin ($p = .03$) with no difference between groups. A decrease in protein ($p = .02$) over time was observed with no difference between groups. An interaction between group and time was observed for white blood cell count ($p = .04$), platelet count ($p < .01$), lymphocyte count ($p < .01$), creatinine ($p < .01$), and calcium ($p = .03$). White blood cell count ($p = .04$), platelet count ($p = .05$), and lymphocyte count ($p = .01$) decreased in the PLA group over time. Lymphocyte count ($p = .05$) increased over time in the BMB group. Serum creatinine increased over time in the BMB group ($p < .01$), and was significantly higher in the BMB group at the post-test time point compared with PLA ($p < .01$). Calcium was higher in the PLA group ($p = .02$) than BMB group at the post-test time point. Although some statistical changes were observed, there is likely little, if any, clinical significance to these changes as the values were still well within the normal clinical reference range.

Table 1. Whole Blood and Clinical Chemistry Markers

Variable	Normal		PLA	BMB	Variable	Normal		PLA	BMB
WBC (10^3/µL)	3.4 - 10.8	Pre	5.4 ± .8	5.1 ± .7	Cr (mg/dL)	0.76 – 1.27	Pre	1.00 ± .08	1.10 ± .12
		Post	4.9 ± .7	5.5 ± .5			Post	1.00 ± .13	1.23 ± .15
RBC (10^6/µL)	4.14 – 5.80	Pre	5.1 ± .4	5.0 ± .3	Na (mmol/L)	136 – 144	Pre	143.8 ± 3.5	141.8 ± 2.9
		Post	5.2 ± .4	4.9 ± .4			Post	141.9 ± 1.3	141.0 ± 1.8
HB (g/dL)	12.6 – 17.7	Pre	14.7 ± 1.0	14.4 ± 1.0	K (mmol/L)	3.5 – 5.2	Pre	4.43 ± .31	4.49 ± .27
		Post	14.8 ± .8	14.3 ± 1.0			Post	4.44 ± .19	4.25 ± .33
HCT (%)	37.5 – 51.0	Pre	44.8 ± 2.5	43.4 ± 3.2	Cl (mmol/L)	96 – 106	Pre	101.1 ± 2.1	100.1 ± 2.1
		Post	45.5 ± .08	43.6 ± 3.0			Post	101.1 ± 1.8	101.3 ± 2.7
MCV (fL)	79 - 97	Pre	87.6 ± 3.1	87.5 ± 6.0	CO_2 (mmol/L)	18 – 29	Pre	22.1 ± 2.4	21.8 ± 2.1
		Post	88.1 ± 4.8	89.3 ± 3.7			Post	24.0 ± 2.6	23.0 ± 2.4
MCH (pg)	26.6 – 33.0	Pre	28.8 ± 1.5	29.0 ± 2.0	Ca (mg/dL)	8.7 – 10.2	Pre	9.5 ± .18	9.4 ± .41
		Post	28.5 ± 1.7	29.3 ± 2.0			Post	9.6 ± .13	9.2 ± .32
MCHC (g/dL)	31.5 – 35.7	Pre	32.9 ± .9	33.1 ± .8	Pro (g/dL)	6.0 – 8.5	Pre	7.20 ± .48	7.15 ± .39
		Post	32.6 ± 1.0	32.7 ± 1.4			Post	6.93 ± .14	6.93 ± .35
PLT (10^3/µL)	150 - 379	Pre	235.0 ± 45.2	241.9 ± 33.9	Alb (g/dL)	3.5 – 5.5	Pre	4.74 ± .30	4.69 ± .39
		Post	224.8 ± 37.3	254.4 ± 43.0			Post	4.61 ± .23	4.54 ± .43
NEU (10^3/µL)	1.4 – 7.0	Pre	2.7 ± .76	2.9 ± .51	Glob (g/dL)	1.5 – 4.5	Pre	2.46 ± .26	2.46 ± .14
		Post	2.4 ± .47	2.8 ± .62			Post	2.31 ± .22	2.39 ± .26
LYM (10^3/µL)	0.7 – 3.1	Pre	2.1 ± .45	1.6 ± .51	A/G	1.1 – 2.5	Pre	1.93 ± .21	1.91 ± .22
		Post	1.9 ± .39	1.9 ± .33			Post	2.03 ± .30	1.94 ± .34
MON (10^3/µL)	0.1 – 0.9	Pre	.48 ± .07	.41 ± .08	Bili (mg/dL)	0.0 – 1.2	Pre	.76 ± .52	.58 ± .21
		Post	.43 ± .13	.43 ± .05			Post	.86 ± .49	.46 ± .17
EOS (10^3/µL)	0.0 – 0.4	Pre	.13 ± .05	.16 ± .07	ALP (IU/L)	39 – 117	Pre	85.9 ± 17.4	77.4 ± 20.3
		Post	.14 ± .07	.25 ± .19			Post	85.3 ± 20.4	79.9 ± 20.9
BAS (10^3/µL)	0.0 – 0.2	Pre	.00 ± .00	.03 ± .05	AST (IU/L)	0 – 40	Pre	26.6 ± 7.2	32.4 ± 19.4
		Post	.01 ± .04	.03 ± .05			Post	26.9 ± 5.4	26.6 ± 7.8
Glu (mg/dL)	65 – 99	Pre	89.4 ± 6.6	85.6 ± 8.0	ALT (IU/L)	0 – 44	Pre	23.1 ± 9.9	32.5 ± 40.0
		Post	93.1 ± 9.7	92.8 ± 6.0			Post	23.4 ± 8.1	23.9 ± 9.2
BUN (mg/dL)	6 – 20	Pre	14.3 ± 4.7	15.8 ± 4.2					
		Post	13.3 ± 4.1	17.4 ± 5.3					

Conclusions

Bang® Pre-Workout Master Blaster™ combined with four weeks of resistance exercise preferentially increased lean body mass and maximal strength compared with resistance training combined with placebo without negatively affecting resting hemodynamics or whole blood and serum clinical safety markers. Serum IGF-1 and BDNF did not differ over time or by group. Additionally, skeletal muscle expression of miR-15a, -16, -23b, and -126 were unchanged. Conversely, resistance exercise significantly increased skeletal muscle miR-23a expression, an inhibitor of catabolic gene expression; thus, future research should further explore this finding as it relates to resistance exercise adaptation.

Disclosure of Funding Source

Vital Pharmaceuticals Inc. (VPX) provided Neil Schwarz the funding needed to conduct the study. The authors have no financial interests as a result of the outcome of this study.